

教育部全国高等学校

农业经济管理类专业教学指导委员会

农经教指委【2022】第3号

签发：唐忠

关于 2022 年度本科教学质量与教学改革工程 项目评审立项结果的通知

各位委员、各有关单位：

为全面落实教育部关于加强教改项目及课程思政建设，农经教指委本年度继续开展教学质量与教学改革工程项目，分一般项目和思政项目两类。经过农经教指委项目前期组织，截至 2022 年 8 月，本年度农经教指委本科教学质量与教学改革工程项目立项申报一般项目 54 项和思政项目 49 项。根据同单位回避原则，本教指委全体委员分为 6 组担任了两类项目立项的评审工作。各位评审委员对申报材料进行了认真评审、严格把关，按照同意票超过 2/3 的原则对项目进行立项，评审结果统计如下：共立项 85 项，其中一般项目 46 项，思政项目 39 项。现将具体评审结果发给各委员及有关单位。

附件1：农经教指委2021年本科教学质量与教学改革工程建设项目立项评审结果（一般项目）

附件2：农经教指委2021年本科教学质量与教学改革工程建设项目立项评审结果（思政项目）

根据教育部教高厅函
【2014】2号的通知，
改革项目由委员
所在单位代章。
——教育部高校农经
教指委秘书处



教育部全国高等学校农业经济管理类专业教学指导委员会

2022 年 8 月 10 日

主题词：教学改革项目立项通知

报：教育部高教司

发：主任委员、副主任委员、秘书长、委员

农业经济管理类专业教学指导委员会 2022 年 8 月 10 日印发

附件 1:

农经教指委 2021 年本科教学改革与质量建设研究项目立项评审结果

(一般项目)

申请人	单位	专业职务	项目名称	项目批准号
卜美文	扬州大学	讲师	虚拟仿真技术与农林经济管理专业创新创业伦理素养教育研究	NJX22101
丛胜美	河南财经政法大学	讲师	视频作业形式的实践教学考察改革研究——以《农产品物流学》为例	NJX22102
戴芳	河北农业大学	副教授	劳动教育嵌入实践教学的“五力齐发、四位一体”路径研究	NJX22103
单立岩	东北林业大学	讲师	数字经济背景下基于跨境电商人才需求的农经类大学生国际商务函电课程教学方法改革与实践	NJX22104
顾莉丽	吉林农业大学	教授	课程思政视角下高等农业院校农业经济学课程教学改革的探索与实践	NJX22105
郭爱云	北京农学院	副教授	基于竞赛的农林经济管理类双创人才培养生态系统构建问题研究	NJX22106
胡伦	江西农业大学	讲师	融入思政元素的《农业政策学》课程“知识、能力与政治素养”三位一体教学模式研究与实践	NJX22107
黄映晖	北京农学院	副教授	基于《2014 年教育部农经教指委《关于推进农林人才培养的指导意见》》的《现代农业概论》课程建设研究	NJX22108
姜美善	华南农业大学	副教授	金融科技背景下“五位一体”的《农村金融学》课程和教材建设	NJX22109
蒋志清	新疆农业大学	讲师	基于边疆一流农经本科专业的《计量经济学》课程教学改革探索	NJX22110
李尔彬	东北林业大学	副教授	基于自主学习理论的线上线下混合教学设计研究——以《土地经济学》课程教学为例	NJX22111

李秋生	江西农业大学	讲师	乡村振兴背景下农林经济管理专业劳育实践模式创新研究	NJX22112
李幸子	河南农业大学	讲师	基于学生“农匠”精神培养的《农村发展概论》课程教学改革与实践—以河南农业大学为例	NJX22113
刘畅	河北农业大学	讲师	沉浸理论及PBL理念下专业核心课程在线教学建设研究	NJX22114
罗慧	青岛农业大学	讲师	产教融合视角下《农业经济学》一流课程建设研究	NJX22115
罗士美	浙江农林大学	助理研究员	“新时代”农林经管类专业人才核心素养及其体系研究	NJX22116
吕晓焕	河南农业大学	讲师	现代信息技术支撑下复合型教学互动模式的探索与实践—以《投资项目评估》为例	NJX22117
马晓旭	扬州大学	副教授	高校农林经济管理专业教师信息化教学能力提升策略研究	NJX22118
孟婷	中国农业大学	副教授	“知-懂-用-创”递进式实训促专业综合能力提升	NJX22119
倪冰莉	河南农业大学	副教授	农经专业《计量经济学》课程教学改革探索	NJX22120
宁晶	云南农业大学	讲师	农林经济管理专业《概率论与数理统计》教学模式研究	NJX22121
欧阳金琼	塔里木大学	教授	民族地区农业经济管理本科专业与地方协同培养模式探索——以塔里木大学“农经专业”为例	NJX22122
彭思喜	华南农业大学	讲师	乡村振兴的卓越农林人才培养机制创新研究	NJX22123
邱海兰	江西农业大学	讲师	乡村振兴视域下农业高校人才培育的路径选择与机制设计研究	NJX22124
施雯	沈阳农业大学	副教授	基于OBE理念的农林经济管理专业“双线融合式”定量分析能力培养模式改革与实践	NJX22125
宋丽红	云南农业大学	高级经济师	疫情背景下农经类大学生职业规划与就业指导教学	NJX22126

			改革与探索——以西南民族地区毕业生为例	
王欢	四川农业大学	讲师	农业技术经济学虚拟仿真实验教学探索与实践研究	NJX22127
王云霞	吉林农业大学	副教授	农业经济管理专业《中级宏观经济学》教学改革	NJX22128
韦开蕾	海南大学	教授	热带农林经济管理专业“三高四早五力”创新人才培养模式研究	NJX22129
文乐	华南农业大学	讲师	面向农经专业本科生的《数据分析与挖掘》课程体系设计与教学模式优化研究	NJX22130
吴凡	南京林业大学	讲师	基于 BOPPPS 模型的农林经管学生“财商”提升教学设计优化研究	NJX22131
夏玉莲	湖南农业大学	副教授	学科交叉视阈下农林经济管理专业知识结构与培养机制研究	NJX22132
谢会强	贵州大学	副教授	“价值引领-创新素养-实践能力”三位一体的农经人才培养模式研究	NJX22133
熊航	华中农业大学	教授	实践教学与农村社会调查融合长效机制研究	NJX22134
徐丽娜	新疆农业大学	讲师	《资源与环境经济学》课程案例库建设研究——基于干旱区绿洲农业发展视角	NJX22135
鄢贞	浙江大学	研究员	科教融合的现代农业课程教学范式创新	NJX22136
杨 伶	中南林业科技大学	副教授	“三情怀，知行合一”——《2014》2流的通知专业 社团实践与卓越农林人才培养模式研究	NJX22137
杨朝英	福建农林大学	副教授	——教育教质量提升路径研究：学生评教与“师生共进”——以农经专业为例	NJX22138
杨江澜	河北农业大学	副教授	一体多维、协同育人——地方农林院校农林经济管理专业人才培养模式探索与实践	NJX22139
杨宁霞	新疆农业大学	讲师	基于 OBE 理念的《农村财务管理》课程案例研发与教学研究	NJX22140
杨忠娜	塔里木大学	副教授	农林经济管理专业实践教学质量评价体系构建及优化研究	NJX22141

尹冠球	沈阳农业大学	讲师	大数据背景下涉农高校基于产学研合作协同育人的人才培养模式构建与实践	NJX22142
张启文	东北农业大学	教授	农业经济管理专业服务乡村振兴人才培养模式创新与实践	NJX22143
张仙	云南农业大学	副教授	根据教育部教高司【2014】2号《通知》要求，农林经济管理类《电子商务》课程思政建设有效性研究	NJX22144
朱晨	中国农业大学	副教授	根据教育部教高司【2014】2号《通知》要求，农林经济管理类《经济数学》课程实践教学改革研究	NJX22145
朱洪革	东北林业大学	教授	“大类招生、专业分流”下农林经济管理专业培养模式创新研究	NJX22146

附件2:

农经教指委 2021 年本科教学改革与质量建设研究项目立项评审结果 (思政项目)

申请人	单位	专业职务	项目名称	项目批准号
曹暕	北京农学院	教授	《农业政策法规》课程思政建设	NJX22201
曹健	新疆农业大学	副教授	基于“虚拟教研室”的边疆一流农经专业《农业经济学》课程思政示范课程建设研究	NJX22202
陈钰	甘肃农业大学	副教授	基于 BOPPS 模式的《产业经济学》课程思政建设与实践	NJX22203
耿利敏	南京林业大学	讲师	《林产品贸易学》课程思政教学模式创新研究	NJX22204
龚斌磊	浙江大学	研究员	基于双层嵌套法的思政点融入模式研究	NJX22205
洪燕真	福建农林大学	副教授	《林业经济学》课程思政示范课程建设	NJX22206
黄波	中国人民大学	副教授	虚拟教研室的课程思政建设与模式创新：以农业经济学课程虚拟教研室为例	NJX22207
黄炜虹	中南林业科技大学	讲师	新时代农林经济管理专业课程思政教育教学体系改革研究	NJX22208
李剑	华中农业大学	副教授	产业经济学课堂思政示范课建设	NJX22209
李庆	东北农业大学	讲师	《农业企业经营管理》课程思政建设与实践	NJX22210
刘飞翔	福建农林大学	副教授	《农业经济学》课程思政建设理论与实践——专业核心主干课《农村发展概论》思政改革探索	NJX22211
刘家富	东北农业大学	副教授	基于“双融合”目标的农业经济学课程思政示范课建设研究与实践	NJX22212
刘宁	河南农业大学	副教授	“五位一体”课程思政创新体系研究——以课堂小剧场为例	NJX22213
刘燕	西南林业大学	副教授	农林经济管理专业《微观经济学》课程思政示范课程建设	NJX22214

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刘宇鹏	河北农业大学	副教授	“农业经济学”课程思政教学模式构建与实践探究	NJX22215
卢昆	中国海洋大学	教授	助力乡村振兴的《微观经济学》课程思政教学案例设计	NJX22216
梅淑元	湖南农业大学	讲师	《微观经济学》课程思政建设研究	NJX22217
穆哈拜提·帕热提	新疆农业大学	副教授	坚持走中国道路在农林经济管理专业《区域经济学》课程思政教学中的融合研究	NJX22218
彭东慧	华南农业大学	讲师	基于 OBE 理念的《金融学》课程思政示范课程建设——以农林经济管理专业为例	NJX22219
秦光远	北京林业大学	副教授	“体系化、模块化、开源化”课程思政改革与探索——以《国际贸易》课程为例	NJX22220
司伟	中国农业大学	教授	农林经济管理专业课程思政体系建设研究	NJX22221
宋玉兰	新疆农业大学	教授	农业高质量发展战略在《农业技术经济学》课程思政教学中的融合研究	NJX22222
唐小平	贵州大学	副教授	《宏观经济学》“课程思政”示范课建设与实践	NJX22223
王金龙	中南林业科技大学	副教授	一流本科专业建设背景下农林经济管理专业课程思政建设路径研究	NJX22224
王智鹏	江西农业大学	讲师	新农科背景下《中国农业经济学》课程思政教学实践及效果评价研究	NJX22225
卫荣	河南财经政法大学	讲师	“五位一体”式教学下《农业经济管理》课程思政示范课程建设研究	NJX22226
吴强	河南农业大学	讲师	农经类专业“五位一体”课程思政教学模式研究——以《新制度经济学》为例	NJX22227
邢大伟	扬州大学	副教授	新农科背景下农业政策学课程思政教学改革与实践	NJX22228
徐金海	扬州大学	教授	“发展经济学”课程思政特色示范课堂建设的实践探索	NJX22229
杨丽莎	贵州大学	副教授	基于“三全育人”理念的《农	NJX22230

			业经济学》课程思政教学模式研究	
叶立赞	河南财经政法大学	讲师	基于《农业经济学》线上线下混合式教学的课程思政教学改革研究	NJX22231
余嘉玲	中国人民大学	助理教授	扎根中国大地的农业经济管理类专业课程思政创新与探索：基于农经教指委教改项目的分析	NJX22232
余建宇	西南财经大学	教授	《中国农业产业组织》国际化教学课程思政建设	NJX22233
喻美辞	华南农业大学	副教授	课程思政专项《农产品国际贸易》课程思政对学生大国农业贸易观的培育研究	NJX22234
张沁岚	华南农业大学	副教授	深挖课程逻辑、讲好中国故事——《发展经济学》课程思政示范课建设	NJX22235
张颖	河南农业大学	讲师	根据教育部教高厅函【2014】2号的通知，指导委员会由主任委员所在单位代表——教育部高校农经教指委秘书处《农业经济学》课程思政建设理念下农林经济管理类专业核心课程思政教学设计——以《农业经济学》为例	NJX22236
周艳波	沈阳农业大学	副教授	《农业政策学》课程思政模式创新研究	NJX22237
朱震锋	东北林业大学	讲师	农林经济管理类课程思政的价值意蕴、逻辑体系与实施路径	NJX22238
宗义湘	河北农业大学	教授	“四有人才”导向的农林经济管理专业统计学课程思政改革与示范	NJX22239

教育部产学合作协同育人项目

立项证书



项目编号：**220902443273010**

项目名称：**农村金融科技实训基地建设**

项目负责人：**姜美善**

学校名称：**华南农业大学**

企业名称：**深圳典阅科技有限公司**

该项目入选教育部产学合作协同育人项目2022年第二批立项项目，特发此证。



教育部产学合作协同育人项目
cxhz.hep.com.cn

教育部产学合作协同育人项目专家组

2023年2月

全国哲学社会科学工作办公室

2019 年国家社科基金后期资助项目立项通知书

姜美善 同志：

经全国哲学社会科学工作领导小组批准，您申请的国家社会科学基金后期资助项目_____

农地确权、制度绩效和农村要素市场的协调发展问题研究

获准立项，项目类别为一般项目，批准号19FGLB052，资助总额25万元，第一次拨款23万元，预留经费2万元。

本年度国家社会科学基金后期资助项目立项时间为2019年9月28日，立项后《国家社科基金后期资助项目申请书》《国家社科基金优秀博士论文出版项目申请书》即成为有约束力的协议，您及责任单位要按照《国家社会科学基金管理办法》承担相应责任并执行以下规定：

1. 国家社会科学基金后期资助项目研究工作，要以习近平新时代中国特色社会主义思想为指导，坚持正确的政治方向、价值取向、研究导向，牢固树立问题意识、创新意识和精品意识，着力推出代表国家水准的研究成果。项目负责人要严

把政治方向关和学术质量关,扎实开展研究工作,努力维护国家社会科学基金项目的导向性、权威性和示范性。

2. (请按照 2016 年修订的《国家社会科学基金项目资金管理办法》的有关规定,根据直接费用的开支范围,科学合理、实事求是地编制项目预算。)请登录国家社会科学基金科研创新服务管理平台在线填写(平台登录网址:<https://xm.npopss-cn.gov.cn/>),请按照平台页面《国家社科基金项目经费预算在线填报手册(项目负责人用户使用)》进行登录和填写。项目经费预算在线填报截止时间为 2019 年 11 月 8 日,逾期未填写经费预算的,视为放弃资助。项目经费不再追加,对于资助经费低于申请资助额的项目,项目负责人可选择不接受资助。一经接受,不得以资助金额不足为由,擅自变更申请书所填内容。

3. 项目负责人要参照评审专家意见对申报成果作出修改、完善。最终成果完成后,项目负责人需向省区市社科规划(工作)办、在京委托管理机构或单列学科规划办提交结项材料,鉴定合格后由我办安排出版事宜。结项材料按照《国家社科基金后期资助项目鉴定结项审批书》(2019 年 10 月修订版)要求提交。重点项目与一般项目结项成果出版由我办指定出版社,出版具体事宜由项目负责人与指定出版社洽谈。优秀博士论文出版项目由我办统一安排出版。成果应在结项公示后出版,对于违反规定的视为自行终止立项协议,我办将

视情况作出撤项、追回所拨经费等处理。凡研究成果中存在侵犯知识产权、抄袭剽窃、弄虚作假等学术不端行为的,或观点结论有违党的理论路线方针政策、刊发后产生不良社会影响的,或在学术规范、学术道德、科研诚信等方面存在严重问题的,视情节轻重作出终止研究或撤项处理并上网通报批评。凡以“国家社会科学基金项目”名义发表成果或向有关部门报送材料,或以项目负责人、参加者等名义接受媒体采访时,若涉及政治敏感问题,事前须征得我办同意。

4. 后期资助项目资金直接拨到项目负责人所在单位财务部门,其使用和管理按照《国家社会科学基金项目资金管理办法》执行。项目成果出版费用由项目负责人按照我办确定的统一标准(每10万字1.7万元),向成果出版机构支付。

5. 项目原则上要按计划完成时间申请结项,按时完成项目且成果优秀的负责人在申请新的国家社科基金项目时予以适当政策倾斜。国家社科基金项目实行定期清理制,本年度立项的重点项目和一般项目³清理截止日为2022年10月31日,优秀博士论文出版项目清理截止日为2021年10月31日,能够在此之前完成的项目不再需要申请延期。如发生延长完成期限、管理单位变动、终止项目等重要事项,项目负责人均需填写《国家社科基金项目重要事项变更审批表》(可在我办网站下载),由所在单位科研管理部门审核后经省区市社科规划(工作)办、在京委托管理机构或单列学科规划办报

我办审批。

以上规定,项目负责人及责任单位应严格遵守。如有异议,可以不接受资助(以书面形式提出申请),立项协议自行废止。



抄送:项目责任单位

全国哲学社会科学工作办公室

2022 年度国家社会科学基金项目 立项通知书

柳松 同志：

经国家社会科学基金学科评审组评审，全国哲学社会科学工作领导小组批准，您申请的国家社会科学基金项目数字普惠金融赋能乡村振兴的模式创新与政策优化研究

获准立项，批准号 22BJY005，项目类别为 一般 项目，资助总额 20 万元，第一次拨款 17 万元，预留经费 3 万元，立项时间为 2022 年 9 月 30 日。立项后《国家社会科学基金项目申请书》即成为有约束力的协议，您及责任单位要按照《国家社会科学基金管理办法》承担相应责任并执行以下规定：

1. 国家社科基金项目研究工作要坚持正确的政治方向和学术导向，牢固树立问题意识、创新意识和精品意识，立足学术前沿，体现有限目标，突出研究重点，避免重复研究，弘扬优良学风，恪守学术规范，着力推出代表国家水准的研究成果。项目负责人要严把政治方向关和学术质量关，扎实开展研究

工作,努力维护国家社会科学基金项目的导向性、权威性和示范性。

2. 项目经费预算编制应科学合理、实事求是。项目负责人须于10月25日—11月10日登录国家社科基金科研创新服务管理平台(网址:<https://xm.npopss-cn.gov.cn>,以下简称“管理平台”)填报预算。预算审核通过后,我办将尽快拨付项目启动经费。要严格执行国家有关科研经费管理制度,按照批准预算和财务规定规范报销支出和核定票据;批准经费不再追加,不能以经费不足为由擅自缩小研究范围或变更最终成果设计。

3. 项目实行全过程跟踪管理、中期检查报告、阶段性成果和最终成果登记制度,科研管理部门要切实承担管理职责。要及时将最新、最有价值的成果编辑《成果要报》稿或《光明日报》、《中国社会科学报》“国家社科基金”专刊稿报我办,其采用情况、阶段性成果发表情况、作者的学风文风和治学态度等将作为验收结项的重要依据。项目研究过程中实行重要事项报告制度。如有项目名称、成果形式、责任单位变更,研究内容重大调整,完成时间延期,以及其他重要事项变更的,须在管理平台提交申请并逐级审核后报我办审批或备案,项目负责人原则上不予变更。实施周期三年(含)以上的项目须接受一次中期检查,请根据具体通知在管理平台提交中期检查表。项目原则上要按计划完成时间申请结项,结项成果验

收达到优秀等级的负责人在申请新的国家社科基金项目时予以适当政策倾斜。**国家社科基金项目实行定期清理制,本年度立项的项目清理截止日为2027年9月1日。**

4. 项目按计划完成后,由项目负责人在管理平台提交结项申请,但成果涉及国家秘密或敏感问题的应以安全方式向管理部门提交纸质结项材料。项目最终成果实行双向匿名鉴定,鉴定费由我办另行支付。最终成果须先鉴定后出版,个别成果如确需提前出版的须报我办审批。未经报批擅自出版的将视为自行终止资助协议,按有关规定追回或停止拨付研究经费。凡以博士论文或博士后出站报告为基础申报的立项课题,申请结项时须附博士论文或博士后出站报告原文,并说明结项成果与博士论文(博士后出站报告)的联系和区别;凡以在研或已结项的各级各类项目为基础申报立项的课题,不得以内容基本相同的同一成果申请多家基金项目结项;凡研究成果中存在侵犯知识产权、抄袭剽窃、弄虚作假等学术不端行为的,或观点结论有违党的理论路线方针政策、刊发后产生不良社会影响的,或在学术规范、学术道德、科研诚信等方面存在严重问题的,视情节轻重按终止研究或撤项处理并上网通报批评;凡以“国家社会科学基金项目”名义发表成果或向有关部门报送材料,或以项目负责人、参加者等名义接受媒体采访时,若涉及政治敏感问题,事前须征得我办同意。凡以“国家社会科学基金项目”名义发表阶段性成果或最终成果,不

得同时标注多家基金项目资助字样。

5. 成果鉴定分为优秀、良好、合格和不合格四个等级,鉴定结果将在我办网站予以公告,我办将根据鉴定结果给予适当奖惩。鉴定为“优秀”或“良好”等级的研究成果,出版时须标注“国家社会科学基金项目资助”字样,并在管理平台登记出版情况,将出版成果统一交中国国家版本馆“国家社会科学基金成果专库”典藏。

6. 西部项目不得因其负责人工作调动而转出西部地区。地方社科院、党校系统承担的西部项目不得因负责人工作调动而转出西部地区的社科院、党校系统。

7. 根据学科评审组专家意见,部分课题名称做了修改,请以本《通知》为准。

以上规定,项目负责人及责任单位应严格遵守。如有异议,可以不接受资助(以书面形式提出申请),立项协议自行废止。


全国哲学社会科学工作办公室
2022年9月30日

抄送:项目责任单位

【项目成员】

署名顺序	人员来源	成员姓名	学科方向	成员性别	职称	学历	工作单位
1	本校老师	柳松	经济学	男	教授	博士研究生	经济管理学院
2	本校老师	谭砚文	经济学	男	教授	博士研究生	经济管理学院
3	本校老师	姜美善	经济学	女	副教授	博士研究生	经济管理学院
4	本校老师	王雄志	管理学	男	副教授	博士研究生	经济管理学院
5	本校学生	柳一诚(学)					
6	本校学生	李晓玲(学)					
7	本校学生	马亚飞(学)					
8	本校学生	王紫翔(学)					

广东省教育科学规划领导小组办公室

广东省教育科学规划领导小组办公室关于公布 2022 年度教育科学规划课题（高等 教育专项）立项名单的通知

各有关高校：

为深入学习贯彻习近平新时代中国特色社会主义思想 and 全国教育大会精神，充分发挥高校在学科、人才和平台优势，服务支撑国家和省决策部署，经学校推荐、省教育科学规划办组织专家评审，现将批准立项的 2022 年度教育科学规划课题（高等教育专项）（见附件）下达到各高校。

请各高校按照国家和省相关科研项目管理办法，统筹安排项目资金，加强资金管理，督促项目承担人按照项目申请书开展研究工作，跟进并协助解决项目实施过程中遇到的问题，确保研究工作顺利推进。省教育科学规划办将适时组织抽查工作。

附件：2022 年度广东省教育科学规划课题（高等教育专项）
立项名单

广东省教育科学规划领导小组办公室

2022 年 9 月 1 日

（联系人及电话：黄春波，020-37628271）

148	2022GXJK148	基于群文阅读的古代文学课程教学改革与实践	李桂芹	华南农业大学
149	2022GXJK149	广东农村家庭资本与高等教育机会可得性研究	彭东慧	华南农业大学
150	2022GXJK150	新医科背景下全链条临床模拟教学案例库建设及应用研究	田京	南方医科大学
151	2022GXJK151	高校教师组织支持感知与创新行为的关系研究：基于工作投入的中介模型检验	陈曦	南方医科大学
152	2022GXJK152	粤港澳大湾区急危重症护理人才需求预测分析与策略研究	丁红	南方医科大学
153	2022GXJK153	模拟·混合·引导：护理临床核心课程教学改革研究与创新实践	史蕾	南方医科大学
154	2022GXJK154	高危妊娠管理综合案例库建设及基于SimMan模拟系统上的应用研究	靳瑾	南方医科大学
155	2022GXJK155	基于Moodle平台数字化课程建设与应用评价研究	叶涛	南方医科大学
156	2022GXJK156	新时代医学研究生培养质量监测评价机制研究	黄文华	南方医科大学
157	2022GXJK157	基于协同创新基地的双师制创新型人才培养模式探索与实践	陈瑶	南方医科大学
158	2022GXJK158	推动高校内部治理体系和治理能力现代化的路径与策略研究——基于党委领导下的校长负责制	占春旺	南方医科大学
159	2022GXJK159	高等院校研究生科研诚信教育管理机制构建与实践	赵镇	南方医科大学
160	2022GXJK160	面向本科实习及住培医师的叙事医学教学改革研究与实践	梁勇前	南方医科大学
161	2022GXJK161	港澳台大学生“一核两翼三支撑”素质拓展与团队建设课程教学模式构建研究	游江	广州中医药大学
162	2022GXJK162	学史明理，立德树人——基于BOPPPS教学模型的《医学史》课程思政体系构建	黄子天	广州中医药大学
163	2022GXJK163	新医科背景下卓越中医师育人体系研究与实践	方熙茹	广州中医药大学
164	2022GXJK164	《药物分析》课程“专创融合”的探索与实践	张蕾	广州中医药大学
165	2022GXJK165	广东高校ESI学科评价与研究	周合兵	华南师范大学
166	2022GXJK166	新时代高校师范生师德养成教育评价改革研究——以广东“新师范”建设为背景	张云婷	华南师范大学
167	2022GXJK167	“微任务”驱动下的教育硕士实习实践模式研究	姚轶懿	华南师范大学
168	2022GXJK168	基于关键特征的教师教育评估模型的建构与应用研究	梁颖俊	华南师范大学
169	2022GXJK169	基于劳动教育教师专业素养的专业硕士（劳动教育方向）培养路径研究	黄道鸣	华南师范大学
170	2022GXJK170	人工智能赋能师范生课堂教学能力测评指标研制与应用研究——以师范生免试认定教师资格改革为背景	吴少平	华南师范大学
171	2022GXJK171	高校预聘-长聘制的合同性质、法理逻辑与救助路径	彭虹斌	华南师范大学
172	2022GXJK172	指向高质量教师教育体系的师范院校协同发展路径研究——以广东师范院校为例	王丰	华南师范大学

【项目成员】

署名顺序	人员来源	成员姓名	学科方向	成员性别	职称	学历	工作单位
1	本校老师	彭东慧	经济学	女	讲师	博士研究生	经济管理学院
2	本校老师	姜美善	经济学	女	副教授	博士研究生	经济管理学院
3	本校老师	米运生	经济学	男	教授	博士研究生	经济管理学院
4	本校老师	柳松	经济学	男	教授	博士研究生	经济管理学院
5	外校人员	张楚倩(外)	经济学	女			
6	本校学生	梁泰源(学)	经济学	男			



Farmland transfer and rural financial structure: Evidence from China

Meishan Jiang^{a,1}, Krishna P. Paudel^{b,1}, Yunsheng Mi^a, Jingrong Li^{c,*}

^a College of Economics and Management, South China Agricultural University, Guangzhou, Guangdong, China

^b Resource and Rural Economics Division, USDA Economic Research Service (ERS), Washington, DC, USA

^c School of Mathematics, Jiaying University, Meizhou, Guangdong, China

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ABSTRACT

This paper studies how farmland transfers (renting) have affected rural micro-financial structure in China. China has implemented the farmland titling policy since 2009 that promoted farmland transfers affecting factor allocation, production structure, and financial structure in the agricultural sector. We use the instrumental variable model to address the endogeneity issue associated with farmland transfers based on in-person interview survey data collected from a random sample of farmers in nine Chinese provinces. We find farmers who choose to transfer-out farmland lend more funds to other individuals. In contrast, farmers who transfer-in farmland i) borrow more from informal than formal financial sources, ii) increase deposits to formal financial institutions, and iii) increase agricultural investment. These changes affect rural funds supply, prompt credit to switch from consumption to production, improve operating efficiency and optimize the rural micro-financial structure. Implementing roundabout transactions to bridge the gap between formal and informal finance could facilitate rural revitalization and foster improved economic prospects in rural areas.

1. Introduction

Farmers in developing countries often face financial exclusion due to asymmetric information, lack of qualified collateral, and vagaries of risk associated with agricultural operations (Stiglitz and Weiss, 1981; Jiang, Paudel, Peng, & Mi, 2020). This lack of sufficient capital for farming leads to poverty, rural decline, and other associated social problems. Previous researchers have proposed several solutions to rural finance problems, including social capital mortgages, agricultural cooperatives, and capitalizing on farmers' assets through systemic reform (Stiglitz, 2015; Jiang et al., 2020; Neupane, Paudel, & He, 2023). Many developing countries in Africa (e.g., Ethiopia, South Africa, and Uganda) and Latin America (e.g., Mexico) have implemented farmland system reforms featuring farmland titling (certification) to address concerns related to rural finance (Blađ, 2020; de Janvry, Emerick, Gonzalez-Navarro, & Sadoulet, 2015; Deininger, Ali, & Alemu, 2013; Deininger, Ali, Holden, & Zevenbergen, 2008; Hart, Chandia, & Jacobs, 2018).

China's recent round of agricultural land system reform referred to as land titling, began as a pilot program from 2009 to 2011. The central policy of the reform focused on separating three rights: land ownership,

land contracting, and land operation. It aimed to maintain collective land ownership while implementing land titling, registration, and certification of land contracting and operational rights. Furthermore, it granted transferability and mortgage rights to the land's operational rights (Luo, 2018; Yan, Yang, & Xia, 2021). This study examines the repercussions of land transfer on rural finance subsequent to the implementation of land titling and the separation of land rights. Land titling strengthens property rights, thereby increasing land rental activities and the adoption of longer-term land contracts. As a result, the transaction costs related to land transfer are reduced. Furthermore, the establishment of platforms dedicated to land transfer transactions is facilitated, and the procedures involved in such transactions are improved and standardized. Collectively, these measures foster the smooth facilitation of land transfer (de Janvry et al., 2015).

Farmland transfers can potentially increase production efficiency by solving farmland fragmentation problems, socialized division of labor in the agricultural production process, and achieving economies of scale. Simultaneously, rural laborers not interested in farming can transfer their farmland to others, engage in non-agricultural employment, reduce farmland idling/abandonment, and increase household income (Li, Zhang, & Mi, 2021). Improved liquidity can qualify farmland

* Corresponding author.

E-mail address: jingronglijnu@gmail.com (J. Li).

¹ Co-first author.

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collateral and enhance farmland's asset signals for credit from formal and informal financing. Therefore, farmers' financing scale, duration, purpose, and supply and demand direction of funds vary for farmland transfers, changing the rural micro-financial structure (see Fig. 1).

The financial structure is the proportion and relative composition of various financial institutional arrangements within the financial system (Lin, 1992). The proportion of the financial markets and intermediaries can be examined from the perspective of regulations and competition. The ratio of farmers' formal and informal finance is the rural micro-financial structure. The optimal financial structure in rural areas can improve factor endowment, make agricultural operations more efficient, promote capital accumulation, and foster economic development. In contrast, the suboptimal financial structure can cause financial crises (Lin, Sun, & Jiang, 2009).

Previous studies have shown that land titling had positive impacts on labor mobility, investment, land productivity, equity and efficiency, and income (Jacoby, Li, & Rozelle, 2002; Deininger et al., 2008; Deininger et al., 2013; de Janvry et al., 2015; Ashwood, Canfield, Fairbairn, & De Master, 2022; Li et al., 2021). Studies have also discussed how land titling promotes land transfers and subsequently improves farmers' access to credit (Jiang et al., 2020; Wen, Paudel, Chen, & He, 2023). However, previous studies have mainly focused on the financial impact of land titling without delving into the underlying mechanisms in depth. In reality, land titling may facilitate land transfers, which in turn causes the mobility and allocation of rural production factors, thus influencing rural finance and the rural financial structure. Therefore, understanding the implications of changes in rural factor mobility and allocation for rural finance becomes of utmost importance. Failure to align the rural financial structure with the evolving production structure inevitably hinders rural revitalization and economic development (Lin, Sun, & Wu, 2012). There is a research gap regarding the impact of farmland transfers on the rural micro-financial structure and the potential solutions to address rural financial issues through the lens of factors of production flow. Therefore, our research objective is to provide insights into the issue of financial inclusion in rural areas from the perspective of strengthening the flow of production factors initiated by farmland transfers. To the best of our knowledge, this paper represents the first attempt to examine the impact of farmland transfers on rural financial structure, aiming to address the research gap in this area. This paper offers valuable insights for other developing countries undertaking farmland rights reform to facilitate land transfers. In addition, we focus on farmers' choice of formal and informal finance from the perspective of the rural micro-financial structure. Furthermore, we analyze how the change in financial structure is initiated by the change in factor allocation and production structure represented by farmland transfers based on financial structure theory. Finally, we explain how factors flow may help solve the rural credit allocation problem on the farmland transfers system reform using data from China.

We use the instrumental variable model to address the endogeneity issue associated with farmland transfers based on in-person interview survey data collected from a random sample of farmers in nine Chinese provinces. The results indicate that farmland transfers significantly impact the rural financial structure. Farmers who transfer-out farmland are more likely to lend more funds to other individuals than to deposit in formal financial institutions. They are also likely to reduce agricultural investments and loan demands. Further, farmers who transfer-in farmland are more likely to increase agricultural investments, borrow more from formal financial institutions and informal channels, and increase deposits and loan demands from formal financial institutions. These microstructural changes reconstruct rural formal and informal finance. These changes enhance rural funds supply, prompt credit use from consumption to production, improve operating efficiency, and optimize the rural micro-financial structure. In light of the ongoing farmland reform and the rapid movement of rural production factors, we propose employing roundabout transactions to bridge the divide between formal and informal finance. This strategic approach holds promise in

addressing rural financial exclusion, bolstering the reform of the farmland system, facilitating the efficiency of the farmland transfer market, and optimizing the financial structure. The objective is to revitalize rural areas, thereby fostering sustainable development.

The remainder of this paper is organized as follows. Section 2 briefly introduces China's current farmland transfers system. Section 3 provides the rationale for farmland transfers and rural financial structure optimization. Section 4 describes the variables and data used in this study. Section 5 presents our empirical strategy. Section 6 presents the results of the effects of farmland transfer-in and transfer-out on the rural financial structure. Section 7 analyzes the robustness of our empirical results. Finally, section 8 concludes the paper.

2. Current farmland transfers system in China

The structure of farmland in China exhibits unique characteristics compared to other countries, but it also faces common challenges. As pointed out by authors such as Deininger, Ali, and Alemu (2011) in Ethiopia, de Janvry et al. (2015) in Mexico, Boué and Colin (2018) in Madagascar, and Boone, Bado, Dion, and Irigo (2021) in Côte d'Ivoire, land reforms are inherently contentious.

In China, the land system is characterized by collective ownership, with the transition to collective ownership of farmland beginning in 1978. Farmers hold contract rights and operate the land, adhering to the household responsibility system for agricultural production. Initially, in the pursuit of fairness during the initial distribution of collective land, the fragmentation of farmland occurred. However, as development progressed, this fragmentation has hindered large-scale farming and the modernization of agriculture, necessitating a further land reform. Notably, China shares common challenges with countries in Africa and Latin America regarding strengthening land reforms, achieving agricultural modernization, enhancing agricultural productivity, and uplifting farmers' income. The experiences and lessons from China's reform initiatives can provide valuable guidance and inform policy approaches for other countries undergoing similar transformations.

The new round of farmland reform since 2009 in China can be explained by focusing on the history of farmland rights, production modes, and farmland transfer markets since 1949 (see Table 1). The current period of farmland management, known as the household contract management phase, began in 1978 (Liu & Cheng, 2007). Zhou, Li, and Liu (2020) further divided this phase into three sub-phases: the establishment of the household contract responsibility system (1978–1992), the stable period of land contractual management rights (1993–2007), and the dynamic stable period of land reform (2008–2013). However, fundamental changes did not occur regarding farmland rights, production modes, and farmland transfer markets. From the beginning of this phase, the farmland ownership rights belonged to village collectives, and a collective contracted out farmland to farmers belonging to that particular collective. As Zhou et al. (2020) outlined, the initial round of farmland contracts spanned 15 years, from 1978 to 1993. Following the expiration of these contracts, the government subsequently extended the contract period twice, each time extending it to 30 years. It is noteworthy to mention that the current farmland contract period has been further extended to 2053.² Although the Chinese government has allowed farmland management rights to be transferred since 1984, the farmland market has not developed for a long time. (Zhou et al., 2020).

The low rate of farmland transfers resulted from a lack of trust in the system and fear of farmland loss, farmland area limitations, asset specificity, fragmentation, an underdeveloped farmland market, and a lack of relevant laws. Additionally, urbanization and the rural-to-urban labor migration have left more farmland uncultivated or idle (Luo, 2018). It is

² The agricultural land contracting agreements are signed progressively, with varying specific expiration dates.

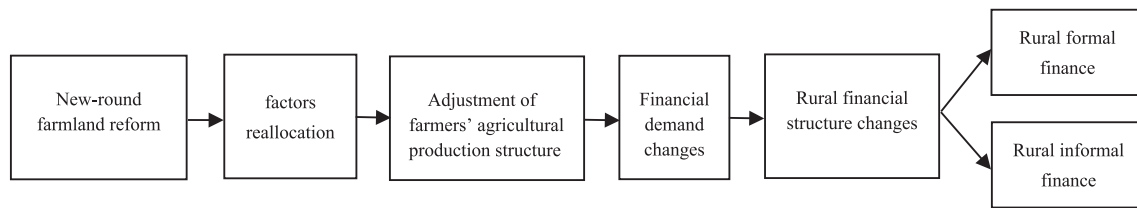


Fig. 1. Farmland transfers and rural financial structure.

Table 1

The stages of rural farmland reform in China.

Stage	First stage	Second stage			Third stage
Period	1949–1953	1953–1956	1956–1958	1959–1978	1978 -now
Name	Farmers' Farmland Ownership	Primary cooperative	Advanced cooperative	People' commune	Household contract management
Farmland right	Private by farmer	Owned by farmer	Owned by Cooperative	Owned by Commune production brigade and production team	Farmer based but owned by Collective
Management right	Farmer	Cooperative (small private plot could be managed by individual)	Cooperative	The production team (small private plot can be managed by individuals)	Farmer
Distribution pattern	Farmer distributes the output of farmland	Distribution according to the farmland share (private plot returns belonged to individual)	Distribution according to work	Distribution according to work (private plot returns belong to individual)	Farmer distributes the output of farmland
Farmland market	Ownership of farmland can be traded	Could not trade farmland	Could not trade farmland	Could not trade farmland	Management right of the farmland could be traded

Note: The source is from [Liu and Cheng \(2007\)](#). Theory and practice of change of rural farmland system of China since 1949. China Rural Survey, 2, pp.70–80 and Zhou, Y., Li, X., & Liu, Y. (2020). Rural land system reforms in China: History, issues, measures and prospects. Land Use Policy, 91, 104,330.

not easy to modernize agriculture if most farmers are smallholders. The new round of agricultural land system reform commenced with pilot programs from 2009 to 2011 and was formally introduced in the “Central Document No.1” in 2013. This reform primarily focuses on the subdivision of agricultural land rights into ownership, contracting, and operational rights. It emphasizes the solidification of the collective membership status of rural villagers with the principle of “no increase in area and no reduction in number” and the clear delineation of land boundaries. The core policy of this reform is to maintain collective ownership of agricultural land while implementing the recognition, registration, and certification of land contracting and operational rights. It also grants transferability and mortgage guarantee rights to land operational rights and encourages and supports the transfer of contracted land to professional farmers, family farms, and farmer cooperatives ([Luo, 2018](#); [Tang, Yun, Liu, & Sang, 2019](#); [Zhou et al., 2020](#)). According to the *Rural Land Contract Law of the People's Republic of China*, the farmland transfers are divided into the contract and management rights transfers (the original contract farmers have no rights and obligations to the collective) and the management rights transfers (the original contract farmers have rights and obligations to the collective, and the new contract farmers have relations with the original contract farmers). The contract and management rights transfers include contracting and auctions (for idle agricultural land). The management right transfers include leasing, share transfer, subcontracting, and mortgage. According to the statistics of formal channels of the Ministry of Agriculture and Rural Affairs of China, until 2013, the area of nationally contracted farmland transfers reached 340 million mu (1 mu = 666.67 square meters) which is 3.1 times more than the farmlands transferred in 2008. The turnover ratio reached 26%, which is 17.1% higher than that in 2008.³ By the end of 2018, the national rural

contracted farmland transfers area was 539 million mu, accounting for more than one-third of the total cultivated farmland area.⁴ The new-round farmland reform that started in 2009 has effectively promoted farmland transfers.

3. Conceptual framework of farmland transfers and rural micro-financial structure

3.1. Rural financial structure

According to the theory of New Structural Economics, the financial structure aligns with the industrial structure, which is determined by the factors' endowment structure of the economy ([Lin, 2011](#); [Lin et al., 2009](#)). The factors endowment structure is the primary driving force in determining the financial structure, although political, cultural, and legal factors will affect the financial structure and development ([Lin et al., 2009](#)). The financial structure is endogenous and dynamic, which results from rational choices by economic individuals ([Lin et al., 2009](#)). Therefore, it is reasonable to study how farmland transfers optimize the rural financial structure from a farm household perspective. Unlike traditional financial structure theory, which focuses on political economy, the new financial structure focuses more on heterogeneous economic development ([Lin et al., 2012](#)). Therefore, a bank-oriented financial structure is more effective for people with low incomes and the economy at the early stage of economic development for improving income than a capital market-oriented structure because banks can solve information asymmetry better when the loan size is small and income uncertainty exists ([Kpodar & Singh, 2011](#)). Small banks help develop labor-intensive industries as they have more local market advantages and flatter hierarchies to monitor small firms ([Beck, Demirgüç-Kunt, &](#)

³ For further details, please refer to the document “Annual Performance Management Summary Report of the Chinese Ministry of Agriculture for the year 2013.” The report can be accessed on the official website of the Ministry of Agriculture and Rural Affairs of the People's Republic of China at moa.gov.cn.

⁴ For further details, please refer to the document “Consolidation and Improvement of the Household Contracting System” “The report can be accessed on the official website of the Ministry of Agriculture and Rural Affairs of the People's Republic of China at moa.gov.cn.

Singer, 2013; Lin et al., 2012). Bank development decreases with economic output, and the securities market becomes the primary source of capital (Demirguc-Kunt, Feyen, & Levine, 2011).

However, compared to studies focusing on banks and capital markets, exploring the characteristics of the financial structure by examining the ratio between formal and informal finance among farmers holds greater significance within the context of rural financial structure (Guo & Jia, 2009). The proportion of formal and informal finance could translate into developing countries' rural finance for national policy and institutions (Lin et al., 2012). Developing countries have gradually formed a financial system dominated by formal finance (formal financial institutions lending) and supplemented by informal finance (private and cooperative lending) in the rural credit market. Informal finance is characterized by lower transaction costs, state-contingent contracts, and information advantages (Conning & Udry, 2007; Giné, 2011). By contrast, formal finance suffers from higher transaction costs, information asymmetry, collateral requirements, and contractual risk-led credit allocation (Guirking, 2008). Formal and informal financial institutions squeeze each other out for their respective advantages (Jain, 1999). They also have a strategic cooperative relationship with vertical or horizontal linkage modes⁵ for their respective disadvantages (Cruz-García & Peiró-Palomino, 2019). Informal financing entities need internal funds to decrease the monitoring cost for better playing the advantage of informal finance in this financial linkage (Conning & Udry, 2007). The classification of different properties proves that one size does not fit all (Beck et al., 2013).

Farmers differ in production sizes, risk characteristics, informal channels, loan demand, and information exposure features. They need the development of formal and informal finance to mobilize savings, diversify risks and allocate funds while optimizing the financial structure (Lin et al., 2009). However, in rural areas of developing countries, formal financial institutions withdraw rural funds in the form of savings to provide urban credit due to asymmetric information, lack of qualified collateral, and high risk associated with agricultural operations (Guo & Jia, 2009). Farmers are exposed to usury when not receiving state loans or loans from relatives or friends. The rural finance landscape in China has transformed after the issuance of the "Number 1 Central Document" by the State Council, which occurred in 2006. Subsequently, national policies have been implemented to facilitate the regulation and development of rural informal finance and small formal financial institutions. National policies emphasize the importance of the appropriate linkage between formal and informal finance to match the factors endowment and production structure in rural areas.

3.2. The effect of farmland transfer on the factor allocation and agricultural production structure

The implementation of land titling in 2009 has promoted farmland transfers, thereby initiating the reallocation of factors (Cheng, Xu, Zhou, He, & Zhang, 2019). First, when the farmland transfer market is functioning, farmland gets transferred to farmers with comparative advantages in agricultural management. Farmland transfers promote large-scale operations, increase efficiency, and enhance agricultural profitability (Deininger et al., 2013). Second, increased agricultural profitability increases the farmland transfer price and the opportunity cost of agricultural operations (Fei, Lin, & Chunga, 2021). Farmers reduce the scale of farmland operation and labor used in agriculture if the marginal product value of agriculture is lower than wage income. In China, in 2019, the income contribution rate of wage income was 41.8%, while household operating income was only 28.8% (Wei & Huang, 2021). Given this reality, small farmers prefer to work off-farm and transfer out farmland. Third, farmland transfers improve the liquidity of farmland, make farmland qualified collateral for a loan, and farmers could obtain

more credit support from formal and informal channels. As the farmland transfer market matures, production factors will likely be reallocated to rural areas (Chamberlin & Ricker-Gilbert, 2016).

Rural production structure includes production entities, modes, purposes, and scales. Investments produce variations in factors allocation and price structure. First, from the perspective of production entities and modes, accelerating farmland transfers is a prerequisite for developing new agricultural management entities, including large and specialized family farms and businesses, professional cooperatives, and agribusinesses (Kan, 2021). These management entities match modern agriculture. Therefore, the production mode is transforming from labor- to capital-intensive operations. However, small farmers are still the main agricultural management entities adopted by most, and they will coexist alongside new agricultural management entities (Luo, 2018). Service outsourcing (custom operations) and the resulting small farmers' organization describe the third development model, introducing technology, entrepreneurial ability, and transaction organization modes to small farmers (Luo, 2018). Small farmers can also form new agricultural management entities through their organizations. Second, new agricultural management entities are more commercially driven. In contrast, small farmer operations are mostly subsistence in nature. Therefore, more farmers are investing to make their farm operations truly commercial and profitable (Wei & Huang, 2021).

3.3. The impact of changes in the agricultural production structure on the rural micro-financial structure

The transformation of production structure from individual small-scale farming to organized large-scale farming and temporary migration of labor from rural to urban areas results in changes in the financial structure (Wen, Paudel, & He, 2022). Therefore, agricultural management entities will pursue financial services from formal and informal channels because of their heterogeneous production size, risk characteristics, and loan demand (Kpodar & Singh, 2011; Lin et al., 2012). The structural shift from small to larger agricultural operations redirects loan demand toward investment in farming rather than consumption. Loans for production purposes suppress the development of rural usury and reduce the interest rate of informal finance. Income from land transfer out and off-farm wage helps to increase informal funds. Additionally, interest income earned is higher from the informal channel than the interest income from bank deposits as the informal channel operates with lower transaction costs. The regulation and development of informal finance have improved the outflow of rural funds through formal finance. Therefore, farmland transfers optimize the rural micro-financial structure. Some studies define informal finance as the outcome of financial repression and constraints, ignoring its information advantage and coexistence with formal finance in the rural financial markets for a long time (Cruz-García & Peiró-Palomino, 2019; Turvey, Kong, & Huo, 2010)). Information asymmetry, fixed transaction costs, and limited liability dictate formal financial institutions to focus on large farmers with titled farmlands or other qualified collaterals (Jiang et al., 2020). Informal finance uses its physical and social distance advantage to service small farmers without collateral and provides small loans (Conning & Udry, 2007; Guirking, 2008). Guirking (2008) indicates that higher transaction costs (including collateral processing, foreclosure, and resale) and the risk of mortgaged farmland loss hinder formal finance expansion in rural areas even if farmland reform improves its mobility. The area of farmland mortgaged by profitable farmland collateral credit is 6.67 ha in China (Zhang, Wang, & Liu, 2015). Even after the farmland transfer market is implemented, small farmers continue to seek financing from an informal channel because it will take time for the market to function fully. New agricultural operations with better credit records and stable income expectations seek to borrow from formal financial channels. The anticipated shift toward new agricultural operations as the dominant entities in the agricultural sector (Wei & Huang, 2021) lays the foundation for our hypothesis. We

⁵ Such as the mode with bank-organization-farmers.



Fig. 2. Study areas (highlighted in yellow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

postulate that farmland transfers, influenced by farmers' resource endowment and changes in the production structure, serve as catalysts for altering the rural financial structure.

4. Data, descriptive statistics, and variables

We collected data from an in-person interview survey of farmers in nine Chinese provinces. This survey was conducted by the research group "Rural Land and Related Factors Market Cultivation and Reform" of South China Agricultural University in January 2015, when numerous migrants and seasonal workers returned to their hometowns during the Spring Festival. We use multi-stage stratified random sampling⁶ in our study: First, we determine the sample provinces. We divide all provinces in China into three groups using the cluster analysis method with six key criteria: the total population, GDP per capita, farmland area, farmland proportion, the agricultural population proportion, and the agricultural output value proportion. The purpose of cluster analysis is to put provinces with similar clustering indicators into one group so that the difference within the group is as small as possible and the difference between the groups is as large as possible. We randomly selected three provinces from China's eastern, central, and western regions based on the abovementioned cluster indices. We chose Guangdong, Jiangsu, and Liaoning provinces from east China; Henan, Jiangxi, and Shanxi provinces from central China; and Ningxia, Sichuan, and Guizhou provinces from west China. Provinces in the same group have similar indicators (including total population, GDP per capita, farmland area, farmland proportion, agricultural population proportion, and agricultural output value proportion), whereas provinces in different groups have large differences. We then determined the sample counties. We divided all

counties in each sample province into three groups according to the abovementioned clustering indices and randomly selected two counties from each group, totaling 54 counties. Finally, we determined the sample counties, villages, and households. We randomly chose four townships in each county, one village in each township, two natural villages in each village, and five farm households in each natural village. We finally interviewed 2880 farmers, but usable answers were collected from 2704 farmers (questionnaires with substantial missing content were excluded). The useable rate of the questionnaire is 93.89%. The surveyed provinces are shown in Fig. 2.

The variable definitions and descriptive statistics are presented in Table 2. We use credit from formal financial institutions, agricultural investment, deposits, credit demand (loan application willingness from formal sources), borrowing from private sources, and lending to private sources to analyze farmers' financial behavior. Changes in the rural financial structure were observed through the proportion of formal and informal financing. We find 613 (22.7%) households have transferred out farmland, and 326 (12.17%) households have transferred in farmland. Compared with insecure farmland rights, farmland titling increases all farmland transactions. Only 53.86% of households had obtained farmland titling in our sample, which might explain the low ratio of farmland transfer-out and farmland transfer-in. The average log value of equipment and machinery used in agriculture is 7.752, and the corresponding agricultural investment is 2326 RMB. Households who have not borrowed account for 80.52%, of which 22.91% demonstrated a willingness to apply for loans, while the other 77.09% were unwilling to apply for loans from formal financial institutions. Households with deposits in banks represent 75.85% of the total sample. Households with credit records supposedly have more opportunities to obtain loans from formal financial institutions. Some of these households (28.96%) also showed an increase in deposit amounts in 2014 compared with 2013. Because of insufficient credit access in rural areas, borrowing from informal channels is an important avenue for farmers. We find that 37.04% of households borrowed from private sources, and 31.74% lent money to others.

We used the household head's characteristics (age, gender, and education level), labor ratio (ratio of working adults divided by total

⁶ Multi-stage stratified random sampling has the following advantages. First, it ensures that the sample contains sampling units with various characteristics, and the sample structure is relatively close to the population structure. Second, it is convenient for the organization and implementation of the survey. Third, we can estimate model to derive interested parameter values and understand the details about each stratified sample.

Table 2
Variable definition and descriptive statistics.

Variable	Definition	Mean	Std.
<i>Dependent variables</i>			
Loan	Household has loan from formal financial institutions (yes = 1, or else 0)	0.195	0.397
Loanw	Household hope to loan more (yes = 1, or else 0)	0.301	0.459
Deposit	Household increase deposit this year (yes = 1, or else 0)	0.289	0.454
Borrowp	Household borrow money from relatives and friends (yes = 1, or else 0)	0.370	0.483
Lendp	Household lend money to relatives and friends (yes = 1, or else 0)	0.317	0.466
Ainvest	Household food crop and cash crop equipment and machine value (take log)	7.752	1.585
<i>Core explanatory variables</i>			
Transfer-out	Household transfers farmland out (yes = 1, or else 0)	0.227	0.418
Transfer-in	Household transfers farmland in (yes = 1, or else 0)	0.121	0.326
<i>Household Characteristics</i>			
Gender	Household head's gender (male = 1, female = 0)	0.636	0.480
Age	Household head's age	43.471	15.138
Educ	Household head's education level (primary school = 1, junior school = 2, high school = 3, above high school = 4)	2.077	0.987
Income	The family income (less than 10 thousand yuan = 1, 10–30 thousand = 2, 30–50 thousand yuan = 3, 50–100 thousand yuan = 4, over 100 thousand yuan = 5)	2.669	1.125
Juniorh	The number of labors with junior high school level	2.257	1.291
Seniorh	The number of labors with senior high school level	0.808	1.024
Laborratio	The ratio of labors and family member	0.725	0.254
Farming	The number of doing farming only in the household	1.049	1.052
Relative	Household has few relatives and friends (yes = 1, or else 0)	0.056	0.231
Cadre	There are village cadres in your family (yes = 1, or else 0)	0.126	0.332
Farmlands	The area of household farmlands	6.814	19.946
Agincome	The ratio of household agricultural income to total income	0.365	0.331
Title	Household farmland have been titled (yes = 1, or else 0)	0.539	0.499
<i>Village Characteristics</i>			
Economy	This county economic development level is very low on this province (yes = 1, or else 0)	0.062	0.241
Transport	Transportation level of this village is very good (yes = 1, or else 0)	0.072	0.258

Note: The data source is from an in-person interview survey by South China Agriculture University in 2015. Table 2 presents the definition and some descriptive statistics of variables we used in the paper.

family members), number of working adults with a junior high school education or below, number of working adults with a senior high school degree or above, and number of adults who are full-time farmworkers to indicate household demographic situations. On average, households have two adults with junior high school education, 0.8 adults with a high school degree, 1.05 adults working on farms only, and 0.81 adults involved in on-farm and off-farm work. We use village cadres, relatives, and friends to indicate farmers' social relationships. Relatives and friends are informal financial resources. Many households responded that they have many friends and relatives, representing 45.7% of the total surveyed households. These circles of friends and relatives give farmers strong networks to borrow or lend. Village cadres can also assist in obtaining relevant information about national policies to make the right decision for the household. Therefore, a household with a village cadre receives greater benefits. We find that 12.63% of households have a family member as a village cadre.

We use farmland holding size, the amount of income from agricultural sources, the size of uncultivated farmland, farmland titling, and household income as economic variables. The average household farmland size is 6.8 mu (1 mu = 0.067 ha), of which the uncultivated farmland size is 0.609 mu (8.94%). The farmers' share of total income from agricultural sources is 36.59%, 48.59% is earned from migrants working off-farm sources, 4.29% from business sources, and 5.17% from other sources. On average, in each household, there are 1.05 adults dedicated to farming and 0.81 adults involved in farming as well as off-farm work. This labor structure proves to be a catalyst for change in the farmland factors market. Off-farm work reduces on-farm labor availability and results in more farmland idling; however, it also provides opportunities for more workers to engage in small and medium enterprises.

Farmland titling promotes farmland transfers. We find that 721 households are in the process of farmland titling (26.7%), 1454 households have already received the farmland titling (53.86%), and the remaining 525 (19.44%) households did not know if the farmland had been titled in their village collectives. Variables representing economic

development and transportation levels in a county help identify the effects of locational heterogeneity.

We also show the descriptive statistics of the outcome variables in the group with only farmland transferred out, the group with only farmland transferred in, and the group with neither farmland transfer-out nor farmland transfer-in (the base group) in Fig. 3.⁷ There is a significant difference in financial behavior between the groups. On the one hand, the agricultural investment and borrowing willingness of farmers who only transfer their farmland out are significantly lower (by 0.657 and 5.7% on average, respectively) than those of households who do not transfer their farmland. The deposit and lending to the private sector for farmers who only transfer their farmland out are significantly higher (by 5.9% and 4.2% on average, respectively) than for farmers who do not transfer their farmland. On the other hand, farmers who only transfer-in farmland have higher financing demand. Their formal loan availability, loan willingness, and borrowing from private sources are higher (by 10.6%, 7.9%, and 10.7% on average, respectively) than those of farmers who do not transfer farmland. In addition, their deposit and agricultural investment are higher (by 5.0% and 0.521, respectively) than the base group. Nevertheless, the mean difference in these variables may be due to differences in other factors between the two groups. Whether farmland transfers affect farmers' financial behavior requires further empirical testing.

5. Empirical analyses

5.1. Baseline model

To obtain the effect of farmland transfers on rural financial structure, we estimate the following reduced-form model:

⁷ We relegate details related to inter-group difference for all variables in the appendix (Table A.1).

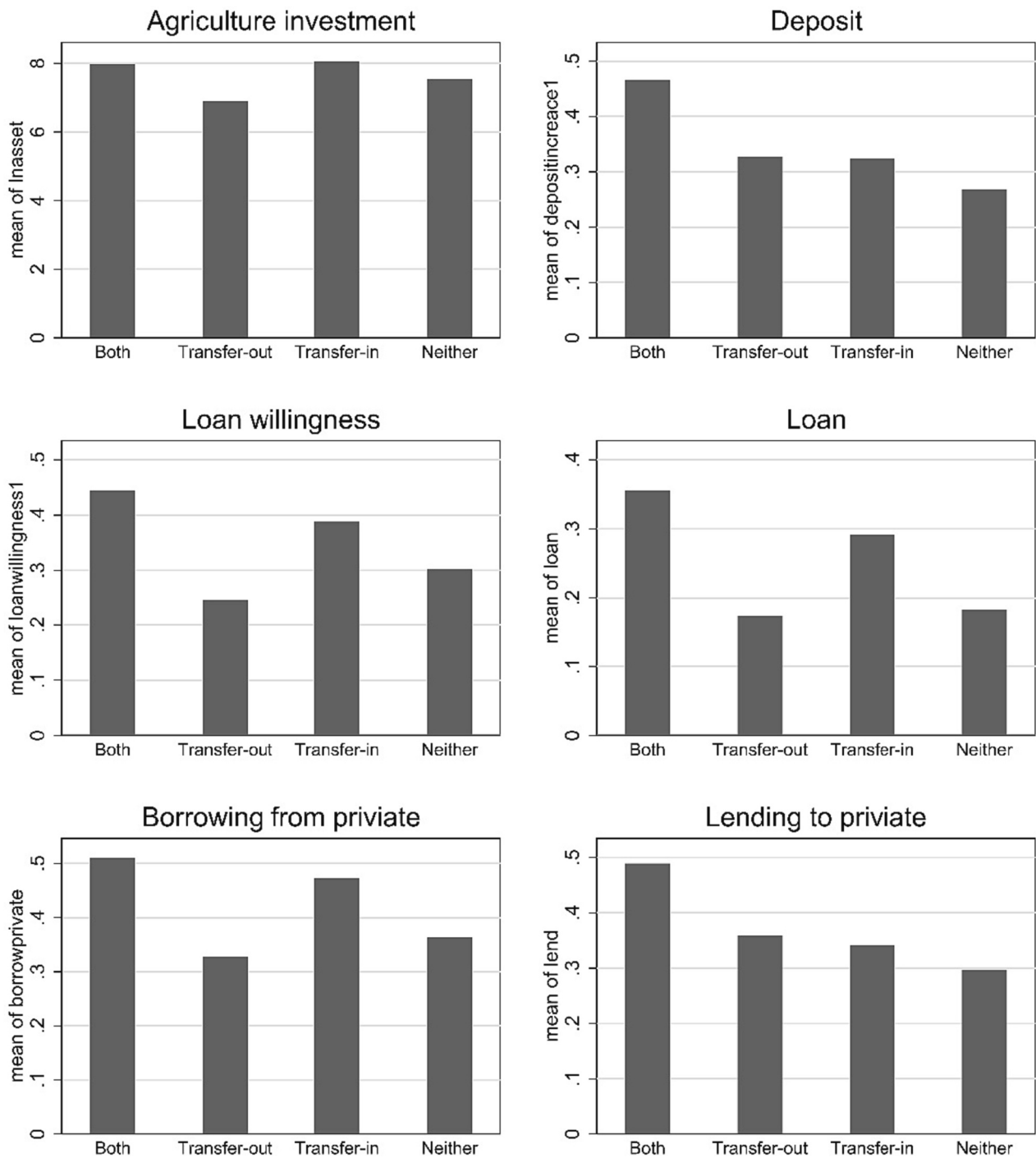


Fig. 3. Inter-group difference for outcome variable.

Note: The data source is from an in-person interview survey by South China Agriculture University in 2015. Fig. 3 reports the average value of outcome variables. “Both” is the group both with farmland transferred out and transferred in. “Transfer-out” is the group with only farmland transferred out. “Transfer-in” is the group with only farmland transferred in. “Neither” is the group with neither farmland transfer-out nor farmland transfer-in (the base group). Agricultural investment is the household food crop and cash crop equipment and machine value (take log). Deposit of formal financial institutions is a binary variable indicating that household increase deposit this year (yes = 1, or else 0). Loan willingness is a dummy variable indicating that the household hope to loan more from formal financial institutions (yes = 1, or else 0). Loan from formal financial institutions is a binary variable indicating that the household has loan from Formal financial institutions. (yes = 1, or else 0). Borrowing from private is a binary variable indicating that the household borrow money from relatives and friends (yes = 1, or else 0). Lending to private is a dummy variable indicating that the household lend money to relatives and friends (yes = 1, or else 0).

$$y_i = \beta_0 + \beta_1 transferout_i + \beta_2 transferin_i + x_i' \beta + c_i + \varepsilon_i \quad (1)$$

Where y_i are some outcome variables for the i^{th} household. Outcome variables are agricultural investment (Aginvest), deposits (Deposit), loans (Loan, this variable indicates farmers' loan holding situation from

formal financial institutions), loan willingness (Loanw, this variable gives information if farmers are willing to apply for loans from formal financial institutions), borrowing from informal channels (Borrowwp), and lending to informal channels (Lendp). $transferout_i$ is a binary variable indicating whether the i^{th} household transfer their farmland

Table 3

The impact of farmland transfers on agricultural investment.

	Agricultural investment					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Transfer-out	−0.646*** (0.185)	−0.628*** (0.175)	−0.598*** (0.173)	−2.969*** (0.793)	−3.314*** (0.932)	−2.987*** (0.919)
Transfer-in	0.522*** (0.173)	0.463*** (0.166)	0.429** (0.166)	1.658** (0.672)	1.440* (0.752)	1.192* (0.736)
Household Characteristics	No	Yes	Yes	No	Yes	Yes
Village Characteristics	No	No	Yes	No	No	Yes
Province fixed effect	No	Yes	Yes	No	Yes	Yes
Observations	616	616	616	572	572	572

Notes: The data source is from in-person interview survey by South China Agriculture University in 2015. The table reports the impact of farmland transfer on agricultural investment. Agricultural investment is the household food crop and cash crop equipment and machine value (take log). Transfer-out is a dummy that is 1 if households transfer their farmland out. Transfer-in is a dummy that is 1 if households transfer others' farmland in. Standard errors are shown in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%.

out. $transfer_{it}$ is a binary variable indicating whether the i^{th} household transfers in farmland from other farmers. x_i represents a set of household characteristics vectors. For different outcome variables, we select the corresponding control variable based on the existing literature (Cheng, Zhou, & Zhang, 2021), generally including household head's characteristics (age, gender, annual income, and educational level), the number of laborers in a household with junior high-level education, the number of laborers in a household with senior high school level, the ratio of laborers and family member (Laborratio), the number of family members only farming in the household (Farming), a social network of household (Relative, Cadre), farmland area of a household (Farmlands), the ratio of household agricultural income to total income (Agincome), farmland titling situation (Title). Besides, some village-level variables could impact farmland transfer decisions and financial behaviors. Therefore, we consider economic development levels and transportation conditions of villages to capture some village characteristics. c_i includes province-level fixed effects.

5.2. Identification challenge and instrumental variable strategy

Generally speaking, there is a hidden bias due to unobservable or unobserved characteristics that are correlated with the treatment and the dependent variable (Wooldridge, 2010). Typically, such a potential confounder, for instance, is farmers' cultivation ability. The cultivation ability could not be measured precisely, while these could be not only positively correlated with farmland transfer-in (negatively correlated with farmland transfer-out) but also affect agricultural investment decisions and financial behaviors. Farmers with better skills in farming are more likely to transfer-in farmland. Also, they may invest more resources in their farmland and have greater financing needs. Omitting farmers' cultivation ability, therefore, is likely to bias the coefficient of $transfer_{it}$ and $transfer_{in}$ although we controlled as many observable variables as possible.

Another endogeneity issue is the reverse causality. For instance, farmers who do not intend to invest resources in farmland may transfer their farmland out to obtain the farmland rent. That is, lower investment incentives may lead to a higher possibility of farmland transfer-out. If so, it could, in particular, bias the coefficient of the treatment variable upwards. In other words, we probably underestimate the impact of the transfer-out on agricultural investment. At the same time, farmers who intend to invest more resources in their farmland may transfer-in farmland to expand production scale, which leads to a bias in the impact of the transfer-in on agricultural investment. Similarly, farmers with a higher (lower) financing demand may transfer-in (transfer-out) farmland, which also lends to the endogeneity issue of reverse causality.

Therefore, we use the instrumental variable (IV) approach to address these concerns. Based on the explanations provided by Kung (2002) and

Li et al. (2021), we take “the farmland transfer out proportion of other peasant households within the village” as the IV of $transfer_{it}$, and “the farmland transfer in proportion of other peasant households within the village” as the IV of $transfer_{in}$. The first stage regressions are:

$$transfer_{out_i} = \gamma_0 + \gamma_1 other_{out_i} + x_i' \gamma + c_i + \xi_i \quad (2)$$

$$transfer_{in_i} = \theta_0 + \theta_1 other_{in_i} + x_i' \theta + c_i + \lambda_i \quad (3)$$

The second stage regression is:

$$y_i = \alpha_0 + \alpha_1 \widehat{transfer_{out_i}} + \alpha_2 \widehat{transfer_{in_i}} + x_i' \alpha + c_i + \varepsilon_i \quad (4)$$

where $other_{out_i}$ represents “Except for the i^{th} peasant household, the farmland transfer-out proportion of other peasant households within the village”, and $other_{in_i}$ represents “Except for the i^{th} peasant household, the farmland transfer-in proportion of other peasant households within the village”. Specifically, suppose there are N households in the village, then $other_{out_i}$ and $other_{in_i}$ is generated by the following form:

$$other_{out_i} = 1 - \frac{\sum_{j=1, j \neq i}^N transfer_{out_j}}{N} \quad (5)$$

$$other_{in_i} = 1 - \frac{\sum_{j=1, j \neq i}^N transfer_{in_j}}{N} \quad (6)$$

The IV must satisfy two key assumptions: relevancy and exclusion restrictions. That is, such an instrument must be correlated with farmland transfer behavior (i.e., the relevancy assumption) but have no direct effect on investment decision and financing behavior when conditional on other control variables (i.e., the exclusion restriction). We argue now and later empirically show IVs meet the relevancy assumption because the proportion of other households within the village represents the maturity of the village's farmland transfer market. The more mature the farmland transfer market, the easier it is for households to find trading partners when transferring their farmland, and the easier it is to transfer out/in farmland. Also, the spillover effect of land transfer between farmers within the village may exist. Therefore, IVs should be positively correlated with endogenous variables. The results of first-stage regression show that the coefficients of $other_{out_i}$ and $other_{in_i}$ are all highly significant at the 1% level, and all F-statistics values are greater than 10 (see Table A.2), indicating that our IVs satisfy the correlation assumption, so $other_{out_i}$ and $other_{in_i}$ are not weak instruments.

Regarding the exclusion assumption, our primary concern is whether the IVs affect the dependent variables through unobservable alternative channels other than the endogenous variable of interest given the control variables, i.e., whether the IVs are uncorrelated with the disturbance

Table 4

The impact of farmland transfers on formal finance.

	Deposit of financial institution			
	OLS		IV	
	(1)	(2)	(3)	(4)
<i>Panel A: Effect on deposit</i>				
Transfer-out	0.049** (0.022)	0.051** (0.022)	0.104** (0.052)	0.051** (0.022)
Transfer-in	0.069** (0.028)	0.072*** (0.028)	0.002 (0.114)	0.075*** (0.028)
Household Characteristics	Yes	Yes	Yes	Yes
Village Characteristics	No	Yes	No	Yes
Province fixed effect	No	Yes	No	Yes
Observation	2678	2678	2497	2497
<i>Loan willingness</i>				
<i>Panel B: Effect on loan willingness</i>				
Transfer-out	−0.037* (0.020)	−0.037* (0.021)	−0.135*** (0.049)	−0.135** (0.057)
Transfer-in	0.076*** (0.029)	0.053* (0.029)	0.307** (0.124)	0.174* (0.103)
Household Characteristics	Yes	Yes	Yes	Yes
Village Characteristics	No	Yes	No	Yes
Province fixed effect	No	Yes	No	Yes
Observation	2678	2678	2497	2497
<i>Loan from financial institution</i>				
<i>Panel C: Effect on formal loan</i>				
Transfer-out	0.001 (0.018)	−0.008 (0.018)	−0.023 (0.045)	0.033 (0.081)
Transfer-in	0.106*** (0.027)	0.087*** (0.026)	0.195* (0.110)	0.261*** (0.081)
Household Characteristics	Yes	Yes	Yes	Yes
Village Characteristics	No	Yes	No	Yes
Province fixed effect	No	Yes	No	Yes
Observation	2678	2678	2497	2497

Notes: The data source is from in-person interview survey by South China Agriculture University in 2015. [Table 4](#) reports the impact of farmland transfer on formal financial. Deposit of formal financial institutions is a binary variable indicating that household increase deposit this year (yes = 1, or else 0). Loan willingness is a dummy variable indicating that the household hope to loan more from Formal financial institutions (yes = 1, or else 0). Loan from formal financial institutions is a binary variable indicating that the household has loan from formal financial institutions. (yes = 1, or else 0). Transfer-out is a dummy that is 1 if households transfer their farmland out. Transfer-in is a dummy that is 1 if households transfer others' farmland in. Standard errors are shown in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%.

ϵ . IVs here are "Except for the i^{th} peasant household, the farmland transfer-in proportion of other peasant households within the village". Generally speaking, other farmers' (except i^{th} farmer) farmland transfers behaviors do not directly affect the i^{th} farmer's investment and financing decisions. However, the validity assumption of the exclusion restriction is untestable. Nonetheless, we provide some empirical evidence of exclusion for robust checks. First, one concern is that IVs here are the farmland transfer proportion of other peasant households within the village. IVs may correlate with unobservable village-level factors that directly affect dependent variables. We control village-level variables potentially correlated with dependent variables, including the average idling farmland area and fertility in the village, to see the sensitivity of coefficients and significance of $transferout_i$ and $transferin_i$. Second, we also provide a plausibly exogenous estimation (Conley, Hansen, & Rossi, 2012), allowing for inference using instrumental variable estimation in situations where the exclusion restriction does not hold precisely.

Table 5

The impact of farmland transfers on informal finance.

	Borrowing from private			
	OLS		IV	
	(1)	(2)	(3)	(4)
<i>Panel A: Effect on Borrowing from private</i>				
Transfer-out	−0.029 (0.022)	−0.020 (0.022)	−0.061 (0.054)	−0.039 (0.060)
Transfer-in	0.117*** (0.030)	0.109*** (0.030)	0.246** (0.122)	0.235* (0.132)
Household Characteristics	Yes	Yes	Yes	Yes
Village Characteristics	No	Yes	No	Yes
Province fixed effect	No	Yes	No	Yes
Observation	2678	2678	2497	2497
<i>Lending to private</i>				
<i>Panel B: Effect on Lending to private</i>				
Transfer-out	0.056** (0.022)	0.056** (0.022)	−0.032 (0.054)	0.086** (0.036)
Transfer-in	0.059** (0.028)	0.059** (0.029)	0.167 (0.117)	0.002 (0.044)
Household Characteristics	Yes	Yes	Yes	Yes
Village Characteristics	No	Yes	No	Yes
Province fixed effect	No	Yes	No	Yes
Observation	2678	2678	2497	2497

Notes: The data source is from in-person interview survey by South China Agriculture University in 2015. [Table 5](#) reports the impact of farmland transfers on informal financial. Borrowing from private is a binary variable indicating that the household borrow money from relatives and friends (yes = 1, or else 0). Lending to private is a dummy variable indicating that the household lend money to relatives and friends (yes = 1, or else 0). Transfer-out is a dummy that is 1 if households transfer their farmland out. Transfer-in is a dummy that is 1 if households transfer others' farmland in. Standard errors are shown in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%.

6. Results

[Tables 3 to 5](#) present the effects of farmland transfer on formal and informal financial activities. We show both OLS results and IV results. Most coefficients of $transferout_i$ and $transferin_i$ change dramatically as we go from OLS to IV results, indicating that farmers' farmland transfer behavior is correlated with some unobservable factors of disturbance term. It may lead to biased results using the OLS model. Therefore, we use the IV results for further analysis.

6.1. Effects of farmland transfer on agricultural investment

After controlling for household characteristics, the IV results in column (4) of [Table 3](#) show that the coefficients of $transferout_i$ and $transferin_i$ are 2.969 and 1.658, respectively. Both values are significant at the 5% level, which indicates that farmland transfer-out/transfer-in has a negative/positive effect on agricultural investment.

However, some common shocks at the province level and some village factors may simultaneously influence farmers' land transfer decision and their financial behavior. If we omit these variables, it may lead to the omitted variable bias. Therefore, we control both province fixed effects and village characteristics such as economic status and transport condition and the results are shown in column (6) in [Table 3](#). The coefficient of $transferout_i$ has hardly changed, which is −2.987 and significant at the 1% level. The coefficient of $transferout_i$ changes from 1.658 to 1.192, but it is still significant at the 10% level. This means that farmers who transfer-out farmland reduce agricultural investment by 298.7% compared to no farmland transfers farmers, while farmers who transfer-in farmland increase agricultural investment by 119.2% compared to no farmland transfers farmers.

Deininger and Jin (2005) report that off-farm sector development and improved education increase farmland transfer-out, thereby

reducing investment in agricultural operations by farmers. Professional agricultural cooperatives develop and provide custom farm machinery services as agricultural modernization and socialization progress; thus, farmers could decrease agricultural investment. Farmers who transfer out farmland reduce investment in farmland because they reallocate their production factors through farmland transfer-out and surplus farm labor to off-farm work (Li et al., 2021). Production factors reallocation provides added income for farmers through farmland rent and wages earned by farm laborers working off farms. The number of households with a total annual income above 50,000 RMB increased slightly among those who transfer out farmland in our sample. On average, farmland transfer-out increases the farm rent income of a household by 4682.49 RMB⁸ in our sample. Farmland transfers ensure that farmland is concentrated among efficient farmers with time and interest in farming. Farmland transfer-out causes households to have a 4.56% higher income ratio from off-farm sources. In our sample, the income of farmland transfer-out households from agriculture sources is 31.07%, and that from off-farm sources is 50.78%. These values are 38.21% (farm) and 47.95% (off-farm) for non-farmland transfer-out farmers. Rural-to-urban migration appears to be the most critical reason for farmland transfer-out. As farmland transfer-out increases, farmers decrease their investment in farms.

Farmers who transfer-in farmland increase agricultural investment by 119.2% compared to no farmland transfers farmers. The reason is that with the support of the state's preferential policies, farmers with comparative advantages in agricultural production can obtain more income than their non-agricultural income by transferring in farmland and increasing agricultural investment, thereby increasing the scale of production and improving agricultural production efficiency. Therefore, the transfer-in of agricultural land increases agricultural investment.

6.2. Effects of farmland transfer on financial behavior

We use formal and informal financial activities resulting from farmland transfers to understand changes in the rural financial structure change. Formal financial activities include deposits made, loans obtained, and credit demanded from a formal financial channel such as banks or Rural Credit Cooperatives (RCC). Informal financial activities include i) borrowing from relatives, friends, and other informal channels and ii) lending to relatives, friends, and other informal channels. We report the treatment effects of farmland transfer-out and transfer-in on various financial activities.

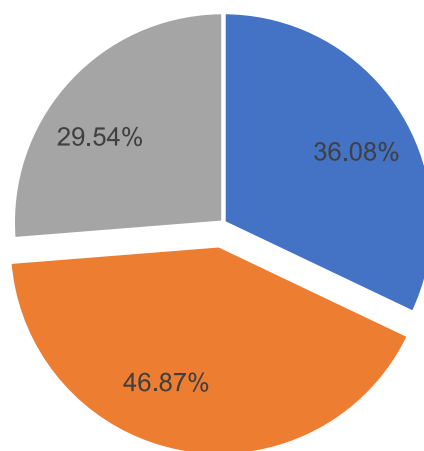
Table 4 shows the impact of farmland transfers on formal financial behavior. Column (4) of panel A show that the probability of increasing the deposit for farmers who transfer-out farmland is 5.1% higher than that of farmers who have no farmland transfers, the probability of increasing the deposit for farmers who transfer-in farmland is 7.5% higher than that of farmers who have no farmland transfers. Column (4) of panel B indicates that, compared to farmers with no farmland transfers, the probability of loan willingness (wanting to borrow) for farmers who transfer-out farmland is 13.5% lower. In comparison, the probability of loan willingness (willing to borrow) for farmers who transfer-in farmland is 17.4% higher. Column (4) of panel C shows that the probability of getting a loan from formal financial institutions for farmers who transfer-in farmland is 26.1% higher than the base group. Table 5 shows the impact of farmland transfers on informal financial behavior. Column (4) of panel A shows that the probability of borrowing from other individuals for farmers who transfer-in farmland is 23.5% higher than that of farmers without farmland transfers. Column (4) of panel B shows that the probability of lending to private persons for farmers who transfer farmland out is 8.6% higher than that of farmers without farmland transfers.

⁸ This is obtained by farmland rent of 808.72 RMB per mu per year multiplied by an average of 5.79 mu per farm household.

The optimization process of factor allocation causes the household production structure to vary, resulting in a new optimal financial structure that matches it. Farmers who transfer-out farmland are not significant loan users of formal financial institutions (see column 4 of Panel C, Table 4). They allocate these extra funds through increasing deposits in formal financial institutions and lending to other individuals or utilizing other informal financial sources in rural areas. Farmland transfer-out farmers deposit more (see column 4 of Panel A, Table 4) and lend more (see column 4 of Panel B, Table 5) to other individuals (private lending) than no farmland transfer farmers. Farmland transfer-out promotes the development of informal finance more.

RCC is a unique FI in many rural areas in China. Other formal financial institutions, such as the Agricultural Bank of China, Rural Commercial Bank, and Postal Savings Bank of China, are located in cities or towns. The lack of formal financial institutions, poor transportation network, and limited financial knowledge increases the transaction costs of deposits in formal financial institutions. Farmers also receive low interest in deposits made to the RCC. According to the People's Bank of China, the interest rate paid for deposits made in the RCC was approximately 0.35% per year for demand deposits and 3.3% for one-year time deposits in 2015. Contrarily, the credit interest rate charged by the RCC to farmers per year was 5.25% in 2015. The interest rate paid by borrowers in informal markets in the same year was as high as the legally permitted rate of 24% or higher, making it usurious. The interest rate of the informal credit market is decided by fund supply and demand, which can reflect the fund shortage situation. The People's Bank of China constrains the interest rate of formal financial institutions. Therefore, farmland transfer-out reduces investment in agricultural production, changes the household production structure, increases the funds lending through informal financial channels, supports the development of informal finance, and changes the rural financial structure. Although farmland transfer-out increases formal financial institutions' deposits, most deposits are moved from rural to urban areas.

Farmland transfer-in induces more fund demands because of farmland rental payment and agricultural investment requirements. Farmland transfer-in costs averaged 361 RMB per mu per year, and the average agricultural investment per farmer made by farmland transfer-in households was 5759 RMB in our sample. Therefore, funds are necessary for farmland transfer-in. On the one hand, farmers can secure those through borrowing from formal financial institutions. The IV results from Table 4 indicate that farmers who transfer farmland in borrow 26.1% more from formal financial institutions than farmers without farmland transfers. Evidence from many countries shows a positive relationship between land transfer and borrowing from formal financial



■ None ■ Houses and residences ■ Other properties

Fig. 4. Types of collateral used by farmland transfer-in farm households.

institutions (Barham, Boucher, & Carter, 2008; Field & Torero, 2006; Feder, Onchan, & Raparla, 1988; Carter & Olinto, 2003). Our survey results in Fig. 4 show that farmers with farmland transfer-in obtain loans without using collateral (36.1%) use their houses and residences as collateral (46.9%), or use some other properties as collateral (29.5%). Farmers with transfer-in farmland are more likely to receive loans from formal financial institutions because farmland can provide capital and production signals and acceptable collateral. Farmland is characterized by asset specificity, suffers from fragmentation, and is concerned about substantial endowment effects (Zhu, Paudel, & Luo, 2021). These imperfections increase collateral costs, which raises borrowing costs for farmers. However, houses and residences have become more effective collateral because they are more liquid than farmland. Guirkinger (2008) indicates that a complete farmland market cannot resolve contractual risk, higher transaction cost, and farm household operation risk in farmland collateral credit. Financial linkage is an effective mode of institutional innovation. Increasing loan accessibility makes farmland transfer-in farmers have 17.4% more credit demand from formal financial institutions than non-farmland transfer-in farmers (see Table 4, column 4). Our empirical study proves that farmland transfer-in promotes the role of formal finance in rural financial structure.

On the other hand, farmers can also secure funds for farmland transfer-in through informal channels. The IV results from Column (4) of Panel A in Table 5 indicate that farmers who transfer-in farmland borrow 23.5% more from private sources than farmers who do not transfer farmland. More investment needs (previous conclusions) of farmers who transfer-in farmland and the convenience and prevalence of informal finance could have contributed to this result. In our sample, loans from informal financial sources account for 47.9% of the farmers who transferred farmland in, whereas 35.5% of farmers who did not borrow from informal financial sources. At the same time, 30.1% of farmers who transfer-in farmland borrowed from formal financial institutions, whereas 18.0% did not borrow from formal financial sources. Fig. 5 shows that farmers' leading sources of informal finance are friends and relatives (91.67%) and farmers within the same village (18.6%). Other informal financial resources are other persons and institutions, including village collectives, mutual-loan clubs, Farmers Cooperation Fund, and leading agricultural enterprises. Indeed, farmland transfers have had a significant impact on the rural financial structure. Although

formal and informal finance have been developed due to farmland transfers, the proportion of informal finance has been higher on the original basis.

Investment boosting agricultural productivity is the key to economic growth and poverty reduction (Deininger et al., 2008). Farmland transfer-in affects income through the return rate of investment on farmland. Unlike farmland transfer-out farmers, farmland transfer-in farmers deposit their income in formal financial institutions. Their deposits increased by 7.5% (column 4 of panel A, Table 4), whereas farmland transfer-out farmers' deposits increased by 5.1%. There are at least three reasons for this change in financial behavior. First, combined with increasing loans, we can infer that deposits come from compensating balances used by formal financial institutions to evade the credit risk of loans. Second, loan disbursement that needs the borrower accounts and deposits in formal financial institutions improves financial literacy and influences farmers' financial behavior. Farmers reassess the risks and benefits of deposits. Third, income enhancement from increased agricultural investment can also contribute to deposits as credit disbursing farmers' deposits increases income in the RCC. In most cases, only a small fraction of the formal financial deposits increased due to the transfer-in of farmland return to the countryside through loans from formal financial institutions.

Therefore, farmland transfer-in enables farmers to increase their investment in agricultural production, change the agricultural production structure, and increase loans from formal and informal financial channels. More loans from informal sources than formal financial sources support the development of informal finance, changing the rural financial structure. Eventually, informal finance is developed compared to formal finance for farmland transfer-in and transfer-out.

7. Robustness analysis

7.1. Control more village-level variables

We take "the farmland transfer out (in) proportion of other peasant households within the village" as the IVs, which represent the land transfer level of the village. One concern is that these IVs may correlate with some unobservable village-level factors directly affecting dependent variables. Therefore, we add the average idling farmland area and

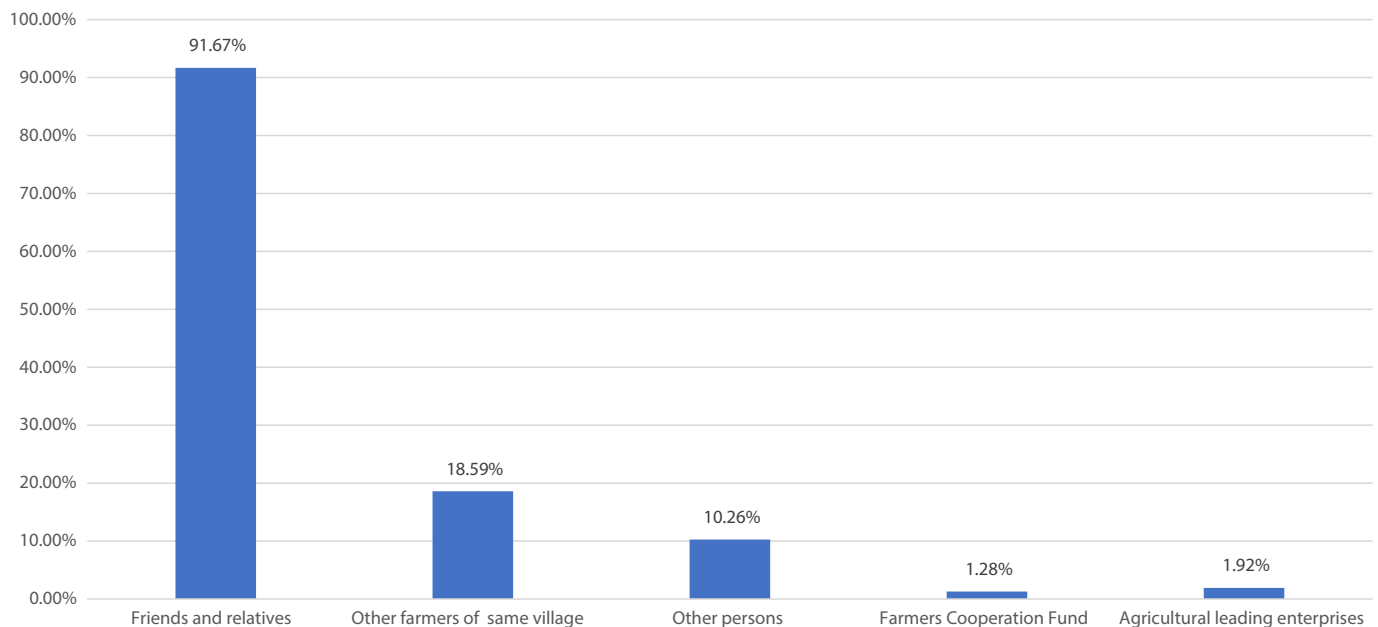


Fig. 5. Alternative informal financial sources utilized by farmland transfer-in farmers in China.

Notes: The data source is from an in-person interview survey by South China Agriculture University in 2015. This Figure shows types of informal finance used in percentage by farmland transfer-in farmers.

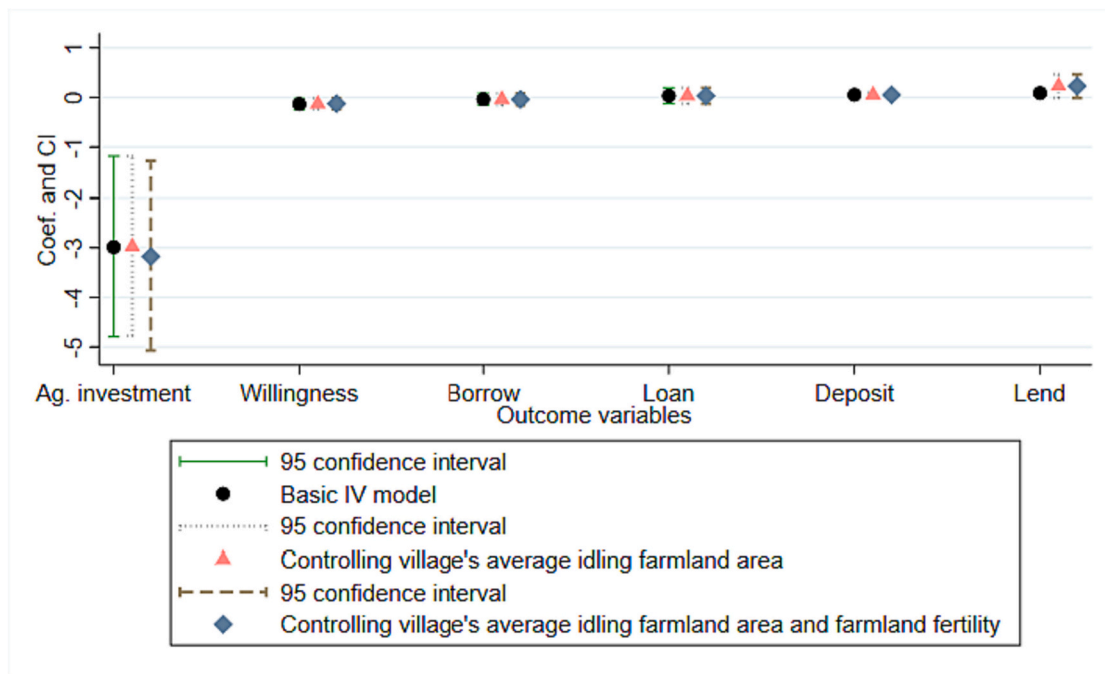


Fig. 6. Coefficients of transfer-out (IV model).

Note: The data source is from an in-person interview survey by South China Agriculture University in 2015. Fig. 6 shows the change of coefficients and confidence interval of $transferout_i$ after controlling more village factors. s.

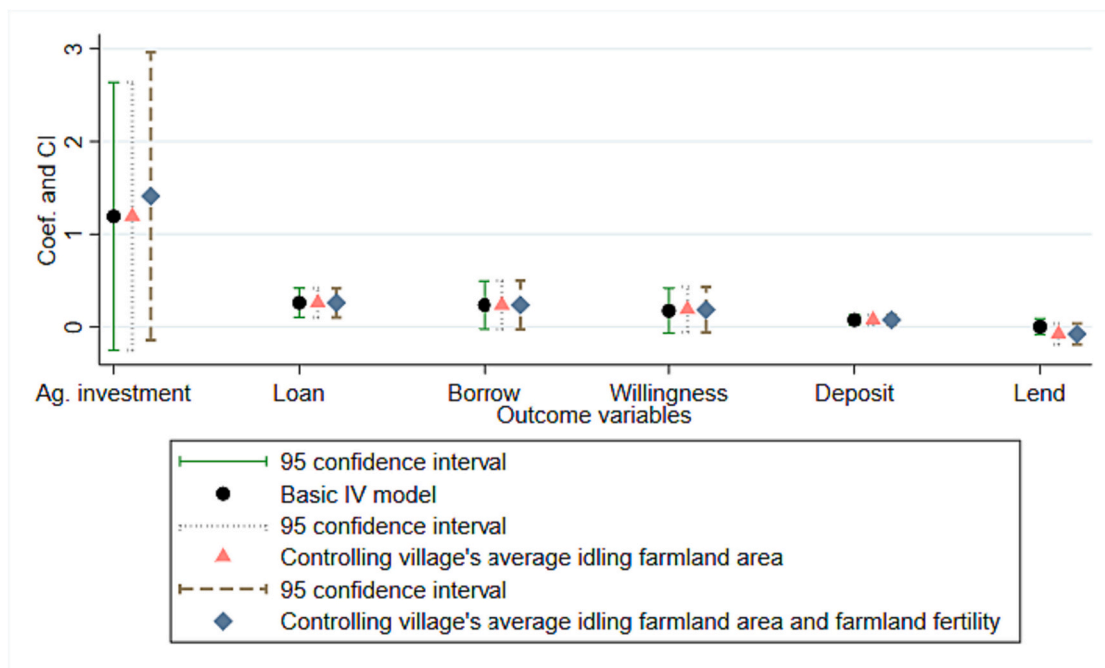


Fig. 7. Coefficients of transfer-in (IV model).

Note: The data source is from an in-person interview survey by South China Agriculture University in 2015. Fig. 7 shows the change of coefficients and confidence interval of $transferin_i$ after controlling more village factors.

average farmland fertility in the village as control variables to determine the sensitivity of coefficients and significance of $transferout_i$ and $transferin_i$. Figs. 6 and 7 show the variation of coefficients and confidence intervals of $transferout_i$ and $transferin_i$, respectively (Table 6 presents specific results). For models where the outcome variables are deposit, loan willingness, loan, borrow from a private source, coefficients and confidence intervals of $transferout_i$ and $transferin_i$ hardly

change. For models where outcome variables are agricultural investment and lend to private source, coefficients and confidence intervals of $transferout_i$ and $transferin_i$ change slightly. Even so, farmland transfer-out still has a significant negative effect on agricultural investment and a significantly positive effect on lending to private. Farmland transfer-in still has a significant positive effect on agricultural investment. Overall, the empirical results after controlling for more village-

Table 6

IV results with controlling more village-level variables.

	Agricultural Investment	Formal finance			Informal finance	
		Deposit	Loan willingness	Loan	Borrowing	Lending
	(1)	(2)	(3)	(4)	(5)	(6)
Transfer-out	−3.175*** (0.965)	0.050** (0.022)	−0.126** (0.057)	0.031 (0.081)	−0.040 (0.061)	0.233* (0.121)
Transfer-in	1.411* (0.791)	0.076*** (0.028)	0.184* (0.105)	0.259*** (0.081)	0.236* (0.135)	−0.088 (0.050)
Average idling farmland in the village	−0.006 (0.057)	0.001 (0.005)	0.006 (0.005)	−0.003 (0.016)	0.000 (0.005)	−0.001 (0.005)
Average farmland fertility in the village	−0.286* (0.157)	−0.029* (0.017)	0.015 (0.017)	−0.013 (0.035)	−0.003 (0.018)	−0.044** (0.018)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Village Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	572	2497	2497	2483	2497	2497

Notes: The data source is from in-person interview survey by South China Agriculture University in 2015. Average idling farmland in the village is calculated by “the number of idling farmland owned by the household / total number of idling in the village”. Average farmland fertility in the village is the average value of all households’ farmland fertility, which is filled out by farmers. The questionnaire question is: “How do you feel about the overall soil fertility of the cultivated farmland your household has grown: 1 = Very good; 2 = Good; 3 = Fair; 4 = Bad; 5 = Very bad”, which are subjective categories stated by the respondents. Agricultural investment is the household food crop and cash crop equipment and machine value (take log). Deposit is a binary variable indicating that household increase deposit this year (yes = 1, or else 0). Loan willingness is a dummy variable indicating that the household hope to loan more from Formal financial institutions (yes = 1, or else 0). Loan is a binary variable indicating that the household has loan from Formal financial institutions. (yes = 1, or else 0). Borrowing is a binary variable indicating that the household borrow money from relatives and friends (yes = 1, or else 0). Lending is a dummy variable indicating that the household lend money to relatives and friends (yes = 1, or else 0). Transfer-out is a dummy that is 1 if households transfer their farmland out. Transfer-in is a dummy that is 1 if households transfer others’ farmland in. Standard errors are shown in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%.

level variables are similar to the previous IV results (Tables 3–5). Therefore, we believe that our IV results are robust.

7.2. Relaxing instrument exogeneity

Although we have controlled some village-level variables, it is impossible to identify all unobservable factors through which IV affects dependent variables. Therefore, we can assume that the instrumental variables failed to satisfy the usual exogeneity condition. We test parameter sensitivity following the plausibly exogenous estimation method proposed by Conley et al. (2012). In this method, the assumption of the exclusion restriction ($\gamma_3 = \gamma_4 = 0$) can be relaxed and

replaced by a user-specified assumption on a plausible range of γ_3, γ_4 (see eq. (7)). γ_3 and γ_4 represents the direct effect of the IV on the outcome.

$$y_i = \gamma_0 + \gamma_1 \widehat{transferout}_i + \gamma_2 \widehat{transferin}_i + \gamma_3 otherout_i + \gamma_4 otherin_i + x_i' \gamma + c_i + \varepsilon_i \quad (7)$$

Here, the definitions of variables are the same as in the 2SLS. The typical inference approaches are the union of confidence intervals (UCI) and the local-to-zero (LTZ). The UCI method uses only a support assumption about γ_3 and γ_4 . Specifically, based on the zero first-stage tests, we set the support restriction of $\gamma_3 \in [-0.1, 0.1], \gamma_4 \in [-0.1, 0.1]$. The LTZ method requires

Table 7

Conley et al. (2012) ‘s plausibly exogenous bounds.

Variable	Agricultural investment	Formal finance			Informal finance	
		Deposit	Loan willingness	Loan	Borrowing	Lending
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:						
UCI $\gamma_3 \in [-0.1, 0.1], \gamma_4 \in [-0.1, 0.1]$						
Transfer-out	(−4.931, −0.608)	(−0.186, 0.397)	(−0.422, 0.147)	(−0.294, 0.259)	(−0.358, 0.229)	(−0.300, 0.727)
Transfer-in	(−0.000, 3.026)	(−0.504, 0.511)	(−0.206, 0.849)	(−0.306, 0.692)	(−0.268, 0.774)	(−0.355, 0.234)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Village Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	572	2497	2497	2497	2497	2497
Panel B:						
LTZ $\gamma_3 \sim U[-0.1, 0.1], \gamma_4 \sim U[-0.1, 0.1]$						
Transfer-out	(−4.590, −0.754)	(−0.090, 0.314)	(−0.471, 0.203)	(−0.352, 0.317)	(−0.402, 0.278)	(−0.323, 0.726)
Transfer-in	(0.138, 2.813)	(−0.340, 0.320)	(−0.233, 0.835)	(−0.335, 0.706)	(−0.283, 0.773)	(−0.397, 0.284)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Village Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	572	2497	2497	2497	2497	2497

Notes: The data source is from in-person interview survey by South China Agriculture University in 2015. Table 7 reports Conley et al. (2012) ‘s plausibly exogenous bounds. Agricultural investment is the household food crop and cash crop equipment and machine value (take log). Deposit is a binary variable indicating that household increase deposit this year (yes = 1, or else 0). Loan willingness is a dummy variable indicating that the household hope to loan more from Formal financial institutions (yes = 1, or else 0). Loan is a binary variable indicating that the household has loan from Formal financial institutions. (yes = 1, or else 0). Borrowing is a binary variable indicating that the household borrow money from relatives and friends (yes = 1, or else 0). Lending is a dummy variable indicating that the household lend money to relatives and friends (yes = 1, or else 0). Transfer-out is a dummy that is 1 if households transfer their farmland out. Transfer-in is a dummy that is 1 if households transfer others’ farmland in. Standard errors are shown in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%.

the specification of the distribution, which describes the prior belief about γ_3 and γ_4 . We assign a uniform distribution over the potential value for γ_3 and γ_4 , i.e., $\gamma_3 \sim U[-0.1, 0.1]$, $\gamma_4 \sim U[-0.1, 0.1]$.

Table 7 presents Conley et al. (2012)'s plausibly exogenous bounds results. We find that no matter the UCI or LTZ method, the bounds of the endogenous variable ($transfer_{in}$ and $transfer_{out}$) cover our IV results. That is, all the coefficients of $transfer_{in}$ and $transfer_{out}$ in Table 7 are within the intervals, indicating that our instrument estimation results are robust.

7.3. Correcting self-selection bias

When all confounding factors are observable, comparing units with different treatments but identical pretreatment variables can be given a causal interpretation (Imbens, 2015). However, as shown in Table A.1, there are likely to be some systematic differences between households with farmland transfers and those without farmland transfers, thereby producing selection bias (Wooldridge, 2010). For example, we find that the ratio of agricultural income of the household with farmland transfer-out is lower than those without farmland transfers, indicating that households with a lower proportion of agricultural income may have more household members working in the city and thus choose to transfer farmland out. Therefore, their agricultural investment motivation and financing demand may be lower. Based on the discussion above, we use the augmented inverse probability weighting estimator of a doubly robust estimation approach to understand the effects of farmland transfers on agricultural investment and financial behavior.

The augmented inverse probability weighting estimator has a double robust property because it specifies outcome models and treatment models at the same time. The augmented inverse probability weighting estimator uses the probability of being in a treatment group by weighing values to calculate the mean outcome. In this procedure, we weigh observations on transfers by $1/p_i$ so that weights will be small when the probability of farmers transferring the farmland is high. We will weigh observations on farmers not transferring farmland by $1/(1 - p_i)$ so that weights will be large when the probability of a farmer not transferring farmland is small. The augmented inverse probability weighting estimator eventually adds an augmentation term in the outcome model. If a treatment model is specified correctly, the augmentation term equals zero. If the treatment model is specified incorrectly and the outcome model is correct, it will rectify the bias, making the estimators robust. So the augmented inverse probability weighting estimator can provide better estimators for an augmentation term when the conditional mean function and the conditional probability function are specified incorrectly (Cerulli, 2015; Tan, 2010). In contrast, a propensity score matching (PSM) model specifies only the treatment model. This characteristic forms a bias correction mechanism and confirms consistent estimates even if the outcome or treatment model is incorrectly specified.

First, we specify the outcome model:

$$m_i^y(x_i) = x_i'\delta + u_i \quad (8)$$

where y_i is the outcome variable, and x_i are covariates chosen to explain the outcome variable.

In the second step, we assume a stable unit treatment value that the sample is independent and identically distributed, the treatment event is farmland transfer-out or not, and farmland transfer-in or not. We model the treatment variable as a function of covariates w_i to estimate the propensity scores $P_i^{Transferout}$ and $P_i^{Transferin}$ for each farmer according to the observable data. This step is the same as the first step of propensity score matching, which aims to get the propensity score values. Treatment models are as follows:

$$P_i^{Transferout}(w_i) = w_i'\eta + v_{1i} \quad (9)$$

$$P_i^{Transferin}(w_i) = w_i'\gamma + v_{2i} \quad (10)$$

In the third step, we use inverse probability to weigh the conditional mean. The propensity score (PS) obtained in the second step can be used to weigh the observed data. Inverse probability weights are calculated as the inverse of the conditional probability that a farmer transfers farmland.

Denoting $1/\hat{P}_i(w_i)$ is for the treated farmers and $1/[1 - \hat{P}_i(w_i)]$ is for the untreated farmers, we then write:

$$\min \sum_{i=1}^N \{D_i[(y_i - m_{1i}(x_i))^2] \} / \hat{P}_i(w_i) \quad (11)$$

$$\min \sum_{i=1}^N \{(1 - D_i)[(y_i - m_{0i}(x_i))^2] \} / [1 - \hat{P}_i(w_i)] \quad (12)$$

Finally, the estimated average treatment effect on the population is:

$$\widehat{ATE} = 1 / N \sum_{i=1}^N [m_{1i}(x_i)] - [m_{0i}(x_i)] \quad (13)$$

Fig. A.1 shows the common support of the propensity scores, indicating that we can match the treatment group with the control group almost exactly, as most propensity scores overlap between the treatment and control groups. The p -values of the covariates balance test are all greater than 0.1, which shows that observable explanatory variables are similar between the treatment and control groups after matching. Table 8 shows the average treatment effects of farmland transfer out/in of the AIPW model. The results are very similar to our IV results. Farmland transfer-in enables farmers to increase agricultural investment and loans from formal and informal financial channels. Farmland transfer-out enables farmers to increase deposits and help lend more money to other farmers.

8. Conclusions

Our study shed light on the restructuring of the rural financial structure caused by the new round of farmland reform in China. We found that farmland transfers affect factors allocation, the agricultural production structure, and the financial structure. We also found that farmland transfer-out results in farmers lending more funds to other individuals and reductions in agricultural investment. While farmland transfer-in caused farmers to borrow more from formal and informal financial channels, the effect was greater for informal financial channels. Farmland transfer-in has improved credit demand, increased agricultural investment, and increased deposits in formal financial institutions. Compared to formal finance, farmland transfers promote the development of informal finance even more. Therefore, the rural financial structure has changed in favor of informal finance.

Many developing countries are faced with the realistic goal of agricultural modernization. When applied to the land system, this goal necessitates institutional reforms to facilitate farmland renting or selling and promote economies of scale. However, during the implementation of these reforms, the rural financial structure needs to undergo transformative changes that align with agricultural modernization. Failure to adapt the rural financial structure to the requirements of agricultural modernization may impede the outcomes of land system reforms and hinder the progress of agricultural modernization.

The practical significance of these findings lies in recognizing that the reform of the farmland market alone cannot be separated from the reform of the financial market. Neglecting the reform of the financial market in the context of rural development may lead to financial and even economic crises. Therefore, it is crucial to establish a rural financial structure compatible with the development of the factors market. Additionally, the importance of informal finance should not be overlooked, especially in the context of developing countries with a small

Table 8

The average treatment effect of the augmented inverse probability weighting estimator model.

	Agricultural investment	–	Effect on formal financial			–	Effect on informal financial	
			Deposit	Loan willingness	Loan		Borrowing	Lending
	(1)		(2)	(3)	(4)		(5)	(6)
<i>Panel A: ATE of Transfer-out</i>								
Transfer-out	–0.519*** (0.183)		0.038* (0.021)	–0.023 (0.021)	0.001 (0.019)		–0.026 (0.023)	0.043* (0.022)
Observation	622		2699	2699	2699		2699	2699
	Agricultural investment		Deposit	Loan willingness	Loan		Borrowing	Lending
	(1)		(2)	(3)	(4)		(5)	(6)
<i>Panel B: ATE of Transfer-in</i>								
Transfer-in	0.685*** (0.203)		0.073** (0.030)	0.068** (0.030)	0.116*** (0.029)		0.128*** (0.031)	–0.052 (0.031)
Observation	616		2678	2678	2678		2678	2678

Notes: The data source is from in-person interview survey by South China Agriculture University in 2015. Table 8 reports average treatment effect of the augmented inverse probability weighting estimator model. Agricultural investment is the household food crop and cash crop equipment and machine value (take log). Deposit is a binary variable indicating that household increase deposit this year (yes = 1, or else 0). Loan willingness is a dummy variable indicating that the household hope to loan more from Formal financial institutions (yes = 1, or else 0). Loan is a binary variable indicating that the household has loan from Formal financial institutions. (yes = 1, or else 0). Borrowing is a binary variable indicating that the household borrow money from relatives and friends (yes = 1, or else 0). Lending is a dummy variable indicating that the household lend money to relatives and friends (yes = 1, or else 0). Transfer-out is a dummy that is 1 if households transfer their farmland out. Transfer-in is a dummy that is 1 if households transfer others' farmland in. Standard errors are shown in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%.

farmer-based economy. Due to geographical isolation, formal finance relies more on contractual incentives to overcome information asymmetry, while informal finance relies on credit technology to enhance information sharing. The survey conducted in this study revealed that 69.2% of farmers borrowed without contracts, and 16.4% experienced overdue informal financial obligations. Given the lower transaction costs and risks associated with informal finance, it has become the dominant borrowing activity in China. A rural optimal financial structure involves the integration of formal and informal sources that may leverage the strengths of both sectors to address limited enforceability and fixed transaction costs. As the agricultural and financial sectors continue to interconnect, the rural financial structure will continue to evolve.

The results from our paper have several policy implications. First, the results imply that a comprehensive reforming of the farmland property rights system may help to facilitate the smooth flow of rural production factors, mitigate risks associated with agricultural production and operations, optimize the allocation of valuable resources, induce favorable changes in the production structure, and ultimately uplift the income levels of rural households. This reform could catalyze positive transformation within rural communities.

Second, as the agricultural sector in China gradually transitions from labor-intensive to capital-intensive operations, the rural financial system needs to adapt accordingly. This adaptive approach ensures that the financial mechanisms do not become obstacles to agricultural modernization and the broader revitalization of rural areas.

Third, the paper emphasizes the need for a robust connection between formal and informal finance. It may not be wise to ignore the role of the informal financial sector in Chinese rural areas. By forging strong institutional connections between formal and informal financial sectors, policymakers can harness the comparative advantages of both sectors. This collaboration allows for a more inclusive and effective financial ecosystem that meets the diverse needs of rural communities.

Fourth, the paper underscores the importance of regulating the development of informal finance while embracing the integration of financial technology within this sector. Informal finance possesses an in-

depth understanding of the unique financial requirements of rural households and the flexibility to adapt credit models accordingly. It serves as a valuable complement to formal finance. Therefore, promoting responsible and well-regulated development of informal finance, combined with the prudent utilization of financial technology, could unleash the full potential of this sector and empower rural communities economically.

In conclusion, these potential policies serve as a blueprint for sustainable rural development, aiming to create an enabling environment where property rights, financial systems, and technological advancements work hand in hand to enhance agricultural productivity, foster rural prosperity, and improve the overall well-being of rural households.

Note: The data source is from an in-person interview survey by South China Agriculture University in 2015. Fig. 4 shows types of collateral used by farmland transfer-in farm households. “None” means no collateral. “House and residences” means house and residence farmland owned by farmers. “Other properties” includes fixed asset, crops, agricultural order, farmland management and contract right, deposit certification and so on.

Data availability

The authors do not have permission to share data.

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Appendix

Table A.1

Inter-group difference for all variables.

Variable	Both transfer-out and transfer-in		Only Transfer-out		Only Transfer-in		Neither land transfer-out or transfer-in		Difference		
	Mean (1)	Std. (2)	Mean (3)	Std (4)	Mean (5)	Std (6)	Mean (7)	Std (8)	(1)–(7)	(3)–(7)	(5)–(7)
<i>Dependent variables</i>											
Loan	0.355	0.484	0.173	0.378	0.288	0.455	0.182	0.386	0.173***	−0.010	0.106***
Loanw	0.444	0.502	0.245	0.430	0.381	0.488	0.302	0.459	0.143***	−0.057***	0.079***
Deposit	0.466	0.504	0.327	0.469	0.318	0.468	0.268	0.443	0.199***	0.059***	0.050*
Borroww	0.511	0.505	0.327	0.469	0.470	0.500	0.364	0.481	0.147***	−0.036	0.107***
Lendp	0.488	0.505	0.359	0.480	0.334	0.475	0.297	0.457	0.192***	0.062***	0.038
Ainvest	7.984	1.485	6.895	1.756	8.073	1.727	7.552	1.480	0.423	−0.657***	0.521***
<i>Household Characteristics</i>											
Gender	0.733	0.447	0.588	0.492	0.665	0.472	0.645	0.478	0.088	−0.057**	0.023
Age	43.088	13.295	43.482	15.253	43.359	13.307	43.567	15.400	−0.407	−0.085	−0.624
Educ	2.111	0.884	2.139	0.995	1.900	0.904	2.085	0.998	0.026	0.053	−0.175***
Income	3.000	1.331	2.727	1.132	2.672	1.130	2.644	1.116	0.358**	0.083	0.015
Juniorh	2.088	1.221	2.169	1.224	2.411	1.234	2.264	1.317	−0.175	−0.095	0.147*
Seniorh	0.933	1.250	0.840	1.105	0.868	1.014	0.784	0.984	0.142	0.055	0.083
Laborratio	0.753	0.238	0.713	0.244	0.763	0.381	0.721	0.231	0.032	−0.008	0.042***
Farming	1.311	1.221	0.697	0.916	1.394	1.033	1.095	1.063	0.213	−0.398***	0.299***
Relative	0.111	0.317	0.046	0.209	0.050	0.210	0.059	0.236	0.051	−0.014	−0.010
Cadre	0.177	0.386	0.123	0.329	0.169	0.380	0.119	0.323	0.059	0.004	0.050**
Farmlands	8.729	11.775	6.755	21.506	10.333	48.266	6.189	9.082	2.585*	0.566	4.144***
Agincome	0.433	0.364	0.301	0.318	0.440	0.330	0.372	0.331	0.060	−0.071***	0.067***
Title	0.533	0.504	0.526	0.499	0.513	0.500	0.547	0.497	−0.012	−0.020	−0.034
<i>Village Characteristics</i>											
Economy	0.066	0.252	0.042	0.201	0.083	0.285	0.064	0.245	0.003	−0.022*	0.018
Transport	0.067	0.252	0.123	0.329	0.036	0.185	0.062	0.240	0.005	0.062***	−0.025*

Note: The data source is from an in-person interview survey by South China Agriculture University in 2015. Table A.1 reports descriptive statistics and inter-group difference of all variables we used in the paper. The “difference” is the two-sample *t*-test between the farmland transfers and non-transfers groups. The null hypothesis is that there is no difference in mean between two groups.

Table A.2

First stage regression.

Second stage outcome	First-stage outcome: transfer-out					
	Agricultural investment	Deposit	Loan willingness	Loan	Borrowing	Lending
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: first-stage for farmland transfer-out</i>						
IV: <i>otherout</i>	0.349*** (0.060)	0.601*** (0.031)	0.601*** (0.028)	0.601*** (0.028)	0.600*** (0.031)	0.600*** (0.031)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Village Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	572	2497	2497	2497	2497	2497
First-stage F-statistic	24.29	39.48	227.52	227.52	185.23	185.23
<i>Panel B: first-stage for farmland transfer-in</i>						
IV: <i>otherin</i>	0.497*** (0.076)	0.401*** (0.044)	0.401*** (0.036)	0.401*** (0.036)	0.403*** (0.045)	0.403*** (0.045)
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Village Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	572	2497	2497	2497	2497	2497
First-stage F-statistic	27.65	11.05	68.22	68.22	41.71	41.71

Notes: The data source is from in-person interview survey by South China Agriculture University in 2015. Table A.2 reports first stage regression of IV approach.

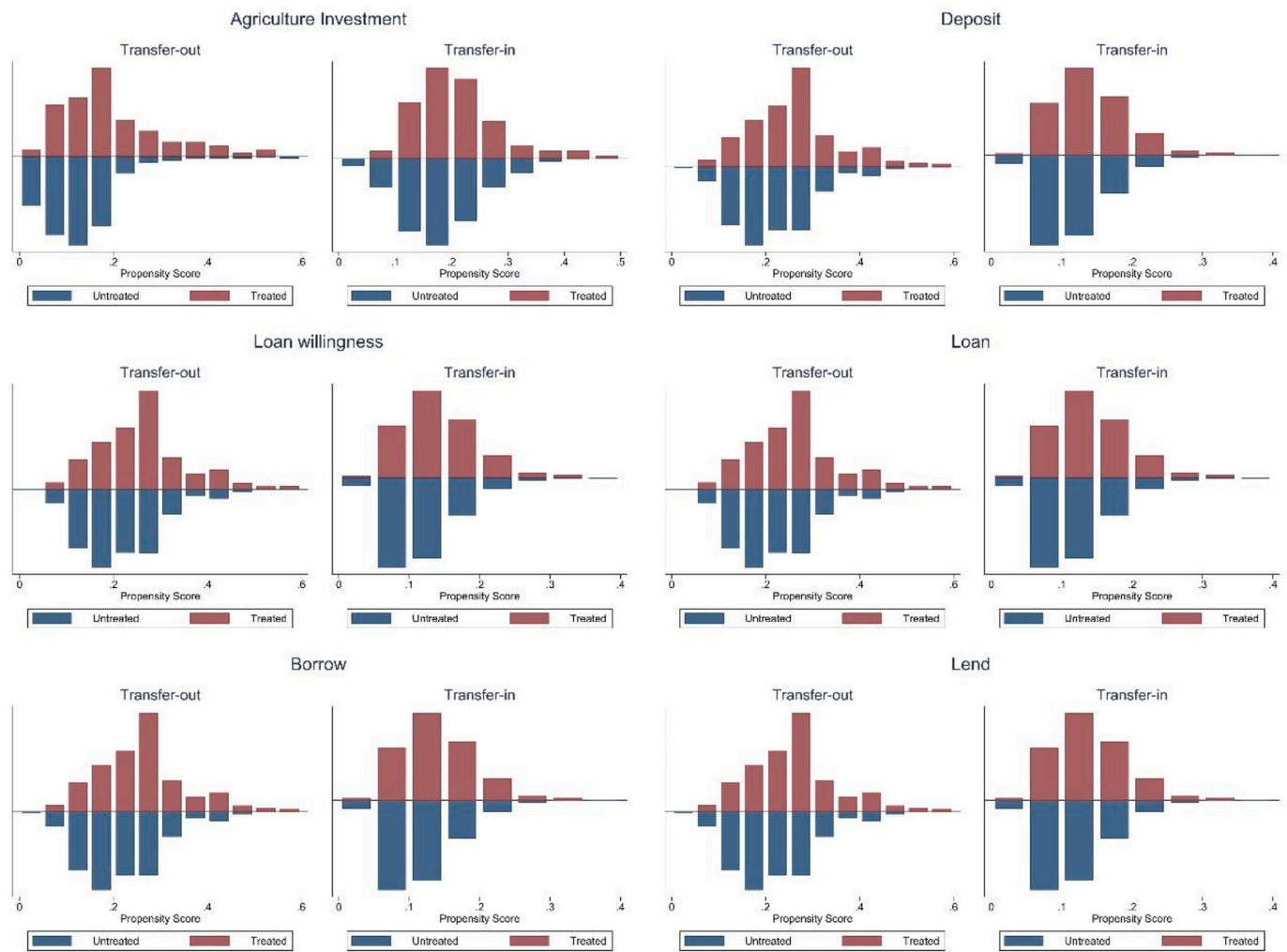


Fig. A.1. The common support of the propensity scores.

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客户集中度与企业创新绩效：供应链金融的值变效应

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社会资本异质性能影响农村金融深度吗

——基于多重中介模型的半参数估计

姜美善 彭东慧 叶美婷

华南农业大学 经济管理学院, 广东 广州 510642

李景荣

暨南大学 经济与社会研究院, 广东 广州 510632

摘 要: 随着城镇化的快速推进,农户社会资本结构发生了重大变化。不同类型社会资本对农户信贷数量的总体影响也相应发生了重大变化,作用机理也存在重要差异。基于多重中介模型的半参数估计方法,结合中国9省农户问卷调查数据,验证社会资本异质性能对农村金融深度影响效果及其作用机制,结果发现:政治型、组织型和金融型社会资本均能通过信息甄别和监督约束提升农村金融深度,而亲缘型社会资本对农村金融深度提升没有显著影响;政治型社会资本主要通过限制农户违约行为提高农村金融深度,而组织型和金融型社会资本主要通过甄别农户的风险偏好提升农村金融深度。因此,通过金融联结提高政治型、组织型和金融型社会资本的参与,能够有助于农村金融的深度发展。

关键词: 社会资本异质性;农村金融深度;多重中介模型;半参数估计

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一、引言

随着农村金融体制改革的逐渐推进,农户信贷可得性不断提高,农村金融宽度也取得

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作者简介:姜美善(1972—),女,华南农业大学经济管理学院副教授,数量经济学博士,研究方向为农村金融;彭东慧(1971—),女,华南农业大学经济管理学院讲师,经济学博士,研究方向为农村金融;叶美婷(1998—),女,华南农业大学经济管理学院硕士研究生,研究方向为农村金融;李景荣(1993—),男,通讯作者,暨南大学经济与社会研究院博士研究生,研究方向为微观计量理论与应用。

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Jiang Meishan, Peng Donghui, Ye Meiting, Li Jingrong, 2021. Does Heterogeneity in Social Capital Affect the Depth of Rural Finance? A Multiple-Mediation Semiparametric Estimation Model. Financial Economics Research, Vol. 36, No. 5: 83-97.

了长足进展(汪金花和熊学萍,2015^[1])。农户贷款数量增加与农村金融深度发展,便显得更为重要^①。特别是乡村振兴战略的全面实施和农业动能由劳动向资本(技术)转换,均要求进一步提升农村金融深度。然而,信息不对称和弱产权导致的高额交易型和管理型交易费用(Stiglitz and Andrew,1981^[2]),使得中国农村金融市场依然存在较为严重的信贷配给和逆向选择问题。这意味着如果农户能够提供充足的抵押品,实现分离均衡,则可以避免隐藏信息和隐藏行为的逆向选择和道德风险,增加金融机构的预期收益,并缓解农户参与金融市场深度不足的问题(李猛,2008^[3]; Hillier and Ibrahim,1993^[4])。现实的情况是,由于资源禀赋稀缺且受限于产权制度,农户难以提供使银行满意的抵押物。此时,社会资本便成为解决农户抵押品稀缺问题的重要途径。社会资本具有信号传递、信息甄别、监督约束和动态激励等多重功能,可以发挥类似于实物抵押品的作用,有利于缓解信贷市场的逆向选择和道德风险问题(李庆海等,2018^[5])。故而,世界各国的农户贷款模式,都非常重视社会资本。比如,小额信贷模式利用社会资本成功发放了无抵押贷款,并取得了良好效果(Lu et al.,2020^[6])。但从实践效果来看,一些国家(地区)的社会资本却没有产生预期效果。比如,洪都拉斯、尼加拉瓜和秘鲁约40%的农户仍存在信贷约束(Barham et al.,2008^[7])。

农村信贷市场积聚了市场理性与人情关系的双重特点,社会资本是二者之间的纽带。但是,在不同国家或地区,社会资本在农户融资中发挥的作用存在较大差异(Kinnan and Robert,2012^[8])。一方面,社会资本在揭示农户信息和行为方面具有不同功能和作用路径,另一方面,在提高农村金融市场深度方面,不同类型的社会资本也可能有差异性微观效果,并存在较大的情景差异。对中国来说,尤其如此。随着农村社会、经济结构变化,一些传统的社会资本已经萎缩,许多新型的社会资本变得越来越重要。同时,从供给、需求和市场等方面来看,制约农户获得更多贷款的因素及其作用机制,也发生了深刻变化。相应地,不同类型的社会资本在提高农村金融深度的微观效果和作用机制方面,也必然存在较大的差异(Guiso et al.,2004^[9])。鉴于此,本文分析社会资本对农村金融深度的总体效果,并细分不同类型社会资本的重要性及其作用机理,不仅在理论上有助于深入揭示社会资本的作用机理,而且在实践中有助于基于情境依赖而充分发挥不同类型社会资本的积极作用。

二、文献综述

随着农村产权抵押融资等相关改革的深入推进,农户的抵押品不仅数量大幅度增加,而且质量也显著改善。但是,有效抵押品不足的问题依然比较突出。一方面,农户拥有的产权(比如农地承包经营权)因资产专用性和制度缺陷而缺乏流动性;另一方面,农业的生产收益因自然风险较高而具有不稳定性,因此难以提供有效的抵押物。抵押品不足,使得农户信贷数量不足现象普遍存在于中国农村(王性玉等,2016^[10];汪险生和郭忠兴,2016^[11])。相应地,社会资本依然是提高农户信贷可得性的重要因素(马九杰,2008^[12];梁爽等,2014^[13])。一些研究发现,获得金融机构贷款的农户中,31.95%的农户使用社会资

^①农村金融宽度是指农村经济发展过程中金融服务的可得性和覆盖面;农村金融深度是指农村经济发展过程中农户获得金融资产数量的增加。本文的农村金融深度特指农户获得农村金融机构提供贷款数量增加。

本抵押获得贷款,仅次于农房抵押贷款(姜美善和米运生,2020^[4])。

不同的社会关系,也意味着不同类型的社会资本。改革开放以来,农村地区主要有政治型、组织型、金融型和亲缘型等不同类型的社会资本(表1)。不同类型社会资本对于农户来说,也具有不同的重要性。具体而言,农民专业合作社关系和正规金融机构关系对农户实际贷款额度和有效借贷机会均具有显著影响,而政治关系和邻里关系仅对有效借贷机会产生影响,亲戚关系则没有任何影响(童馨乐等,2011^[5])。金融关系资本和专业合作社资本不能缓解需求型信贷配给,政治关系资本和亲缘关系资本则无法缓解供给型信贷配给(王性玉等,2016)。此外,非正式社会资本比正式社会资本对正规信贷约束的缓释作用更小(李庆海等,2017^[6])。也有学者如梁爽等(2014)发现社会资本对农户从正规金融机构中获得的贷款额度不存在显著影响。Jin et al. (2019)^[7]和 Cornett et al. (2021)^[8]研究发现,社会资本的作用主要体现在提高贷款质量、筛选风险贷款和促使银行追求利润最大化以外的社会责任,有助于金融深度的提高。学界出现这些争议的原因在于不同类型社会资本在功能和作用机制方面存在巨大差异(米运生等,2018^[9])。

表1 农户社会资本类型

社会资本类型	获得渠道	增强金融深度的原因
政治型社会资本	农户本人及其亲戚朋友所拥有的政治身份	资源获取能力提升
组织型社会资本	农户参加专业合作社等组织	生产经营信息获取能力和抵御经营风险能力提升
金融型社会资本	农户参加金融互助组等融资性组织;与金融机构工作人员有某种社会关系;存款、贷款和其它信用活动	信息显示能力和抵押担保能力提升
亲缘型社会资本	农户因血缘关系和社交关系所形成关系网络	非实物抵押担保能力提升

现有文献已经意识到社会资本异质性的存在,并且也分析了其对农村金融市场发展的影响。不足之处主要在于:第一,已有文献主要关注农户信贷可得性,而对于更为重要的信贷数量则未能引起足够重视;第二,关于社会资本对农户信贷的影响局限于分析总体效应,忽视了风险偏好和违约行为这两个影响机制,并因此忽视了不同类型社会资本在影响过程中的功能差异和可能存在的多重中介效应;第三,计量方法存在一定偏差,无法保证估计参数的一致性,进而导致社会资本对农户信贷的影响估计存在偏差。基于此,本文理论分析社会资本异质性对农户信贷数量(农村金融深度)的总体影响,引入风险偏好和违约行为作为中介变量,结合中介效应分析异质性社会资本对农村金融深度的作用机制;在实证分析中,采用多重中介模型的半参数估计方法,克服扰动项分布设定偏误和参数估计非一致性的普遍问题,从而可以更清楚准确地识别社会资本的多重功能和作用机制。

三、社会资本异质性影响农村金融深度的内在逻辑

(一) 社会资本促进农村金融深度的基本原理

社会资本是根据预期收益投资的社会关系,或有目的地获得和转移社会结构资源。在不完全竞争市场下,社会资本可以为个人提供机会和选择,降低组织招募的交易成本,有助

于传递私人信息(Lin, 2017^[2])。而且,社会资本有利于加强个人身份识别,使得作为特定社会网络的成员可以共享利益和资源,并获得社会网络情感支持。由此可见,社会资本作为“抵押品化的社会关系”,是个人的社会证书,反映了其可以通过社会网络获得的资源。不难理解,社会资本可缓解因信息不对称而产生的逆向选择和道德风险,并增加农户信贷数量,提升农村金融深度。其作用机制有两个方面。首先,社会资本可以缓解逆向选择。农户通过提供社会资本揭示风险偏好和投资项目风险等相关信息,金融机构可以据此向农户提供激励相容的合约,形成自选择约束,确保诚信是农户的最佳选择,从而减轻逆向选择带来的问题(Cornett, 2021; Putnam, 1995^[1]; Tsai, 2004^[2])。其次,社会资本可以缓解道德风险。道德风险主要表现为农户事后隐藏行为和息。银行可以通过社会资本监督和惩罚功能强弱,判断农户的还款能力或违约行为,进而决定是否发放贷款和贷款数量(Clark et al., 2021^[3])。

(二) 异质性社会资本对农村金融深度的影响及其作用机制

随着城镇化的推进,农村社会、经济结构进而社会资本结构发生了深刻变化。一方面,新的社会资本出现。比如,随着农民组织化和农业规模化发展,依托专业合作社或行业协会等新型农业经营(服务)主体而形成的组织型社会资本成为农户非常重要的新型社会资本。另一方面,传统社会资本发生了转型并呈现出新的存在形式。比如,政治资本的表现形式从依托封建乡绅和官僚而演变为依托国家机关及其工作人员而形成的社会网络。此外,兼具上述各形态的新型社会资本即金融型社会资本也呈现出来。农户因参加金融互助组等融资性组织,与金融机构工作人员存在某种社会关系,或者通过存款、贷款和其它信用活动而形成金融型关系网络。与此形成鲜明对比的是,传统的依托熟人社会、以人际信任为主要形式的亲缘型社会资本,其重要性不断下降(李庆海等, 2017)。上述不同类型的社会资本,涵盖了农户生活生产领域的大部分社会关系。但是,它们对农村金融发展深度的影响方向和作用机理,则不尽相同。

政治型社会资本是农户及其亲戚朋友由于所拥有的政治身份而形成的特定关系网络,不仅体现了农户在社区的认可度和影响力,是诚信和获取收入能力的体现;也有利于农户获得更多有形和无形的资源,形成农户额外的收入来源。因此,拥有的政治型社会资本越强,农户在农村社会越可能具有更多的资源和信息优势,增加获取金融资源配置的机会。当然,它的机会成本也非常大:信贷违约成本会内部化于信贷、社会甚至政治等各领域。由此可见,金融机构识别政治型社会资本的成本较低,但对违约农户具有一系列的恶劣影响,是高质量的社会资本(表1)。基于上述分析,本文提出假设1。

假设1: 政治型社会资本可以提高农村金融深度。

组织是追求共同目标的群体,是制度和受益于制度的人的组合(North, 1990^[2])。组织产生的原因是信息流通(弗鲁博顿, 2015^[3]),组织型社会资本通过合约提高农户生产率和抵御自然、市场风险的能力,具有揭示项目风险和风险偏好的作用(表1)。同时,组织型社会资本也有利于声誉机制实施。因为声誉机制只有在违约能够被足够多的人知道时才能发挥最大效应。由于组织本身承担着信息的生产和传递功能,所以可以在一定程度上降低银行筛选、控制和监督借款人成本,通过降低交易费用,克服门槛效应,使农户获得更高的贷款数量。比如,农户自发形成的以提升自身经营水平的非正式组织——专业技术合作组

织,在实施监督和提高借贷资金偿还率方面具有积极作用(胡新艳等,2016^[24])。基于上述分析,提出假设2。

假设2:组织型社会资本可以提高农村金融深度。

金融资源对农户来说非常重要。因此,金融型社会资本可以在多个方面促进农户获得更多贷款(表1)。首先,金融型社会资本可以向金融机构提供农户有关收入、存款、生产经营和借贷等信息。其次,金融型社会资本可以作为农户获得金融机构贷款的担保中介。最后,金融型社会资本可以利用社会网络对农户事后贷款用途进行监管。特别是经营性农户因为持续资金需求而使得动态激励、资产专用性等声誉机制可以充分发挥作用,并促进信贷契约自我实施,降低农户违约风险。鉴于金融型社会资本在解决信息不对称带来的逆向选择和道德风险方面存在重要作用,本文得到假设3。

假设3:金融型社会资本可以提高农村金融深度。

亲缘型社会资本是指农户因血缘和社交关系所形成的关系网络资本(表1)。对于大部分农户来说,依托熟人社会网络而形成的社会资本,是获得金融资源特别是民间信贷的重要因素。从资金来源角度考虑,如果农户可以在亲戚朋友处获得资金,则会对正规金融贷款具有一定程度的挤出效应。从信息收集、贷款监督和契约执行等方面来看,正规金融可以利用私人信息,提高农村金融深度。亲缘型社会资本也有其天然劣势。许多小农难以形成和维护高质量的社会网络。特别是,城镇化推进所导致的农户进城务工和定居、家庭结构的小型化发展等因素(陈小知等,2021^[27]),使得传统宗法关系和社会网络日益疏散。亲缘型社会资本数量和质量下降,也降低了其在信贷市场上的重要性。基于上述分析提出假设4。

假设4:亲缘型社会资本对提高农村金融深度的影响是不确定的。

四、实证研究设计

(一) 变量选择及数据统计特点

本文数据来源于课题组2015年在全国范围内农户抽样调查问卷。课题组选取了除港澳台外,中国31个省、市、自治区(不含港澳台地区)的总人口、人均GDP、耕地面积、耕地面积比重、农业人口占省(市、自治区)总人口比重和农业产值占省(市、自治区)GDP比重等六个指标进行聚类分析,按照中国地理分区最终选定广东、贵州、河南、江苏、江西、辽宁、宁夏、山西和四川9个省进行抽样调查。随后从9个省分别选择了6个县域,共计54个县域;每个省抽取240个样本户,最终发出问卷2880份,回收问卷2704份,问卷有效率93.89%。

1. 因变量。在实际调研中,为方便起见,被调查者有可能会将自己获得的贷款数额取整,比如获得贷款12500元人民币(下同)简记为10000元。与此同时,获得贷款额度较高农户可能不太愿意让别人知道自己的贷款情况,在填写问卷时采取保守填法。针对这个问题,课题组在问卷中将“从银行获得的贷款”划分四个区间:没有获得贷款、1万元以下、1万元至5万元和5万元以上。在实际调研中,让农户根据获得的贷款数额选择对应区间。根据农村金融深度的概念,农村金融深度提升即农户进入更高的贷款区间。表2报告了农户贷款区间的分布情况,其中最高额度区间农户比例为5.66%,低于1万元额度区间样本所占比例高达80.81%,说明样本中农户以较低额度贷款为主。

表2 农户贷款区间分布

贷款区间	0	0~1万元	1万元~5万元	5万元以上	合计
频数	657	30	80	46	813
频率	80.81%	3.69	9.84%	5.66%	100%

2. 核心自变量。具体而言,本文用“亲戚朋友中是否有村干部”作为政治型社会资本代理变量;用“农户家里是否有人参加专业技术协会”衡量组织型社会资本;用“家里是否有人参加金融互助组”衡量金融型社会资本;用“亲戚朋友多不多”衡量亲缘型社会资本。样本中有15.01%的农户具有政治型社会资本,3.57%的农户家里有人参加专业技术协会,家里是有人参加金融互助组的农户仅占全部样本的2.09%,94.71%的农户认为自己亲朋好友比较多。

3. 中介变量。风险偏好用“是否购买农业保险”衡量,购买农业保险则表示农户属于风险规避型。因为农业保险使农户遭受自然风险时,可以减轻投资项目的损失。样本中购买农业保险的农户比例为25.95%。违约行为用“是否对银行贷款有过违约”来衡量,31.83%的农户没有违约过。

4. 控制变量。由于中介效应分析需要对因变量和中介变量进行依次回归,而不同行为决策的影响因素不一定相同。本文根据已有文献选择性别、年龄、受教育程度、家庭年收入、农地确权、农地面积、劳动力占比、地区经济发展水平、交通便利程度和对保险政策的满意度作为农村金融深度、保险购买行为和违约行为的控制变量(Carter and Olinto,2003^[2];李庆海等,2017;王志刚等,2013^[3])。变量名称、定义及其简单描述性统计见表3。

表3 变量定义与统计特征

变量	变量说明	均值	标准差	最小值	最大值
因变量					
农村金融深度	没有获得贷款=0,10000元以下=1,10000~50000元=2,50000元以上=3	1.403	0.882	0	3
核心自变量					
政治型社会资本	是否有亲朋好友担任村干部;有=1,没有=0	0.150	0.357	0	1
组织型社会资本	家里是否有人参加专业技术协会;有=1,没有=0	0.036	0.186	0	1
金融型社会资本	家里是否有人参加了金融互助组;有=1,没有=0	0.021	0.143	0	1
亲缘型社会资本	农户的亲戚朋友多不多;多=1,不多=0	0.947	0.224	0	1
中介变量					
风险偏好	是否购买农业保险;是=1,不是=0	0.271	0.445	0	1
违约行为	是否对银行贷款有过违约;是=1,不是=0	0.318	0.466	0	1
控制变量					
性别	户主是否为男性;是=1,不是=0	0.627	0.484	0	1
年龄	户主年龄是否在50岁以上;是=1,不是=0	0.935	0.933	0	1
受教育程度	小学=1,初中=2,高中=3,高中以上=4	2.085	0.968	1	4
家庭年收入	家庭年收入在10000元以下=1,10000~30000元=2,30000~50000元=3,50000~100000元=4,100000元以上=5	2.557	1.134	1	5

续表 3

农地确权	家庭农地是否确权; 没有确权 = 1, 确权 = 0	0.738	0.440	0	1
农地面积	家庭拥有的农地面积(亩)	9.996	34.147	0	680
劳动力占比	家庭劳动力人数占家庭总人数的比例	0.661	0.257	0	1
地区经济发展水平	地区经济水平是否特别低; 是 = 1, 不是 = 0	0.305	0.461	0	1
交通便利程度	交通条件是否便利; 是为 1, 不是 = 0	0.807	0.395	0	1
对保险政策的满意度	从“很不满意”到“非常满意”5 级赋值	2.914	1.002	1	5

(二) 模型设定

在关于社会资本对农户融资问题的实证研究中,因变量的代理变量选取不一,但都可归纳为以下两种数据类型。第一是连续变量,直接将农户获得的贷款数额或贷款占比作为因变量(梁爽等,2014; 张兵等,2015^[64]),进而采用最小二乘法回归;第二是虚拟变量或分类变量,如“信贷可得性”经常使用以下代理变量“是否从银行得到过贷款,是为 1,否则赋值为 0”或“从银行获得贷款的难易程度,分等级赋值”,进而使用受限因变量模型。

值得注意的是,对于前者而言,如果数据真实可靠,客观性强,则用连续性数据来估计方程是比较理想的。但在实际调研中,财务状况属于较为隐私的问题,被调查者很容易产生臆答现象,导致问卷数据不能反映农户的真实财务情况(王春超和周先波,2013^[65])。对于后者而言,已有研究使用 Probit 或 Logit 及其衍生模型解决了遗漏变量、测量误差和互为因果等内生性问题。但此类模型估计参数的方法为最大似然估计法(Maximum Likelihood Estimation,简称 MLE),其前提是要求扰动项服从某一特定的分布。Logit 类模型要求扰动项服从 logistic 分布,而 Probit 类模型要求扰动项服从正态分布。若分布假定是合理的,则参数估计方法可以得到一致和渐近正态的估计量;若扰动项分布的设定有偏,参数估计是非一致的。为了正确识别社会资本对农村金融深度的影响,一方面要设计合理的问卷调查,获得可以反映农户真实情况的信贷数据;另一方面需要选用合适的计量模型,保证参数估计的一致性。为此,本文引入风险偏好和违约行为的中介变量,结合中介效应分析异质性社会资本对农村金融深度的作用机制,使用半参数估计放宽对扰动项的分布设定,以期得到参数的一致性估计。

1. 总效应模型设定。基于农户贷款数量的区间分段设计,本文采用有序响应模型(Ordered Response Model)进行估计。有序响应模型是用可观测的有序响应数据建立模型研究不可观测潜变量变化规律的方法,是受限因变量模型的一种特例。因为农村金融深度是一种潜变量。其影响方程表示如下:

$$\text{loan}_i^* = \alpha_0 + x_i' \alpha + u_i \tag{1}$$

其中, i 表示第 i 个农户; loan_i^* 代表其所获得的贷款数额; x_i' 表示可能影响第 i 个农户贷款数额的解释变量向量; α 是解释变量的系数向量, α_0 是常数项; u_i 是服从零均值假定的随机扰动项,设其方差为 σ_u^2 。在样本中,虽然 loan_i^* 无法直接观察,但其落入了可以观察的 4 个具有排序的相邻区间 loan_i (分别记为 0、1、2 和 3):

$$\text{loan}_i = \begin{cases} 0, & \text{如果 } \text{loan}_i^* \leq 0 \\ 1, & \text{如果 } 0 < \text{loan}_i^* \leq 1 \\ 2, & \text{如果 } 1 < \text{loan}_i^* \leq 5 \\ 3, & \text{如果 } \text{loan}_i^* > 5 \end{cases} \tag{2}$$

则 y_i 的分布为:

$$P(\text{loan}_i = 0 | x_i) = P(u_i \leq 0 - \alpha_0 - x_i \alpha) = \varphi(r_0 - x_i \alpha) \quad (3)$$

$$P(\text{loan}_i = 1 | x_i) = P(0 - \alpha_0 - x_i \alpha \leq u_i \leq 1 - \alpha_0 - x_i \alpha) \\ = \varphi(r_1 - x_i \alpha) - \varphi(r_0 - x_i \alpha) \quad (4)$$

$$P(\text{loan}_i = 2 | x_i) = P(1 - \alpha_0 - x_i \alpha \leq u_i \leq 5 - \alpha_0 - x_i \alpha) \\ = \varphi(r_2 - x_i \alpha) - \varphi(r_1 - x_i \alpha) \quad (5)$$

$$P(\text{loan}_i = 3 | x_i) = P(u_i \geq 5 - \alpha_0 - x_i \alpha) = 1 - \varphi(r_2 - x_i \alpha) \quad (6)$$

其中, $r_0 = -\alpha_0$, $r_1 = 1 - \alpha_0$, $r_2 = 5 - \alpha_0$ 被称为“切点”。扰动项分布函数为 $\Phi(\cdot)$, 其对数似然函数为:

$$\ln L(r_0, r_1, r_2, \sigma_u) = \sum_{i=1}^n \sum_{j=-1}^3 1\{\text{loan}_i = j\} \ln [\varphi(r_{j+1} - x_i \alpha) - \varphi(r_j - x_i \alpha)] \quad (7)$$

式(7)中的 $r_{-1} = -\infty$, $r_4 = \infty$, r_0, r_1, r_2 同上; $1\{\cdot\}$ 是示性函数, 当括号内条件为真时取1, 否则为0。

2. 中介模型设定。 “是否购买农业保险”和“是否对银行贷款有过违约”为二元选择变量。本文选用经典的 Probit 模型进行估计, 具体形式如下:

$$\text{insurance}_i^* = \gamma_0 + z_i \gamma + v_i \quad (8)$$

$$\text{insurance}_i = 1\{\gamma_0 + z_i \gamma + v_i \geq 0\} \quad (9)$$

其中, insurance_i^* 为潜变量不可观测, 可以理解为购买保险给农户带来的效用, 当其大于0时, 农户会选择购买保险。 z_i 表示解释第 i 个农户风险偏好, γ 是解释变量的系数向量, γ_0 是常数项, v_i 是服从零均值假定的随机扰动项, 设其方差为 σ_v^2 , 分布函数为 $\varphi(\cdot)$ 。 insurance_i 是实际观测到的农户保险购买行为, 似然函数可以写为:

$$\ln L(\gamma_0, \gamma, \sigma_v) = \sum_{i=1}^n \text{insurance}_i \cdot \ln \varphi(\gamma_0 + z_i \gamma) \\ + (1 - \text{insurance}_i) \ln [1 - \varphi(\gamma_0 + z_i \gamma)] \quad (10)$$

对违约行为也建立二元 Probit 模型:

$$\text{default}_i^* = \beta_0 + w_i \beta + \varepsilon_i \quad (11)$$

$$\text{default}_i = 1\{\beta_0 + w_i \beta + \varepsilon_i \geq 0\} \quad (12)$$

其中, default_i^* 为潜变量不可观测, 可理解为农户违约给其带来的效用。当其大于0时, 农户会选择违约。 w_i 表示第 i 个农户的风险偏好; β 是解释变量的系数向量, β_0 是常数项, ε_i 是服从零均值假定的随机扰动项, 设其方差为 σ_ε^2 , 分布函数为 $\delta(\cdot)$ 。 default_i 是实际观测到的农户违约行为, 似然函数可以写为:

$$\ln L(\beta_0, \beta, \sigma_\varepsilon) = \sum_{i=1}^n \text{default}_i \cdot \ln \delta(\beta_0 + w_i \beta) \\ + (1 - \text{default}_i) \ln [1 - \delta(\beta_0 + w_i \beta)] \quad (13)$$

风险偏好和违约行为纳入到农村金融深度方程中:

$$\text{loan}_i^* = \lambda_0 + \lambda_1 \text{insurance}_i + \lambda_2 \text{default}_i + x_i \lambda + \xi_i \quad (14)$$

其中, λ_0 为截距项, λ_1 和 λ_2 为风险偏好和违约行为对农村金融深度的影响系数, ξ_i 为服从零均值假定的随机扰动项, 方差为 σ_ξ^2 , 分布函数为 $v(\cdot)$ 。至此, 可以利用有序 Probit 模型再次估计该方程。估计过程与总效应模型类似, 在此不再赘述。

3. 半参数估计。若 u 、 v 、 ε 和 ξ 均服从正态分布,将其分布函数标准化后,总效应模型和中介效应模型都为 Probit 类模型的参数估计;若不服从正态分布,用上述方法会导致参数的不一致估计。一般来说,由于无法事前得知扰动项的真实分布,所以本文借鉴王春超和周先波(2013)的做法,使用半参数估计,放宽对扰动项的假定,得到与扰动项分布无关的估计量。具体而言,将 u 、 v 和 ε 的分布视为未知的,用 Hermit 序列来逼近三者的分布函数。半参数估计方法如下所示:

$$f_k(\omega) = \frac{1}{c} \left(\sum_{i=0}^k \lambda_i \omega^i \right)^2 \psi(\omega) \tag{15}$$

其中, $\omega \in \{u, v, \varepsilon, \xi\}$, c 为标准化因子保证 $f_k(\omega)$ 的积分等于 1, λ_i 是待估参数, $\psi(\omega)$ 是标准正态分布的密度函数。用公式(15)的累积分布函数 $F_k(\omega)$ 来逼近似然函数中的 $\varphi(\cdot)$ 、 $\varphi(\cdot)$ 、 $\delta(\cdot)$ 和 $v(\cdot)$,然后最大化似然函数,求解对应的参数估计量。在大样本条件下,此估计量是一致的和渐近正态的(Stewart,2004^[5])。当 $k=2$,半参数估计和参数估计是一样的,可以使用似然比检验来判断使用半参数估计的必要性。

五、实证研究的结果分析

(一) 识别中介效应变量

识别中介变量首先需要利用样本数据对经典有序 Probit 模型进行估计,然后对 k 的不同取值进行半参数估计,再通过似然比检验选择合适的 k 值,最终本文选用 $k=4$ 时的结果报告总效应模型(表 4)^①。

表 4 社会资本对农村金融深度的影响分析

变量	农村金融深度 (模型 1)	风险偏好 (模型 2)	违约行为 (模型 3)	农村金融深度 (模型 4)
核心自变量				
政治型社会资本	0.821 *** (0.235)	0.593 * (0.152)	-0.636 ** (0.381)	0.278 ** (0.118)
组织型社会资本	0.719 ** (0.392)	0.693 *** (0.106)	-0.237 * (0.158)	0.616 *** (0.188)
金融型社会资本	0.891 * (0.554)	0.762 *** (0.103)	-0.363 ** (0.211)	0.0256 (0.245)
亲缘型社会资本	0.344 (0.329)	-0.126 *** (0.028)	0.302 (0.430)	0.0146* (0.0097)
控制变量				
性别	0.267 ** (0.113)	-0.0328 (0.331)	-0.238 (0.244)	0.691 *** (0.210)
年龄	-0.0802 (0.0527)	0.104 (0.128)	0.185 (0.157)	-0.182 ** (0.0848)
受教育程度	0.113 *** (0.0424)	0.0277 (0.123)	-0.321 ** (0.134)	0.0230 (0.110)

①因篇幅有限,检验结果省略。

续表 4

家庭年收入	0.00107 (0.0360)	-0.276 *** (0.107)	0.613 *** (0.132)	
农地确权	0.591 *** (0.173)			0.522 ** (0.235)
农地面积	0.0214 (0.0298)	0.0220 (0.0198)	-0.00162 (0.00329)	0.00354 (0.0671)
劳动力占比	0.332 ** (0.162)	0.877 (0.616)	0.257 (0.451)	0.406 (0.402)
地区经济发展水平	0.0669 (0.0904)			0.273 (0.186)
交通便利程度			-0.635 *** (0.106)	
对保险政策的满意度		0.578 *** (0.162)		
		中介变量		
风险偏好				0.712 *** (0.219)
违约行为				-0.740 *** (0.229)

注: 括号内是稳健标准误; *、**、*** 分别表示在 10%、5% 和 1% 的水平下显著

模型 1 的回归结果显示政治型、组织型和金融型社会资本对农村金融深度的总效应显著,且均为正向影响(表 4)。亲缘型社会资本对农村金融深度的总效应不显著。从模型 2 和 3 可以看出(模型 2、模型 3 的 k 值为 5),政治型、组织型和金融型社会资本对风险偏好具有显著正向影响,即这三类社会资本均能促进农户购买农业保险,降低项目风险。与此同时,这三类社会资本对违约行为有显著负向影响,即可以减少农户的违约行为。从模型 4 可以看出(模型 4 的 k 值为 5),加入风险偏好和违约行为两个中介变量后,两者对农村金融深度的影响分别为 0.712 和 -0.740,且均在 1% 水平下显著。结合模型 2 和 3 可以说明,选取风险偏好和违约风险作为中介变量是合理的。政治型、组织型和金融型社会资本的两类中介效应都是显著的,假说 1~3 均得到验证。值得注意的是,亲缘型社会资本对农村金融深度影响的总效应不显著,但是对风险偏好具有显著的负向影响,对违约概率具有正向影响但不显著,说明可能存在遮掩效应。在分析总体效果之后,进而对四类社会资本的中介路径做详细分析。

(二) 社会资本异质性的多重中介过程分析

中介效应分析需要不同方程回归系数的量尺相同,才具有可比性,继而可以计算中介效应(Mackinnon, 2012^[3])。本文采用的均为受限因变量模型,系数尺度相同,可直接使用其数和显著性进行中介效应分析,不需要进行等量尺化操作。本文采用系数乘积法来估计中介效应量及中介效应占总效应的比例。在对等级因变量的中介效应估计中,系数乘积法得到的结果优于系数差减法(刘红云等,2013^[4])。

对于政治型社会资本而言,“政治型社会资本—风险偏好—农村金融深度”和“政治型社会资本—违约行为—农村金融深度”的作用路径均显著。这说明,政治型社会资本既可

以作为高质量社会资本,筛选出低风险项目农户,又可以在贷款过程中实施监督,发现农户的违约行为。原因是显然的。村干部是农户选举出来的,同时接受农户对其政治、经济和文化等各方面的监督,而监督其贷款违约情况只是这一监督路径中的剩余产品,具有规模经济效应,交易成本极低。因此,这两条路径都提高了社会资本对农村金融深度的促进作用。与此同时,“政治型社会资本—风险偏好—农村金融深度”和“政治型社会资本—违约行为—农村金融深度”作用路径分别占总效应的 51.4% 和 57.3%。后者比例更大,说明在信贷市场上,政治型社会资本的监督约束功能比信息甄别功能更重要,主要体现在缓解道德风险上。

对于组织型社会资本而言,“组织型社会资本—风险偏好—农村金融深度”和“组织型社会资本—违约行为—农村金融深度”的两条路径也都显著。农户参加专业技术合作社等组织可以提高自身技术水平和生产效率。同时,从育苗到销售的服务,可以保障农户投资项目收入,降低农户的经营风险。不难理解,组织型社会资本可以作为筛选低风险项目的机制,增加发放贷款数量。组织型社会资本虽然没有小组贷款机制作为基础,但由于合作社的团体行为,农户可以向其他成员传递生产能力和产量的信号,因此产生了群体监督机制。这个信号是公开的并能够以低成本被金融机构获得,对农户履约起到约束效果,减少违约行为。这两条路径分别占总效应的 68.6% 和 24.4%。这说明组织型社会资本的功能主要体现在缓解逆向选择问题上。

对于金融型社会资本而言,“金融型社会资本—风险偏好—农村金融深度”和“金融型社会资本—违约行为—农村金融深度”作用路径也都显著,且分别占总效应的 54.3% 和 30.1%。这说明,农户通过在金融互助组的金融交易向银行传递了关于信用状况、经营能力和还款能力等历史信息,降低双方信息不对称程度,缓解逆向选择。此外,农户还可以通过事后的金融交易继续显示收入状况,预警违约风险。但是,由于农户可能在有违约企图时隐藏金融交易信息,因此,金融型社会资本的功能主要体现在信息甄别上。

对亲缘型社会资本而言,“亲缘型社会资本—风险偏好—农村金融深度”的作用路径显著,但其中介效应量为负数,与直接效应符号相反。这说明,可能存在遮掩效应(Suppression effects),即当第一步检验后,如果符号相反,则按遮掩效应解释(Rucker et al., 2011^[3]; 温忠麟和叶宝娟,2014^[34])。亲缘型社会资本对农户的保险购买行为具有挤出效应(王志刚等,2013),亲朋好友越多,对农户购买保险的挤出效果越强,从而无法保证项目的低风险,减少了银行发放贷款数额,弱化了农村金融深度。与此同时,“亲缘型社会资本—违约行为—农村金融深度”的作用不显著。这说明农户违约时的声誉惩罚作用也较小,亲缘型社会资本激励和监督功能较弱,无法缓解道德风险问题。亲缘型社会资本对农村金融深度影响不显著的原因在于,逆向选择识别成本过高带给农户的负效应,导致金融机构对农户贷款数量减少。

(三) 稳健性检验

农户自选择行为和自身异质性可能会导致回归结果出现偏差。比如,在衡量组织型和金融型社会资本时,本文采用的是“家里是否有人参加专业技术协会”和“家里是否有人参加了金融互助组”。这些参与行为明显与农户自身异质性相关,可能存在自选择问题。因此,本文采用增广的逆概率加权方法(Augmented inverse-probability weighting, AIPW)估计

社会资本对农村金融深度的平均处理效应,利用倾向匹配得分的方法选取反事实结果进行比较,缓解自选择和异质性导致的内生性问题,并对前文实证结果进行稳健性检验。使用AIPW估计方法需要对社会资本干预模型的协变量合理性进行检验:第一,图1验证了样本中干预组和控制组大部分在共同区域内,说明在倾向匹配得分时不会损失很多样本;第二,协变量平衡性检验结果显示,四类社会资本卡方检验结果均无法拒绝“协变量是平衡的”原假设,说明匹配后协变量是平衡的;第三,对于匹配后协变量的标准偏差(Standard bias)检验结果显示,匹配后的主要变量标准偏差比匹配前小,并且标准偏差低于10%。这说明干预组和控制组的协变量并无显著差异。因此,社会资本干预过程中的样本选择是合理的。

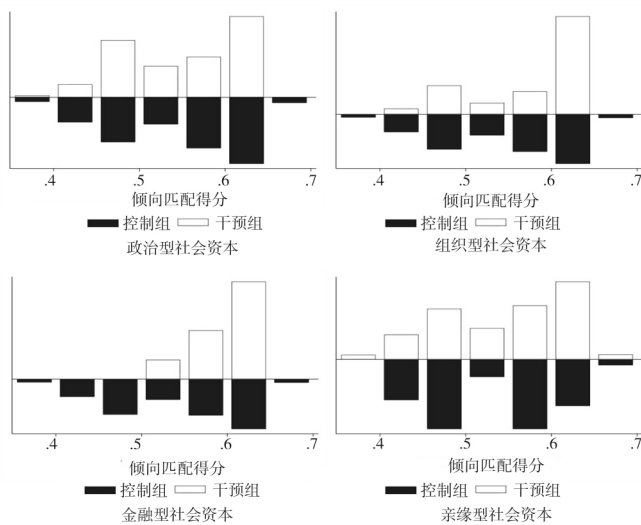


图1 社会资本倾向匹配得分共同取值范围

采用增广的逆概率加权方法分析社会资本对农村金融深度影响的结果显示(表5),政治型、组织型和金融型社会资本都能提升农村金融深度,而亲缘型社会资本对提升农村金融深度没有显著影响。由此说明前文实证结果是稳健的。

表5 AIPW 回归结果

变量	农村金融深度			
政治型社会资本	0.190 *** (0.087)			
组织型社会资本		0.994 *** (0.228)		
金融型社会资本			0.416 * (0.253)	
亲缘型社会资本				-0.057 (0.152)
观察值	813	813	813	813

注: 括号内是稳健标准误; *, **, *** 分别表示在 10%、5% 和 1% 的水平下显著。

六、结论和政策建议

农村金融市场深度不足制约着乡村振兴和农业现代化进程,而社会资本在很大程度上可以弥补农户因为抵押品不足而产生的贷款数量偏低问题。对于转型时期的中国来说,农户可使用的社会资本发生了结构性变化。本文利用多重中介模型的半参数估计法,以风险偏好和违约行为作为中介变量,深入刻画了异质性社会资本对农村金融深度影响的中介效应,分析了异质性社会资本对农户信贷数量的总体影响及其作用机理。结果表明,政治型、

组织型和金融型社会资本能提高农村金融深度,缓解信贷约束,但影响路径的侧重点不同。具体而言,政治型社会资本的功能主要体现在监督约束功能,可以有效缓解事后的道德风险问题;而组织型和金融型社会资本的功能主要体现在信息甄别功能,有利于缓解事前的逆向选择问题。亲缘型社会资本由于存在遮掩效应,对农村金融深度没有显著影响。

在此基础上,本文提出如下两点政策建议。第一,金融机构应加强村镇网点建设。农户获得金融型社会资本,需要金融机构加强村镇网点的设置(例如乡村金融综合服务站),承担办理银行卡、助农取款服务、提供农村信贷融资中介服务、收集农户金融需求、咨询代理金融业务、金融知识和业务宣传、农户信用信息收集和非现金支付工具推广等功能。多方面缓解金融机构地理排斥,形成更多金融交易;同时,需要提高农户的金融素养和社会信用,进而加深农村金融深度,推动农户增加投资,扩大生产规模,提高资本有机构成。第二,引入新型农业经营主体和村集体等组织型和政治型社会资本,重构信贷合约结构。交易费用导致了信息不畅通和合约执行的机会主义。科层化的组织改革,不仅可以降低交易费用,而且可以优化激励,从而促进农村金融市场深度发展。在贷款过程中引入专业技术合作社等新型农业经营主体、村集体和党小组等组织,通过合约的不同组合,提高预期收益,可以保障信息甄别和监督约束的实施。

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Does Heterogeneity in Social Capital Affect the Depth of Rural Finance? A Multiple – Mediation Semiparametric Estimation Model

Jiang Meishan¹, Peng Donghui¹, Ye Meiting¹, Li Jingrong²

(1. School of Economics & Management, South China Agricultural University, Guangdong, Guangzhou 510642, China;

2. Institute for Economic and Social Research, Jinan University, Guangdong, Guangzhou 510632, China)

Abstract: Using a multiple mediation semi – parametric estimation model, based on a survey conducted on rural households in 9 provinces in China, this study investigates the effects of social capital heterogeneity on rural financial depth and the mechanisms behind such an effect. The results showed that, political, organizational, and financial social capital improved the depth of rural finance through information screening, supervision, and restraint, while kinship social capital had no significant impact. Political social capital enhanced rural financial depth mainly by restricting farmers' noncompliance behaviors, while organizational and financial social capital enhanced financial depth mainly by identifying farmers' risk preferences. Therefore, the participation of political, organizational, and financial social capital through financial linkages is conducive to in – depth development of rural finance.

Keywords: social capital heterogeneity, rural financial depth, multiple mediation model, semiparametric estimation

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Farmers' cooperatives and smallholder farmers' access to credit: Evidence from China

Meishan Jiang, Jingrong Li^{*}, Yunsheng Mi

College of Economics and Management, South China Agricultural University, Guangzhou, Guangdong, China

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ABSTRACT

Farmers' cooperatives serve as effective means of transforming smallholder farmers' production methods in the process of agricultural modernization in developing countries. This paper aims to examine the credit effects of farmers' cooperatives by employing a framework based on institutional finance theory. Based on the 2021 China Household Finance Survey data, an endogenous switching probit model is employed to explore the impact of cooperative membership on smallholder farmers' access to credit. The research findings indicate the following: i) Farmers' cooperatives possess information advantages, as financial institutions gain access to smallholder farmers' information through the organized value chains of farmers' cooperatives, leading to a direct reduction in transaction costs and an improvement in access to credit. ii) Farmers' cooperatives can promote smallholder farmers' agricultural investments, increase household income for smallholder farmers, enhance the liquidity of farmland, and further improve access to credit for smallholder farmers. Therefore, farmers' cooperatives represent an inevitable trend in the agricultural modernization of developing countries. Rural financial institutions should alter their financial models and resolve adverse selection and moral hazard issues in the credit process through organizational approaches, thereby enhancing access to credit for smallholder farmers.

1. Introduction

Smallholder farmers (hereinafter referred to as SFs) are microeconomic entities engaged in small-scale family farming operations. They operate at the household level, relying primarily on their own labor and personal ownership of production assets to meet their consumption needs (Sibhatu and Qaim, 2018). SFs are characterized by part-time farming, low livelihood levels, deep-rooted traditional cultural characteristics, and a high propensity for risk aversion (Ellis, 1993). In 2008, the World Bank defined SFs as farmers with cultivated farmland areas smaller than 2 ha (5 acres). The majority of farmers in developing countries are SFs, and as of 2019, 98% of farmers in China fall into this category.¹ SFs' production relationships are contradictory to the marketization, industrialization, technological advancement, industrial organization, and socialization characteristics of modern agricultural productivity. The organic link between SFs and the development of modern agriculture must be facilitated through organizations to provide modern agricultural services (Bernard and Spielman, 2009; Jardine et al., 2014). This approach has also been recognized and promoted by the Chinese government as a means to address this contradiction.

^{*} Corresponding author.

E-mail address: lijingrong@scau.edu.cn (J. Li).

¹ The data was obtained from speech by Han Jun, vice minister of Agriculture and Rural Affairs of China, at the press conference held by the State Council Information Office in March 2019. The online link is www.gov.cn.

Farmers' cooperatives, as a primary form of organization in many developing countries, operate within a network of relationship contracts characterized by mechanisms of interest alignment. The ultimate goal of agricultural cooperative development is to effectively reduce transaction costs and production costs by utilizing labor, farmland, and capital resources efficiently. By extending the agricultural value chain, farmers' cooperatives aim to increase the prices of agricultural products and subsequently enhance SFs' income (Bernard and Spielman, 2009; Jardine et al., 2014; Kansanga et al., 2018). On one hand, farmers' cooperatives can regulate transaction patterns and behaviors, leading to cost savings (Candemir et al., 2021). On the other hand, the organizational structure of agricultural integration allows for internal division of labor, further extending the agricultural value chain, and improving the level of agricultural industry through forms of agricultural organization and socialization (Huang and Liang, 2018). Consequently, farmers' cooperatives transform the economic and social characteristics of smallholder farmers and generate financial effects as a result. These effects represent one of the numerous mechanisms that link SFs and farmers' cooperatives in terms of their mutual interests (Abate et al., 2016).

In developing countries, SFs face greater credit constraints and the poverty trap, which keeps them distanced from modern agriculture. The most significant reasons for the credit constraint among SFs are information asymmetry in household production patterns, uncertainty in agricultural returns, and a lack of qualified collateral due to weak asset liquidity. Even if information asymmetry is resolved, the uncertainty in returns necessitates collateral when borrowing from formal financial institutions. However, the specificity, uncertainty, and low transaction frequency of rural assets limit their liquidity as collateral, and institutional deficiencies further restrict liquidity (Williamson, 2000). These factors ultimately contribute to SFs' credit constraint. Financial innovations from an institutional perspective have been attempted and implemented in developing countries to alleviate credit constraints on SFs. Currently, there are two main approaches to addressing the collateral tyranny in rural credit markets. The first approach is the capitalization of rural assets, particularly farmland. The second approach is the organization of SFs, wherein various forms of organizations serve as third-party guarantees or intermediaries for SFs' credit information, restructuring the traditional credit process. In theory, the role of organizations is expected to be more significant than the capitalization of rural assets, as improving the liquidity of rural assets also requires organizational participation. Farmers' cooperatives currently represent the primary form of organization in rural China, and if SFs can enhance their access to credit through participation in farmers' cooperatives, it would resolve their credit constraint issues, strengthen both small and large-scale farmers, and promote the modernization of agriculture in developing countries.

Existing research on farmers' cooperatives has mostly focused on the influence of cooperative membership on the adoption of chemical fertilizers (Ma et al., 2018), commercialization behavior (Bernard et al., 2008; Bernard and Spielman, 2009; Wollni and Fischer, 2015), productivity (Lin et al., 2022), household income (Hoken and Su, 2018), farm sustainability (Candemir et al., 2021), distributional effects (Ito et al., 2012) and household welfare (Ma and Abdulai, 2016; Wossen et al., 2017; Kumar et al., 2018). There is a research gap regarding the credit effects of farmers' cooperatives. Therefore, our study aims to analyze the credit effects and the mechanisms of farmers' cooperatives. Our research makes contributions in the following three aspects: First, to the best of our knowledge, this study is the first to examine the impact of cooperative membership on SFs' access to credit. Second, this study attempts to investigate the mechanisms from the perspective of the welfare benefits brought by farmers' cooperatives, including income improvement, increased investment, and enhanced farmland liquidity. Finally, unlike previous studies that focused on general farming households, our research specifically targets SFs. We define SFs based on specific criteria outlined in the Third National Agricultural Census in China. These criteria define SFs based on the number of crop maturity cycles per year and the scale of land in the local context, which is more scientific compared to the World Bank standards. Our findings indicate the following: Farmers' cooperatives possess information advantages. Financial institutions, through the organized supply chain, acquire information on SFs' production, income, and other factors, directly reducing transaction costs for SFs and financial institutions, thus improving access to credit. At the same time, farmers' cooperatives enhance SFs' access to credit through the following mechanisms: First, from the perspective of credit demand, participation in farmers' cooperatives can increase agricultural investments for SFs, thus raising their credit demand. From the perspective of credit supply, farmers' cooperatives alter traditional financing models. Second, through their advantages in purchasing, production, and sales, farmers' cooperatives increase household income for SFs, change the risk evaluation by financial institutions, and improve the accessibility to credit for SFs. Lastly, farmers' cooperatives enhance farmland liquidity, allowing SFs to provide qualified collateral to financial institutions, thereby improving access to credit.

The remaining sections of this paper will unfold our research in the following aspects: Section 2 provides an introduction to the research background. Section 3 discusses the underlying logic of how farmers' cooperatives influence the SFs' access to credit. Section 4 presents the data and corresponding descriptive statistics, providing detailed information on the data and variables used. Section 5 outlines the empirical specifications employed in the analysis. Section 6 presents the results of the empirical research. The conclusions of this paper are presented in Section 7.

2. Background

2.1. The development of farmers' cooperatives in China

The development of farmer cooperatives in China has its roots in the cooperatives established during the era of socialist transformation and has since evolved into specialized cooperatives. This development showcases the agricultural policy reforms in China, encompassing the transition from the initial phase of socialist transformation to the current era of agricultural modernization. According to the classification proposed by Zhang (2021) and Zhu and Liu (2019), the development of cooperatives in post-revolution China can be categorized into three distinct stages: the period from the establishment of the People's Republic of China to the pre-reform and opening-up era, the period of reform and opening-up, and the new era of socialism.

The period from the establishment of the People's Republic of China to the pre-reform and opening-up era (1953–1978) can be delineated into three distinct phases. The period from 1953 to 1956 was the primary cooperatives stage in rural China. During this period, farmers retained ownership of the means of production and farmland, while the agricultural production and management rights were held by the cooperatives. Farmer participation in cooperatives was voluntary during this phase. From 1956 to 1958, the phase transitioned to advanced cooperatives. In this stage, the means of production and land belonged to the cooperatives, which also had the right to manage agricultural production. Farmers were compelled to join the cooperatives during this period. Subsequently, after 1959, the cooperative system transitioned into the People's Communes. Throughout these three stages, farmers gradually transitioned from voluntary to compulsory membership, and their means of production and land gradually became owned by the cooperatives. Additionally, farmers lost their rights to manage agricultural production. Eventually, the cooperatives were transformed into people's communes.

Until the implementation of the Household Responsibility System (HRS) in 1978, farmers in China owned the means of production, while farmland was collectively owned. Under this system, farmers held farmland contracting and management rights, as well as agricultural production and management rights. Agricultural products belonged to the farmers after the payment of agricultural taxes, until the abolition of agricultural taxes in 2006.

During the period of reform and opening-up (1978–2017), the cooperative sector experienced a resurgence, guided by the principles of voluntary membership and freedom of withdrawal, while enjoying substantial operational autonomy. Unlike before the reform and opening-up, from this stage onwards, farmers can freely choose to join or withdraw from cooperatives. In 2006, the government issued a directive approving the establishment of credit cooperatives in rural areas, allowing farmers and rural small enterprises to initiate the creation of community-based credit cooperatives that serve as member-oriented organizations with democratic management by members. This marked a stage of integrated development for cooperatives in China, encompassing specialized cooperation, supply and marketing cooperation, and credit cooperation. In 2007, the "Law of the People's Republic of China on Farmers' Specialized Cooperatives" was enacted, with both central and local governments allocating funds to support specialized farmer cooperatives in carrying out services such as information dissemination, training, agricultural product quality standards and certification, agricultural production infrastructure construction, market marketing, and technology promotion. These measures further facilitated the rapid development of cooperatives.

During the socialist new era phase (2017–), significant developments have occurred in the cooperative sector. In 2017, the "Law of the People's Republic of China on Farmers' Specialized Cooperatives" was revised, leading to the diversification of cooperative forms. The government has implemented measures to promote the development of farmers' specialized cooperatives, including fiscal support, tax incentives, support in finance, technology, and talent, as well as industrial policy guidance. These measures have played a crucial role in fostering the rapid advancement of cooperatives in China.

In comparison to cooperatives in Europe, America, and other developing countries, Chinese farmer cooperatives demonstrate distinctive characteristics (Huang and Liang, 2018). First, these cooperatives assume a public role in the implementation of national agricultural policies. Chinese farmer cooperatives are mandated to meet the requirements of cooperation, industrialization, and socialization in the context of agricultural modernization. They encompass a wide range of functions, including procurement, production, marketing, agricultural technology, and acting as political representatives for farmers. Second, aiming for shared prosperity, these cooperatives emphasize elite governance rather than relying solely on consensus-based governance. Member heterogeneity is significant, with a prevailing model characterized by large farmers providing assistance and management to SFs. Decision-making and distribution of benefits are based on the level of capital investment, resembling a shareholding cooperative system. Lastly, Chinese farmer cooperatives tend to be small in scale and exhibit a strong local focus. They are limited in their national and global outreach, lacking cross-border cooperatives at the national or even international level.

Rural cooperatives represent an organizational form of agricultural industrialization, offering several benefits for SFs: (i) Farmers' cooperatives serve as a bridge between the government and its members, facilitating the dissemination of government policy information, implementation of policy support, and provision of technical assistance, thereby enhancing farmers' negotiating power. (ii) Farmer cooperatives act as a link between the market and their members. They centralize the procurement of seeds, pesticides, fertilizers, etc., reducing production costs and ensuring quality. Farmers' cooperatives coordinate with enterprises to standardize product specifications and quality, expand market access, and increase sales volume. (iii) Enhance households' income. The operational model of the cooperative reduces farmers' production costs, increases the selling prices of agricultural products, and consequently raises households' income. However, farmers forfeit their autonomy in production and the right to distribute profits after participating in cooperatives, which constitutes the primary cost of cooperatives participation. After joining cooperatives, production decisions and profit allocations are no longer made by individual farmers but by cooperatives. State subsidies are also collected and distributed collectively by cooperatives, eliminating individual decision-making power over them. Consequently, there are information asymmetry problems between SFs and cooperatives' managers. For instance, poor management of the cooperative, improper technical utilization due to managerial deficiencies, insufficient assessment of market risks may negatively impact the cooperative's operations and consequently decrease households' income.

2.2. Credit constraints faced by smallholder farmers in developing countries

In developing countries, SFs commonly face credit constraints imposed by formal financial institutions (Boucher et al., 2008). To provide fair financial inclusion opportunities for SFs, China implemented the New Rural Finance Policy in 2006, allowing for the establishment of credit cooperatives. Similar financial organizations have also been established in other developing countries, significantly improving the rural financial system and increasing rural financial supply capacity. Although the financial inclusion of

rural households has increased substantially in many developing countries in recent years, a significant number of SFs continue to face credit constraints, indicating that the issue of credit constraints has not been fundamentally alleviated (Balana et al., 2022). While information asymmetry in household production and the uncertainty of agricultural returns contribute to the credit constraint of SFs (Peng et al., 2021), the fundamental cause can be attributed to the "Tyranny of Collateral" as proposed by Rajan and Zingales (2003): the lack of a social credit system and the failure of contract enforcement mechanisms. These factors make it difficult for formal financial institutions to address information and default risks using transaction credit (Barrot, 2016).

The equilibrium of rural credit markets in the absence of collateral is characterized by adverse selection and credit constraints under information asymmetry. Even in the presence of information symmetry, smallholder farmers' agricultural production characteristics, including low resilience to market and natural risks, limited production elasticity, and lower insurance rates, resulting in highly unstable incomes. As a result, formal financial institutions require collateral to mitigate default losses.

However, the limited liquidity of assets owned by farmers results in a lack of qualified collateral. For instance, farmland serves as the primary asset held by farmers. However, in China, farmland exhibits characteristics of fixed geographic location, fragmentation, and dispersion, resulting in a high degree of asset specificity. Furthermore, although central policies and relevant legal regulations have eased restrictions on utilizing farmland as collateral, numerous details remain ambiguous. Uncertainties persist regarding whether the mortgagee is limited to formal financial institutions such as banks, the necessity of approval from the farmland contracting parties for mortgage arrangements, and the redemption process after debt repayment. These policy-level uncertainties amplify the uncertainty associated with collateral disposal. Collectively, these factors indicate that the present farmland transfer market in China remains limited, characterized by a low degree of liquidity in farmers' farmland assets. In cases of farmer default, banks encounter significant transaction costs when disposing of farmland usage rights.

In an environment where credit constraints are dominated by limited liability, wealth serves as collateral that limits defaults. Therefore, financing capacity increases with existing wealth. In a market dominated by moral hazard, financing capacity weakens with increasing wealth. This is because the inherent conflict between borrowers' intangible repayment efforts and the tangible returns allocated to lenders and borrowers generates negative incentive effects and disutility for borrowers, but borrowers do not bear the full consequences of effort disutility (Conning and Udry, 2007). Consequently, as wealth increases, borrowers seek lower interest rates since greater wealth may result in more losses. The wealthy are more likely to engage in riskier production activities (Boucher and Guirkinger, 2007). These characteristics reduce the financing capacity of the wealthy, diminish contract matches, and prompt the use of internal capital for financing with increasing existing wealth (Paulson et al., 2006; Boucher and Guirkinger, 2007). Hence, SFs in developing countries face a credit market dominated by limited liability.

3. Conceptual framework

3.1. Information advantage of farmers' cooperatives

Organizations of SFs refer to the process, institutions, or state in which SFs, based on the requirements of modern agriculture, adopt a market-oriented approach, cooperative systems as the foundation, and an incentive mechanism as the bond, effectively integrating various elements. This integration aims to achieve an organic combination of cooperativization, industrialization, and socialization in modern production models (Cook, 1995). The organizations can be categorized into production organizations (e.g., professional technical organizations, labor output organizations, entrepreneurial organizations) and transaction organizations (farmland cooperatives, rural financial cooperatives, or mutual financial organizations), which facilitate the transmission of internal information among SFs, mitigate information asymmetry and alter the economic and social attributes of SFs.

The participating organizations, whether they are production organizations or transaction organizations, establish a mutually cooperative pattern between formal financial institutions and rural intermediaries (insiders), enabling financial institutions to provide credit to SFs in a market-oriented manner. This phenomenon is referred to as financial linkage (Pagura and Kirsten, 2006). The organizations not only undertake the tasks of screening, monitoring, and loan repayment but also determine the scale and interest rates of credit. Formal financial institutions can also engage the organizations (rural intermediaries) and pay them commissions. Therefore, the role of organizations in the financial linkage is as follows: First, it allows formal financial institutions to become insiders through the organizations, reducing the level of information asymmetry, as this type of information asymmetry is unknown to outsiders and the cost of obtaining information is higher than the expected returns due to its fragmented nature. Second, rural intermediaries can access relatively low-cost credit funds, achieving economies of scale. Third, competition among private intermediaries can lower market interest rates and improve the accessibility of loans for SFs (Figueiredo and Franco, 2018).

The agricultural industry chain production organizations that have emerged under the background of agricultural modernization, industrialization, and socialization have also played an important role in alleviating the credit constraints of SFs. Vertically integrated production organizations (company + specialized cooperatives + SFs) improve the operational efficiency and effectiveness of the entire agricultural industry chain by linking production, processing, distribution, and sales processes (Ma and Abdulai, 2016). It changes the weak position of SFs in the market. As an integrated organization that strengthens the linkages between SFs, companies, and markets in agriculture, industry, and commerce, it can collect and summarize information from various entities in the industry chain and promote the formation of an information network system within the agricultural industry chain, enabling a certain degree of information sharing with external formal financial institutions (Zhou et al., 2019). Through the contractual relationships in the industry chain, formal financial institutions can obtain dynamic production and operational information from SFs, such as quality, business scale, capital utilization efficiency, the profitability of business activities, market demand, and agricultural product prices (Pearce, 2003).

Farmers' cooperatives provide modern production and operational services to SFs through vertically integrated production and sales models. Within this framework, products, contracts, and agricultural production facilities have emerged as collateral for supply chain finance, possessing self-liquidating properties. Concurrently, farmers' cooperatives can utilize the threat of expelling SFs as an incentive for them to fulfill contracts. Due to the specific characteristics of agricultural assets, these collateral items acquire higher value within the organizational context. Farmers' cooperatives integrate the agricultural value chain, transforming relationships from spontaneous transactions into integrated models, aiming to enhance financing prospects within the value chain and facilitate the inflow of external funds into the industry chain (Orwothun and Qutieshat, 2022). Based on these premises, this study proposes [Hypothesis 1](#):

Hypothesis 1. Farmers' cooperatives alleviate information asymmetry between SFs and financial institutions, thereby enhancing SFs' access to credit.

3.2. The potential mechanisms through which cooperative membership rights influence access to credit

3.2.1. Agricultural investments

Farmers' cooperatives increase the likelihood of successful agricultural investments for SFs through various channels. First, the organization synergizes rural industry resources, develops specialized industries, and creates investment projects. It provides comprehensive services throughout the entire process, including seed supply, technical guidance, pest and disease control, and product marketing. This generates investment demand among SFs, lowers investment risks, and increases the likelihood of technology adoption, thereby promoting agricultural investment (Ma and Abdulai, 2019). Second, farmers' cooperatives facilitate mechanization, modernization, socialization, and ecologicalization of SFs' investments through joint ventures, enabling them to enter the threshold of modern agricultural investment and enhance investment efficiency (Candemir et al., 2021). Additionally, the commitment of SFs to invest in the cooperative upon joining serves as a driving force for increased agricultural investments (Ma and Abdulai, 2019). Moreover, joining a cooperative offers tax benefits, incentivizing investment (Hoken and Su, 2018). Furthermore, the organization of SFs reduces transaction costs involved in negotiations, contracting, and other dealings with investment projects, thereby encouraging agricultural investments (Ma and Abdulai, 2019). In conclusion, farmers' cooperatives lower investment costs, increase agricultural product investment prices, reduce investment risks, and enhance investment returns. This leads to an expansion of SFs' agricultural investments, thereby increasing credit demand. The increase in agricultural investment implies an increase in the fixed assets owned by farmers, such as large machinery. These can serve as collateral when applying for loans. Banks can easily monitor investments in assets with specific purposes, thereby reducing moral hazard and regulatory costs, and increasing the supply of credit. Hence, an increase in agricultural investment triggers a rise in both the demand for and supply of credit, consequently enhancing farmers' access to credit. Based on these observations, we propose the following [Hypothesis 2](#):

Hypothesis 2. Farmers' cooperatives enhance household agricultural investments among SFs, increase the credit demand of SFs, and thereby improve SFs' access to credit.

3.2.2. Household income

The production scale of SFs depends on household consumption satisfaction and population differentiation. Participation in farmers' cooperatives alters the production equilibrium of SFs. First, farmers' cooperatives, as institutional mechanisms, aim to mitigate price losses caused by oversupply, combat opportunism, and address risks resulting from market failures (Cook, 1995). Second, improvements in prices and non-price factors, including standardization, food safety, contractual arrangements, facilitated market access, technology dissemination, social capital networks, and member capacity building, enhance the marginal income of SFs. Additionally, farmers' cooperatives reduce the risks associated with market entry for SFs through contractual arrangements and derivatives trading, thereby improving income stability. Liu et al. (2007) conducted field surveys in county-level areas and found that low-income farmers had difficulty obtaining loans from financial institutions such as credit cooperatives and banks, but coverage rates increased significantly as household income levels improved. With the same loan amount, Hodula et al. (2023) found that income is the primary influencing factor for financial institutions in providing loans because annual incomes will contribute to borrowers' total debt settlement. An increase in income can enhance the repayment capacity of households, thereby reducing moral hazard problems and increasing farmers' access to credit. Based on these considerations, we propose the following hypothesis:

Hypothesis 3. Farmers' cooperatives increase household income for SFs, enhance their creditworthiness evaluation, and subsequently improve SFs' access to credit.

3.2.3. Farmland liquidity

New institutional economics takes transactions as the unit of analysis, with frequency, uncertainty, and asset specificity as key dimensions. Frequency and asset specificity are major factors influencing governance modes (Riordan and Williamson, 1985). Governance refers to the actions taken to achieve order, resolve conflicts, and obtain common interests. Williamson (2002) suggests that the optimal governance structure can effectively facilitate transactions while minimizing contract and performance costs. Governance structures can be categorized as market-based, hybrid, and hierarchical. The stronger the asset specificity, the further the chosen organizational structure deviates from market governance (Riordan and Williamson, 1985). Asset specificity intensifies the losses incurred from opportunism, necessitating organizational arrangements to safeguard transactions. Efficiency-building efforts can reduce transaction costs. Markets possess spontaneous adaptability, while organizations exhibit cooperative adaptability, enabling

further progress in long-term contracts (Wollni and Fischer, 2015).

The asset specificity of agricultural assets held by SFs enhances bilateral dependency, making the mixed structure of farmers' cooperatives more suitable for the SFs' credit market. Farmland is the most valuable asset for SFs, and farmland mortgage loans form the core business of rural mortgage markets. Farmland tenure reforms in most developing countries have provided formal property rights to farmland, established channels for farmland transfer, increased the net collateral value of farmland, and reduced leverage. By mitigating agency problems and utilizing farmland assets as collateral, credit constraints can be alleviated and risk discounts and interest rates can be lowered in rural credit markets dominated by limited liability. However, in China, issues such as redemption, resale, and collateral transfer of farmland have resulted in high transaction costs for farmland mortgage loans, particularly for small plots of farmland. Due to high asset specificity, high uncertainty, and low transaction frequency of farmland, farmland transfer in rural China is not active. Formal financial institutions face high transaction costs when dealing with farmland assets of SFs in case of contract violation. Due to the long production cycle of agriculture, the lack of farmland appraisal institutions, and the imperfections in the farmland transfer market, as the scale of circulation increases, the growth rate of farmland transfer slows down and transaction frequency decreases. Furthermore, fixed geographical location and farmland specificity increase the marginal production cost of farmland inflows as the trading radius expands, reducing the likelihood of contract signing. This means that the buyer's market is largely limited to SFs within the same village, resulting in a weak market when banks dispose of farmland assets, making it difficult to compensate for these costs as transactions do not occur frequently due to asset specificity and uncertainty. Therefore, SFs face challenges in implementing farmland mortgages. If political, legal, and moral factors impede the development of property rights, the costs will be even higher. As a result, even if SFs possess farmland ownership, they may be excluded from the credit market.

Farmers' cooperatives can reduce transaction costs² associated with farmland disposal. On one hand, they can increase the likelihood of contiguous farmland parcels by integrating small, scattered plots of farmland owned by SFs, thereby reducing the geographic specificity of the farmland. On the other hand, they can embed contract enforcement within the relational network of SFs, effectively monitoring and promoting SFs' performance through reputation mechanisms, thus reducing uncertainty in the transaction process. Additionally, farmland can circulate within the agricultural cooperative, internalizing the transaction costs of farmland valuation and information search, and mitigating the adverse effects caused by the lack of a farmland valuation system and imperfect circulation markets. Therefore, farmers' cooperatives can alleviate SFs' credit constraints. We propose following *Hypothesis 4*.

Hypothesis 4. Farmers' cooperatives can mitigate SFs' credit constraints by enhancing farmland liquidity, thereby improving their access to credit.

4. Data and variables

4.1. Data

The data used in this study comes from the 2021 wave of the China Household Finance Survey (CHFS) conducted by the Southwestern University of Finance and Economics, and survey data on Inclusive Finance and Agricultural Research conducted by the South China Agricultural University. It is the largest unofficial household asset sampling survey project in China. The data covers various information, including household assets, liabilities and credit constraints, income, consumption, social insurance, demographic characteristics, employment, payment habits, etc. The sample size of the 2021 survey is 22,027 households from 29 provinces, 269 counties, and 1028 village or neighborhood committees in China. Among the sampled households, there were 8703 households from rural areas and 13,324 households from urban areas.³ We define SFs as those who hold farmland of fewer than 6.67 ha (100 mu) in areas with a single harvest per year, or less than 3.34 ha (50 mu) in areas with multiple harvests per year, based on the criteria specified in China's Third National Agriculture Census.

4.2. Proxy variables and descriptive statistics

This paper aims to study the impact of cooperative membership on credit access. The dependent variable is credit access. Referring to Cheng et al. (2021), we use a binary indicator "whether the household received loans from banks or credit cooperatives, Yes= 1, otherwise= 0" as a proxy variable of access to credit. The core explanatory variable is cooperative membership. We use a binary indicator "whether the household has the membership in the cooperative, Yes= 1, otherwise= 0" for the proxy variable of cooperative membership. Credit access may be related to many household characteristics. These characteristics may directly affect the household's access to credit. There is an omitted variable bias if we omit these household characteristics. Therefore, we choose the following variables as control variables according to previous studies (Ma et al., 2018; Ma and Abdulai, 2019; Lin et al., 2022): age, household head's gender, household head's education level, household head's village cadre status, household head's financial literacy, number of household member with junior high school level, number of doing farming in the household, number of household members working outside the village, annual household income, household's financial asset (take log), area of household farmlands (take log). In addition, the access to credit may have village differences. For this reason, we use the primary fuel types used for cooking in the village

² Transaction costs in farmland disposal including search costs, negotiation and signing costs, and supervision and execution costs.

³ For detailed information on the sampling process, please refer to the official website of the China Household Finance Survey (CHFS) at <https://chfs.swufe.edu.cn/>.

to capture the economic development of the village. Additionally, we use the number of bank outlets in the village, the distance between bank outlets and village committees, and the number of financial service outlets (including self-service banks, ATMs, and agricultural financial service points) to capture the financial development of the village.

Finally, we include dummy variables for the eastern, central, and western regions⁴ in the regression to account for regional differences among households. Fig. 1 shows the regional distribution of cooperatives in the sample. It can be observed that the majority of cooperatives in the sample are located in the western region, accounting for 46.3%. The eastern region follows with 28.1%. Lastly, the central region accounts for 25.6%. The number of cooperatives in the eastern and central regions is similar, with the western region having the most. Additionally, in terms of the participation rates in cooperatives (see Fig. 2), approximately 6.7% of households in the western region, 6.3% in the central region, and 6.1% in the eastern region participate in cooperatives. This indicates that there are certain regional differences in the distribution of cooperatives and their participation rates. The economically underdeveloped western region has more cooperatives and a higher participation rate among household farmers, highlighting the importance of controlling for regional differences in the selection equation.

In Section 3.3, we discuss three channels through which cooperatives influence access to credit: agricultural investments, household income, and farmland liquidity. We employ “1 if the household’s agricultural investment is higher than that in the previous survey” as a proxy variable for agricultural investment, “1 if the household’s income is higher than that in the previous survey” as a proxy variable for growth in household income, and “1 if the household had transferred their farmland, 0 otherwise” as a proxy variable for farmland liquidity. It is worth noting that there is a timing inconsistency in the agricultural investment and household income mechanism. The agricultural investment and household income data from the CHFS are the flow from the previous year⁵ (i.e., 2020 or 2021), while whether households participate in cooperatives are their status when they were interviewed. Fig. 3 displays the histogram distribution of the years in which households participated in cooperatives. As Fig. 3 shows, households participated in cooperatives mainly from 2016 to 2021. There are 34 households (10.1%) that joined cooperatives after 2020, with 31 households joining in 2021 and 3 households joining in 2022. Among the households that joined cooperatives in 2021, 15 households were surveyed in 2021 (indicating an inconsistency in timing), while 16 households were surveyed in 2022. The 3 households that joined cooperatives in 2022 certainly have a timing inconsistency issue, resulting in a total of 18 households with timing inconsistencies. We address this issue by excluding these 18 households from the sample in mechanism analysis.

The descriptive statistics of specific variables are shown in Table 1. According to Table 1, it can be observed that only 5.8% of SFs have obtained loans from formal institutions, indicating the challenges faced by small-scale farmers in accessing credit. Furthermore, in Table 2, we present the differences between cooperative members and non-members. Some household and village characteristics, such as household head’s gender, household head’s education level, number of household members with junior high school level, annual household income, household’s financial asset (take log), and area of household farmlands, differ between members and nonmembers. Cooperative tend to be better educated and richer, and have larger farmland sizes, indicating potential self-selection with regard to the cooperative participation decision. Simultaneously, it is noteworthy that 10.3% of cooperative members have obtained loans from formal financial institutions, whereas this proportion stands at only 5.5% for nonmembers. Cooperative members are 4.8% higher in access to credit. While the t-statistics analysis in Table 2 is informative about the difference in household characteristics and credit access between members and nonmembers, but we cannot draw inferences concerning the impact of cooperative membership on credit access because the findings are conditioned on neither observed nor unobserved factors. To draw a causal inference about the relationship between cooperative membership and credit access, we rely on results from a further econometrics analysis, which will be the focus of the next section.

5. Empirical study

The matter of paramount importance in this study is estimating the effect of cooperative membership on credit access. Notably, an outcome equation can be specified as:

$$Y_i^* = \alpha D_i + X_i' \gamma + u_i \quad (1)$$

$$Y_i = 1(Y_i^* > 0) \quad (2)$$

where Y_i^* is the latent variable that determines the observed outcome. $1(\cdot)$ is an indicator function and Y_i is a binary indicator variable that equals 1 if the household i received a loan from a formal financial institution. D_i is a binary indicator variable that equals 1 if the household i participates in the cooperative. X_i represents a vector of control variables affecting credit access. u_i is an error term associated with the outcome variables.

However, using a binary choice model (probit or logit model) to estimate Eqs. (1) and (2) may lead to biased results. An important empirical challenge is that there may be an endogeneity issue of the cooperative membership. We employ a simple model to describe the process of SFs’ participation in cooperatives. On one hand, farmers benefit from joining cooperatives due to information

⁴ The definitions of eastern, central, and western provinces in China can be found at https://www.stats.gov.cn/hd/lyzx/zxgk/202107/t20210730_1820095.html.

⁵ Due to the impact of the pandemic, 70% of the household samples in the CHFS wave 2021 were completed in 2021, while the remaining 30% of samples were completed in 2022.

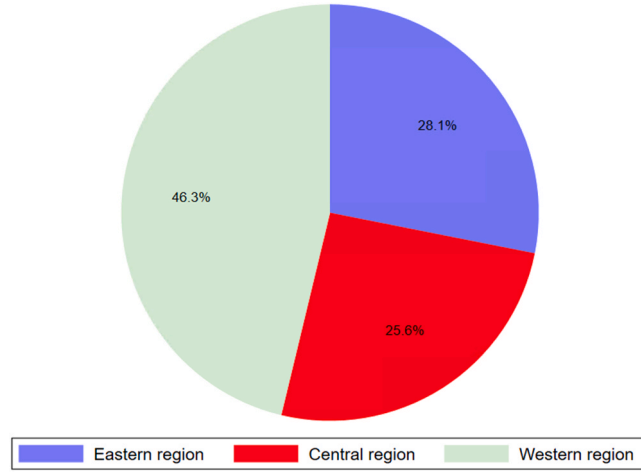


Fig. 1. Regional distribution of cooperatives. Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics.

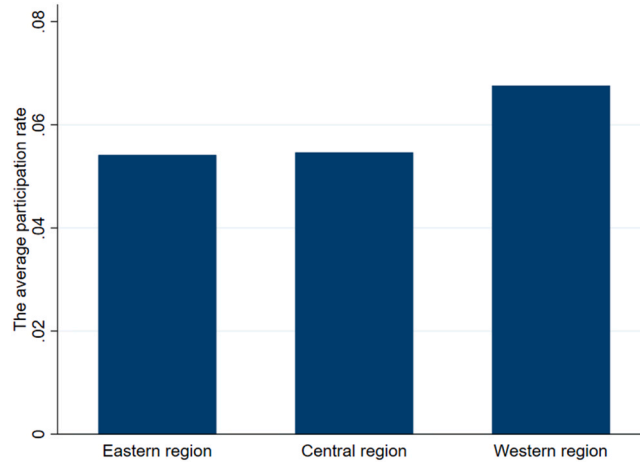


Fig. 2. Participation rates in cooperatives of households across different regions. Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics.

advantages and increased income. On the other hand, joining cooperatives entails the loss of production autonomy and profit distribution rights, which represent the primary costs of participation. When cooperatives are poorly managed, technology is underutilized, market risks are underestimated, it can have adverse effects on the operations of cooperatives and consequently affect farmers' income. Therefore, SFs face a cost and benefit trade-off when participating in cooperatives. Let R_i denote the returns of the i th household from participating in the cooperative, and C_i represent the costs. Therefore, the net returns of cooperatives participation can be expressed as:

$$D_i^* = R_i - C_i \quad (3)$$

where D_i^* is defined as the difference between the expected net returns of being a cooperative member and not being a member. However, some benefits and costs are difficult to directly measure. Nevertheless, they can be considered as functions of household socioeconomic characteristics and village characteristics, denoted as W_i . The benefits and costs can be represented as $R_i(W_i)$ and $C_i(W_i)$ respectively. Therefore, the equation above can be written as:

$$D_i^* = R_i(W_i) - C_i(W_i) \quad (4)$$

Furthermore, we assume that both the benefits and costs are linear functions of W_i : $R_i(W_i) = W_i'\beta$ and $C_i(W_i) = W_i'\delta$. The net returns can be expressed as:

$$D_i^* = W_i'\eta + v_i \quad (5)$$

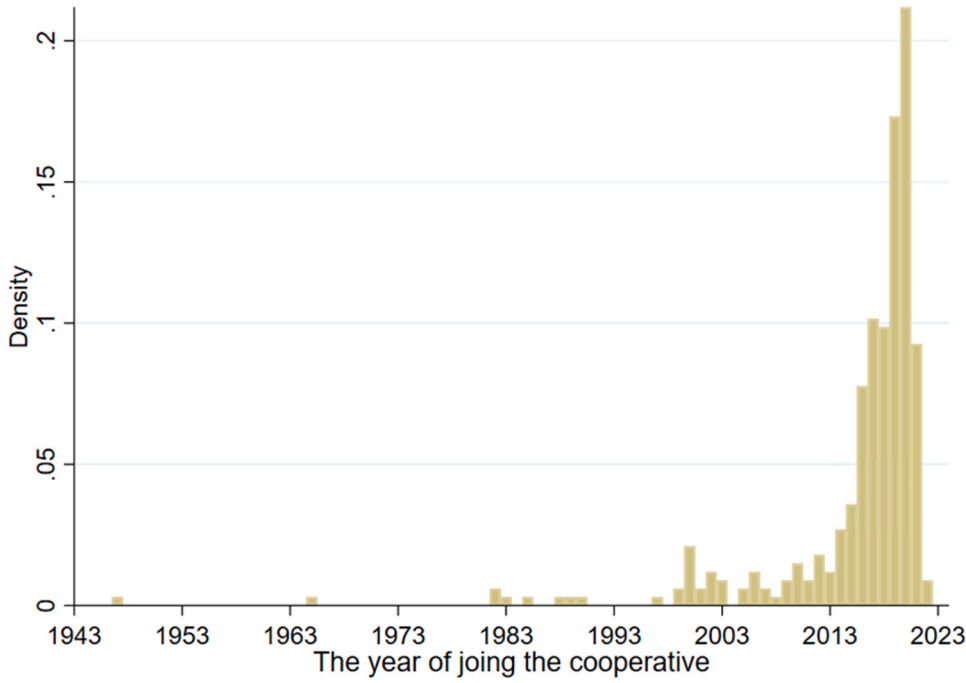


Fig. 3. Time distribution of farmers' participation in cooperatives. Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics.

where $\eta = \beta - \delta$. v_i represents the error term resulting from the mis-specification of the functional form and other omitted factors. The household will opt into the cooperative if $D_i^* > 0$. The selection equation can be specified as:

$$D_i = 1(D_i^* > 0) \quad (6)$$

where $1(\cdot)$ is an indicator function. The decision to be a cooperative member is voluntary, indicating the farmer's self-selection. Farmers may self-select into cooperatives due to their inherent characteristics, such as incentives and ability. These unobserved factors may also influence SFs' access to credit. If some unobservable factors (e.g., farmers' innate ability) influence both the error term (v_i) in the cooperative membership choice equation and the one (u_i) in the outcome equation, selection bias occurs, resulting in a correlation of the two error terms in the two specifications, such that $\text{Corr}(u_i, v_i) \neq 0$. In this case, any standard regression model such as probit or logit model applied to estimate the outcome equation produces biased results. Thus, rigorous assessment of the effect of cooperative membership on credit access of farmers should take into account the selection bias.

To address the issue of selection bias, some econometric approaches, such as the propensity score matching method (PSM), have been widely employed (Bernard et al., 2008; Fischer and Qaim, 2012; Ito et al., 2012). However, a major limitation of PSM is that it only accounts for selection bias associated with observed factors. In this paper, we employ an endogenous switching probit model (ESPM) to address the issue of selection bias by accounting for both observed and unobserved heterogeneities (Lokshin and Sajaia, 2011). Endogenous switching regression has been widely adopted by researchers to deal with selection bias caused by both observed and unobserved factors (Ma and Abdulai, 2016; Kumar et al., 2018). Specifically, suppose we have a validity instrument variable Z_i , then the selection equation becomes

$$D_i^* = Z_i'\theta + W_i'\eta + \varepsilon_i \quad (7)$$

If the IV Z_i meets the assumptions of correlation and exogeneity, we can address the endogeneity issues by using the ESPM model according to Eq. (1) (2) (6) (7).

In this paper, we employ a village-level membership network (i.e., village-level participation rates of cooperative membership expect the farmer's own household) as an IV. This IV has been frequently used in previous studies to address the issues of selection bias in cooperative participation (e.g., Ito et al., 2012; Ma and Abdulai, 2016; Ma et al., 2020; Lin et al., 2021). IV must satisfy two key assumptions: correlation and exogeneity. That is, (i) the IV affects the farmer's decision of joining cooperatives, and (ii) the IV has no direct effect on credit access except through its effect on the farmer's participation in a cooperative. We believe that this IV satisfies the assumptions of correlation and exogeneity. On the one hand, the peer effect for cooperative participation in the village is found to have a positive impact on the household's decision to join cooperatives (Ito et al., 2012). Thus, the farmer household's decision to participate in cooperatives is expected to be correlated with the village-level participation rates of other households. On the other

Table 1
Variable definition and descriptive statistics.

Variable	Definition	Obs.	Mean	Std. dev	Min	Max
<i>Panel A: Dependent variables</i>						
Credit access	1 if the household has a loan from banks or credit cooperatives, 0 otherwise	5094	0.058	0.235	0	1
<i>Panel B: Core explanatory variables</i>						
Membership	1 if the household belongs to a cooperative, 0 otherwise	4980	0.083	0.276	0	1
<i>Panel C: Household head's Characteristics</i>						
Age	Household head's age	5094	57.200	11.038	16	93
Gender	1 if the household head is male, 0 otherwise	5097	0.823	0.381	0	1
Education	Household head's education level (No schooling at all = 1. Primary school = 2. Junior high = 3. High school = 4. Technical high school = 5. College/Vocational school = 6. Bachelor's degree or above = 7)	5071	2.583	0.980	1	8
Village cadre	1 if the head of the household is a village cadre, 0 otherwise	4463	0.060	0.238	0	1
Financial literacy	The household head's concern about economic and financial information (1 =Never concerned. 2 =Rarely concerned. 3 =Neutral. 4 =Frequently concerned. 5 =Extremely concerned)	5039	1.843	1.141	1	5
<i>Panel D: Household Characteristics</i>						
High school people	Number of household members with junior high school level	5097	0.595	0.873	0	7
Farming people	Number of doing farming in the household	5097	3.490	1.765	1	12
Migrant labor	Number of household members working outside the village	5097	0.696	0.932	0	6
Household income	The annual household income (take log)	4588	9.990	1.475	0	14.392
Financial assets	Household's financial asset (take log)	5058	8.374	3.230	0	16.812
Land	Area of household farmlands (take log)	4617	10.156	2.592	0	19.113
<i>Panel E: Village Characteristics</i>						
Non-clean energy	1 if the main cooking fuel for residents in this village is firewood or coal.	5097	0.265	0.441	0	1
Bank outlets	Number of bank outlets (including rural credit cooperatives, postal savings banks, etc.) in the village	5097	0.360	0.695	0	8
Distance	Distance between bank outlets and village committees (km)	5096	1.245	0.957	0	4.605
Financial service outlets	Number of financial service outlets (including self-service banks, ATMs, and agricultural financial service points) in the village.	5097	0.239	0.965	0	5
<i>Panel F: Spatial Characteristics</i>						
Western region	1 if the household in the western region of China, 0 otherwise	5097	0.454	0.498	0	1
Central region	1 if the household in the central region of China, 0 otherwise	5097	0.227	0.419	0	1
Eastern region	1 if the household in the eastern region of China, 0 otherwise	5.097	0.317	0.465	0	1
<i>Panel G: IV</i>						
Membership network	Village-level participation rates of cooperative membership except households themselves	4980	0.063	0.083	0	1
<i>Panel H: Channels</i>						
Increased agricultural investment	1 if the household's agricultural investment is higher than that in the previous survey	3156	0.519	0.499	0	1
Increased household income	1 if the household's income is higher than that in the previous survey	3156	0.481	0.499	0	1
Land transfer	1 if the household had transferred their farmland, 0 otherwise	5080	0.198	0.398	0	1

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics.

hand, others' participation in cooperatives is expected to have no direct effects on credit access of each farmer household, as cooperatives only provide services for their members. We also conducted some robustness checks on the validity of this IV, as detailed in the subsequent sections.

The ESPM model consists of two stages. The first-stage is a selection equation based on a dichotomous criterion function for the choice of cooperative membership, as shown by the Eq. (6). In the second stage, two regime equations for cooperative members and nonmembers can be specified for the outcomes of interest. The model is specified as:

$$Y_{1i}^* = X_{1i}'\gamma_1 + u_{1i}, Y_{1i} = 1(Y_{1i}^* > 0) \quad (8)$$

$$Y_{0i}^* = X_{0i}'\gamma_0 + u_{0i}, Y_{0i} = 1(Y_{0i}^* > 0) \quad (9)$$

Observed Y_i is defined as

$$Y_i = Y_{1i} \text{ if } D_i = 1 \quad (10)$$

$$Y_i = Y_{0i} \text{ if } D_i = 0 \quad (11)$$

where Y_{1i} and Y_{0i} are credit access for cooperative members and nonmembers, respectively. X_{1i} and X_{0i} are vectors of control variables for cooperative members and nonmembers, respectively. u_{1i} and u_{0i} are error terms. Assume that ε_i , u_{0i} and u_{1i} are jointly normally

Table 2
Mean difference of the variables.

	Members		Nonmembers		Mean difference
	Mean (1)	Std. Dev. (2)	Mean (3)	Std. Dev. (4)	
<i>Panel A: Dependent variables</i>					
Credit access	0.103	0.304	0.055	0.228	0.048 * **
<i>Panel B: Household head's Characteristics</i>					
Age	56.887	11.056	57.269	11.039	-0.676
Gender	0.851	0.356	0.823	0.381	0.028 *
Education	2.834	0.998	2.564	0.973	0.270 * **
Village cadre	0.145	0.352	0.054	0.225	0.091 * **
Financial literacy	2.158	1.232	1.817	1.130	0.341 * **
<i>Panel C: Household Characteristics</i>					
High school people	0.678	0.884	0.590	0.875	0.087 *
Farming people	3.399	1.762	3.499	1.761	-0.100
Migrant labor	0.731	0.956	0.692	0.928	0.039
Household income	10.257	1.435	9.970	1.479	0.287 * **
Financial assets	9.094	2.297	8.329	3.234	0.765 * **
Land	10.626	2.457	10.127	2.604	0.499 * **
<i>Panel D: Village Characteristics</i>					
Non-clean energy	0.274	0.274	0.265	0.441	0.009
Bank outlets	0.490	0.959	0.348	0.656	0.142 * **
Distance	1.226	1.018	1.247	0.951	-0.021
Financial service outlets	0.250	1.192	0.240	0.930	0.010
<i>Panel E: Spatial Characteristics</i>					
Western region	0.438	0.496	0.456	0.498	-0.018
Central region	0.219	0.413	0.230	0.420	-0.011
Eastern region	0.344	0.475	0.314	0.464	0.030
<i>Panel F: IV</i>					
Membership network	0.129	0.136	0.058	0.074	0.072 * **
<i>Panel G: Channels</i>					
Agricultural investment growth	0.534	0.499	0.518	0.499	0.016
Household income growth	0.519	0.500	0.475	0.499	0.044
Land transfer	0.246	0.245	0.193	0.193	0.053 * **

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. The mean difference is the two-sample t-test between cooperative members and non-members. The null hypothesis is that there is no difference in mean between the two groups. * ** : significant at 1%; * *: significant at 5%; * : significant at 10%.

distributed with a mean-zero vector and correlation matrix

$$\Omega = \begin{pmatrix} 1 & \rho_0 & \rho_1 \\ \rho_0 & 1 & \rho_{10} \\ \rho_1 & \rho_{10} & 1 \end{pmatrix} \quad (12)$$

where ρ_0 and ρ_1 are the correlations between v_i , u_{1i} and v_i , u_{0i} . ρ_{10} is the correlation between u_{0i} and u_{1i} . If ρ_0 or ρ_1 is statistically significant, this would indicate the presence of selection bias arising from unobservable factors. Hence, taking into account both observable and unobservable factors is a prerequisite to obtain unbiased estimates of treatment effects. Since Y_{1i} and Y_{0i} are never observed simultaneously, the joint distribution of (u_{1i}, u_{0i}) is not identified, and consequently, ρ_{10} cannot be estimated. We assume that $\rho_{10} = 1$. This model is identified by the nonlinearities of its functional form. The log-likelihood function for the simultaneous system of Eqs. (6), (7), (10) and (11) is

$$\begin{aligned} \mathcal{L}(\theta, \eta, \gamma_1, \gamma_0, \rho_1, \rho_0) \\ = \sum_{D_i \neq 0, Y_i \neq 0} \ln \{ \Phi(Z_i' \theta + W_i' \eta, X_{1i}' \gamma_1, \rho_1) \} + \sum_{D_i \neq 0, Y_i = 0} \ln \{ \Phi(Z_i' \theta + W_i' \eta, -X_{1i}' \gamma_1, -\rho_1) \} \\ + \sum_{D_i = 0, Y_i \neq 0} \ln \{ \Phi(-Z_i' \theta - W_i' \eta, X_{0i}' \gamma_0, -\rho_0) \} + \sum_{D_i = 0, Y_i = 0} \ln \{ \Phi(-Z_i' \theta - W_i' \eta, -X_{0i}' \gamma_0, \rho_0) \} \end{aligned} \quad (13)$$

where $\Phi(\cdot)$ is the cumulative function of a bivariate normal distribution. Therefore, we can obtain the estimators of $\theta, \eta, \gamma_1, \gamma_0, \rho_1$ and ρ_0 according to Eq. (13). After estimating the model's parameters, we can calculate the average treatment effect on the treated (ATT) and the average treatment effect on the untreated (ATU). The effect of the treatment on the treated, or the expected effect of the treatment on individuals with observed characteristics x who participated in the program (TT):

$$TT(x) = \Pr(Y_1 = 1 | D = 1, X = x) - \Pr(Y_0 = 1 | D = 1, X = x)$$

$$= \frac{\Phi(X_1\gamma_1, Z'\theta + W'\eta, \rho_1) - \Phi(X_0\gamma_0, Z'\theta + W'\eta, \rho_0)}{F(Z\gamma)} \quad (14)$$

where $F(\cdot)$ is a cumulative function of the univariate normal distribution. The effect of the treatment on the untreated (TU), which is the expected effect of the treatment on individuals with observed characteristics x who did not participate in the program:

$$\begin{aligned} \text{TU}(x) &= \Pr(Y_1 = 1 | D = 0, X = x) - \Pr(Y_0 = 1 | D = 0, X = x) \\ &= \frac{\Phi(X_1\gamma_1, -Z'\theta - W'\eta, -\rho_1) - \Phi(X_0\gamma_0, -Z'\theta - W'\eta, -\rho_0)}{F(-Z\gamma)} \end{aligned} \quad (15)$$

According to Eqs. (14) and (15), ATT and ATU can be specified as:

Table 3

Determinants of cooperative membership and its impact on SFs' access to credit.

	Selection	Access to credit	
	(1)	Members (2)	Nonmembers (3)
Age	-0.024 (0.024)	0.189 * (0.114)	0.102 * ** (0.033)
Age squared	0.236 (0.216)	-2.011 * (1.183)	-1.211 * ** (0.323)
Gender	0.010 (0.097)	-0.335 (0.276)	0.232 * (0.137)
Education	0.104 * ** (0.039)	0.041 (0.159)	0.057 (0.050)
Village cadre	0.489 * ** (0.099)	0.097 (0.338)	-0.050 (0.184)
Financial literacy	0.080 * ** (0.026)	-0.039 (0.099)	0.033 (0.038)
High school people	-0.068 (0.047)	0.246 (0.177)	-0.011 (0.053)
Farming people	-0.003 (0.026)	0.219 * ** (0.085)	0.098 * ** (0.031)
Migrant labor	0.003 (0.046)	-0.415 * ** (0.175)	-0.279 * ** (0.064)
Household income	-0.023 (0.144)	-0.213 (0.329)	-0.243 * (0.115)
Household income squared	0.003 (0.008)	0.013 (0.020)	0.017 * * (0.007)
Financial assets	-0.031 (0.037)	1.682 * ** (0.507)	0.104 * * (0.051)
Financial assets squared	0.004 (0.003)	-0.095 * ** (0.027)	-0.010 * ** (0.004)
Land	-0.017 (0.046)	2.171 * ** (0.717)	-0.052 (0.057)
Land squared	0.002 (0.003)	-0.093 * ** (0.033)	0.004 (0.003)
Non-clean energy	0.039 (0.065)	-0.251 (0.287)	0.230 * * (0.106)
Bank outlets	0.171 * ** (0.065)	-0.077 (0.307)	0.037 (0.092)
Distance	0.090 * * (0.045)	-0.037 (0.156)	0.085 (0.067)
Other financial institutions	0.081 * * (0.037)	-0.047 (0.148)	-0.079 (0.068)
Middle region	-0.007 (0.077)	-0.683 * (0.410)	-0.434 * ** (0.124)
Eastern region	0.088 (0.069)	-0.431 (0.385)	-0.377 * ** (0.112)
IV: Membership network	3.665 * ** (0.318)		
Observations	3512		

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Access to credit is a dummy variable that is 1 if the household received loans from banks or credit cooperatives. In Table 3, Column (1) reports the results of the selection equation, i.e., Eqs. (6) and (7). Columns (2) and (3) in Table 3 present the results of the outcome equation regarding access to credit, i.e., Eqs. (10) and (11). Cluster standard errors are shown in parentheses. * ** : significant at 1%; * *: significant at 5%; * : significant at 10%.

$$ATT = \frac{1}{N_D} \sum_{i=1}^{N_D} TT(x_i) \quad (16)$$

$$ATU = \frac{1}{N - N_D} \sum_{i=1}^{N - N_D} TU(x_i) \quad (17)$$

where N is the number of observations and N_D is the number of observations with $D = 1$ (number of treated individuals).

6. Results

6.1. Estimation of selection equation and outcome equation

The estimation results for the selection equation are presented in Table 3, column (1). The disturbance terms of households within the same village may be correlated, so the standard errors are clustered at the village level. The level of education has a significant positive effect on SFs' participation in cooperatives, which is consistent with the findings of Wossen et al. (2017). Additionally, households whose household heads are village cadres are more likely to participate in cooperatives. Households with cadre heads have a better understanding of cooperatives being an effective organizational form for integrating SFs and agricultural modernization development. They may expect more policy support and benefits from participating in cooperatives, hence increasing their probability of participation. At the same time, households whose household heads have higher financial literacy are also more likely to participate in cooperatives. Greater financial literacy among household heads enables them to better understand the role of cooperatives in improving access to credit due to their organizational characteristics and policy support. Consequently, they are more likely to choose to join cooperatives in order to access more credit resources. Furthermore, the number of bank outlets (including rural credit cooperatives, postal savings banks, etc.) and other financial institutions (including self-service banks, ATMs, and agricultural financial service points) have a positive influence on SFs' participation in cooperatives. The number of bank branches and proximity to bank branches are important indicators of inclusive financial development. Higher numbers of bank branches and closer proximity signify a higher level of inclusive financial development. In rural areas of China, one of the key manifestations of inclusive finance is the financial linkage between formal financial institutions and cooperatives (Pagura, 2008). Consequently, as the development of inclusive finance progresses, there is an increasing demand from SFs for organizational engagement. Therefore, as inclusive finance becomes more developed, there is a greater demand from SFs for cooperative engagement. The membership network has a significant positive effect on SFs' participation in cooperatives. This indicates that the IV chosen in our study is correlated to the endogenous variables so satisfy the assumption of relevance.

The regression results for SFs who participate in cooperatives and those who do not participate are illustrated in columns (2) and (3) of Table 3, respectively. It is observed that the factors influencing access to credit differ between cooperative members and non-members. For instance, in the sample of non-members, households with male household heads exhibit a 23.2% higher probability of access to credit compared to households with female-headed families. However, in the sample of participating SFs, the gender of the household head is not statistically significant. This suggests that cooperative participation may partially mitigate gender-based discrimination in the credit market. The impact of farmland size is found to be statistically insignificant for nonmembers, whereas it is significant for members. The asset specificity of farmland constrains its liquidity, and the liquidity of collateral is a fundamental characteristic for it to qualify as collateral. Consequently, in the absence of a unified farmland transfer platform, farmland exhibits limited liquidity, making it challenging to serve as eligible collateral and mitigate default risks for SFs. However, following participation in cooperatives, SFs gain the ability to internally transfer their farmland within the cooperative, thereby enhancing the liquidity of farmland and enabling it to serve as collateral for banks, thus increasing loan accessibility. When not participating in cooperatives, the farmland of SFs' faces difficulties in being recognized by banks as collateral. This finding partially validates our Hypothesis 4, which posits that organizational participation enhances the liquidity of farmland assets, transforming them into viable collateral.

Table 4
Impact of cooperative membership on SFs' access to credit.

	Mean of predicted probability of access to credit		Treatment effects
	Choose to become members (1)	Choose not to become members (2)	
Members	0.100 (0.008)	0.026 (0.002)	ATT: 0.074 * ** (0.005)
Nonmembers	0.162 (0.003)	0.056 (0.001)	ATU: 0.106 * ** (0.002)

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Access to credit is a dummy variable that is 1 if the household received loans from banks or credit cooperatives. ATT is calculated by Eqs. (14) and (16). ATU is calculated by Eqs. (15) and (17). Standard errors are shown in parentheses. * ** : significant at 1%; * *: significant at 5%; * : significant at 10%.

6.2. The impact of cooperative membership on access to credit

Based on the estimation of the ESPM model, we can calculate TT and TU. Fig. 1 displays the fitted probabilities of obtaining loans for members and nonmembers, as well as the probability density distributions of their counterfactual frameworks. It can be observed that if members choose not to participate in cooperatives, their probability density distribution curve of obtaining loans will concentrate at smaller probabilities, indicating that they have a higher probability of obtaining loans when participating in cooperatives compared to when they do not (counterfactual). On the other hand, if nonmembers choose to participate in cooperatives, their probability density distribution curve of obtaining loans exhibits a significantly thicker tail, indicating that they have a lower probability of obtaining loans compared to when they participate in cooperatives (counterfactual). Furthermore, we calculate ATT and ATU. As shown in column (4) of Table 4, members have a 7.4% higher probability of obtaining loans compared to their probability when they do not participate in cooperatives (counterfactual). Conversely, nonmembers have a 10.6% lower probability of obtaining loans compared to their probability when they participate in cooperatives (counterfactual). Farmers' cooperatives can reduce information asymmetry by organizing and involving formal financial institutions as internal participants. Furthermore, as intermediaries in rural areas, farmers' cooperatives can aggregate SFs' credit demands and negotiate with formal financial institutions as large clients to obtain better credit conditions. These conditions may include extended loan terms, increased credit limits, and reduced interest rates, thereby rendering SFs' loan applications profitable and enhancing both the supply and demand sides of credit. Additionally, the rural credit market operates as a limited liability market, where the supply chain established by farmers' cooperatives serves as eligible collateral in the form of movable assets. The aforementioned functions of farmers' cooperatives collectively enhance the likelihood of SFs' access to credit. Hypothesis 1 is supported by empirical evidence.

6.3. Robustness tests

We conduct four robustness tests as follows: First, we check the validity of our IV choice. We follow Ma and Abdulai (2016) and Lin et al. (2022) by estimating the selection equation and the outcome equation, separately, in which the membership network is included as an explanatory variable. Furthermore, following Di Falco et al. (2011) and Kumar et al. (2018), we conducted a falsification test by regressing access to credit as the dependent variable on the membership network as the explanatory variable, using the sample of non-cooperative members. Second, we employ alternative estimation models to assess the robustness of the empirical findings, including the IV-Probit model and the double-robust models (which encompass AIPW and IPWRA). Third, we replace the dependent variable to conduct the estimation. Apart from loans from banks and cooperatives, credit cards and online loans are also loans from formal financial institutions. Therefore, we use credit cards and access to online loans as the dependent variables and re-estimate the models to obtain the impact of cooperatives on these forms of formal credit. Fourth, we discuss the measurement error problems in the dependent variable. Given that access to credit involves financial information, some surveyed households may be reluctant to disclose their financial status, potentially leading to inaccuracies in responses regarding credit access. Consequently, we discuss the implications of measurement error in access to credit on our results.

6.3.1. Validity check of the IV

Table 5 presents the results of the validity check of the IV. Column (1) in Table 5 indicates that the village-level membership network has a significant effect on the individuals' cooperative membership decision equation. This suggests that the IV satisfies the relevance assumption. Column (2) in Table 5 indicates that when the cooperative variable is controlled for, the membership network has no effect on access to credit. This suggests, to some extent, that the membership network has no direct impact on access to credit other than through cooperative participation. These findings validate the assumptions of exogeneity and relevance for the IV. A further falsification test also reveals that the selected instrument has no impact on access to credit for nonmembers (column (3) in Table 5), again supporting the validity of our IV choice.

6.3.2. Alternative estimation models

Table 6 presents the estimation results based on the IV-Probit model and the double-robust models. The IV-Probit model reports regression coefficients, with a coefficient of 0.947 for cooperative membership, which is statistically significant at the 1% level. The AIPW and IPWRA models report the average treatment effect (ATE), with an ATE of 0.045 for the AIPW model, significant at the 5% level. The IPWRA model yields an ATE of 0.042, also significant at the 10% level. All three models produce results that are statistically significant at least at the 10% level, indicating a positive impact of cooperative membership on SFs' access to credit. Thus, the previous conclusions are robust.

6.3.3. The effects of cooperative membership on credit cards and online loans

Rural households may also access formal credit through other channels, such as credit cards and online loans. Therefore, we estimate the ESPM model again using credit cards and online loans as dependent variables. We use "1 if the household has credit cards, 0 otherwise" as the proxy variable for credit cards and "1 if the household has loans from online lending platforms, 0 otherwise" as the proxy variable for online loans. The estimation results are shown in Table 7. From Table 7, it can be observed that SFs' participation in cooperatives can increase the probability of obtaining credit cards and online loans. Specifically, Table 7 panel A indicates that members have a 11.5% higher probability of obtaining credit cards compared to their probability when they do not participate in cooperatives (counterfactual). Conversely, nonmembers have a 2.8% lower probability of obtaining credit cards compared to their probability when they participate in cooperatives (counterfactual). Table 7 panel B shows that members do not have a significantly

Table 5

Test the validity of the instrument variable.

	Cooperative membership (1)	Access to credit (2)	Access to credit for nonmembers (3)
Cooperative membership		0.229 * (0.135)	
Membership network	0.786 *** (0.080)	0.578 (0.600)	0.430 (0.702)
Household Characteristics	Yes	Yes	Yes
Village Characteristics	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Observations	3512	3512	2890

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Access to credit is a dummy variable that is 1 if the household received loans from banks or credit cooperatives. Cluster standard errors are shown in parentheses. *** : significant at 1%; ** : significant at 5%; * : significant at 10%.

Table 6

Results of IV-Probit, AIPW and IPWRA.

	Access to credit		
	IV-Probit (1)	AIPW (2)	IPWRA (3)
Cooperative membership	0.947 ** (0.476)	0.045 ** (0.021)	0.042 * (0.019)
Household Characteristics	Yes	Yes	Yes
Village Characteristics	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Observations	3512	3512	3512

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. The IV-Probit model provides estimates for the coefficients, whereas the AIPW and IPWRA models report the ATE. Cluster standard errors are shown in parentheses. *** : significant at 1%; ** : significant at 5%; * : significant at 10%.

Table 7

Impact of cooperative membership on SFs' access to credit cards and online loans.

	Mean of predicted outcomes		Treatment Effects
	Choose to become members (1)	Choose not to become members (2)	(3)
Panel A: credit cards			
Members	0.277 (0.007)	0.162 (0.006)	ATT: 0.115 *** (0.006)
Nonmembers	0.165 (0.002)	0.137 (0.002)	ATU: 0.028 *** (0.001)
Panel B: online loans			
Members	0.039 (0.005)	0.046 (0.004)	ATT: − 0.007 (0.005)
Nonmembers	0.040 (0.001)	0.034 (0.001)	ATU: 0.006 *** (0.001)

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Credit card is a binary variable that is 1 if the household has credit cards. Online loan is a binary variable that is 1 if the household has loans from online lending platform. ATT is calculated by Eqs. (14) and (16). ATU is calculated by Eqs. (15) and (17). Standard errors are shown in parentheses. *** : significant at 1%; ** : significant at 5%; * : significant at 10%.

higher probability of obtaining online loans compared to their probability when they do not participate in cooperatives (counterfactual). However, nonmembers have a 0.6% lower probability of obtaining online loans compared to their probability when they participate in cooperatives (counterfactual). This indicates that participation in cooperatives does indeed increase the probability of obtaining credit cards and online loans.

6.3.4. The measurement error problems in access to credit

If the measurement error is uncorrelated with the explanatory variables, then the measurement error in access to credit can be

considered as random, which does not affect the estimates of parameters and the ATT (Wooldridge, 2010). If the measurement error is correlated with the access to credit, endogeneity issues arise, resulting in substantial bias in the estimates of parameters and the ATT. However, this endogeneity problem can be addressed using the control function approach.⁶ In this study, we consider that the measurement error in access to credit may be correlated with household income. Households with actual access to loans but relatively low income might tend to conservatively report no credit access due to concerns about repayment capacity, leading to biased estimation results. However, as long as we can find a good IV for household income, we can use the control function approach to address this endogeneity issue. Following the IV choice for cooperatives, we use “other households’ income in the village” as the IV. We believe that this IV satisfies the assumptions of relevance and exogeneity. On the one hand, “other households’ income in the village” reflects the economic development level of the village, which is closely related to the household’s own income. On the other hand, “other households’ income in the village” should not directly affect the access to credit of the household. The estimated results of ATT and ATU are shown in Table 8. From Table 8, we can see that the estimated ATT is 0.078, and the estimated ATU is 0.034. Comparing with Table 4 in the paper, the estimated ATT without considering measurement error is 0.074, and the estimated ATU is 0.106. This indicates that the impact of measurement error on ATT is relatively small, but it is more significant for ATU, leading to an overestimation in ATU. However, both ATT and ATU are still significant, which to some extent confirms the robustness of our previous conclusions.

6.4. Mechanism analysis

Drawing upon the preceding hypotheses, agricultural investment, farmland transfer, and household income emerge as potential mediating mechanisms. The outcomes of the mechanism analysis, as illustrated in Table 9 and Fig. 5, unequivocally demonstrate that cooperative membership exerts a substantial positive impact on agricultural investment growth, contributes to the augmentation of household income, and facilitates farmland transfer activities.⁷ These empirical findings provide robust support for the validation of Hypotheses 2, 3, and 4.

Panel A of Table 9 presents the effects of cooperative membership on agricultural investment. As shown in Column (3) of panel A in Table 9, the probability of agricultural investment growth for cooperative members is significantly higher than their non-participating counterparts. Participating in the agricultural cooperative leads to a 33.2% increase in agricultural investment growth for members. At the same time, nonmembers exhibit a 15.3% lower agricultural investment growth compared to their participating counterparts. That is to say, by participating in farmers’ cooperatives, SFs can integrate the value chain, overcome investment barriers, and enhance the likelihood of technology adoption, thereby generating investment demand. Additionally, farmers’ cooperatives contribute to the mechanization, modernization, socialization, and ecological enhancement of SFs’ investments, improving the efficiency of agricultural investment and reducing investment risks (Candemir et al., 2021). Consequently, farmers’ cooperatives lower the agricultural investment costs for SFs, increase agricultural product prices, and improve profitability, thus stimulating agricultural investment (Hoken and Su, 2018). Therefore, participation in farmers’ cooperatives expands the scale of agricultural investment, thereby increasing credit demand. Meanwhile, banks could easily supervise machinery investment with asset specificity, which reduces moral hazard and supervision costs. Large machinery could be used as the collateral to increase credit supply (Chen et al., 2022). Therefore, increase in agricultural investment leads to an increase in both the demand for and supply of credit, thereby increasing farmers’ access to credit. improving SFs’ access to credit. Hypothesis 2 is validated.

Panel B of Table 9 presents the effects of cooperative membership on household income. In panel B of Table 9, as indicated by the results in Column (4), the probability of household income growth for cooperative members is 19.8% higher than their non-participating counterparts. On the other hand, non-members experience a 5.8% lower probability of household income growth compared to that when they participate in the cooperative. With the same loan amount, Hodula et al. (2023) found that income is the primary influencing factor for financial institutions in providing loans because annual incomes will contribute to borrowers’ total debt settlement. Farmers’ cooperatives enhance SFs’ marginal income and income stability through improvements in price and non-price factors, such as standardization, food safety, contract farming, market access facilitation, technology dissemination, social capital networks, and member capacity building. Therefore, participating in farmers’ cooperatives increases SFs’ income. The increased income enhances financial institutions’ assessment of expected returns from SFs, leading to increased credit supply and improved SFs’ access to credit. Hypothesis 3 is validated.

Panel C of Table 9 presents the effects of cooperative membership on farmland transfer. In panel C of Table 9, the results in Column (4) demonstrate that cooperative members have a significantly higher probability (22.7%) of engaging in farmland transfer compared to their non-participating counterparts. Nonmembers exhibit a statistically significant 4.0% lower probability of farmland transfer compared to their participating counterparts. The rural credit market is a limited liability market. Farmers’ cooperatives enhance the liquidity of farmland through internal transfer, making it a qualified collateral and improving SFs’ credit accessibility. Jiang et al. (2023) also indicates that increased land liquidity can significantly enhance the probability of farmers’ credit access. Particularly, during the process of agricultural modernization, as the demand for substantial funding increases, financial institutions face higher default risks and stricter collateral requirements. Farmland, as SFs’ primary asset, becomes a qualified collateral, facilitating internal farmland transfer within the cooperative. This arrangement not only resolves the issues of redemption, resale, and collateral transfer for financial institutions, reducing transaction costs but also addresses SFs’ concerns about the risk of losing their farmland, mitigating

⁶ More details about the control function approach can be found in the online appendix.

⁷ The estimation of the selection equation and outcome equation for agricultural investment, land transfer, and household income can be found in the online appendix.

Table 8

ATT and ATU after addressing measurement errors in access to credit.

	Mean of predicted probability of access to credit		Treatment effects
	Choose to become members (1)	Choose not to become members (2)	
Members	0.100 (0.008)	0.022 (0.002)	ATT: 0.078 * ** (0.007)
Nonmembers	0.090 (0.003)	0.056 (0.001)	ATU: 0.034 * ** (0.002)

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Access to credit is a dummy variable that is 1 if the household received loans from banks or credit cooperatives. ATT is calculated by Eqs. (14) and (16). ATU is calculated by Eqs. (15) and (17). Standard errors are shown in parentheses. * ** : significant at 1%; * *: significant at 5%; * : significant at 10%.

Table 9

Impact of cooperative membership on agricultural investment, land transfer and household income.

	Mean of predicted outcomes		Treatment Effects
	Choose to become members (1)	Choose not to become members (2)	
Panel A: Agricultural investment growth			
Members	0.862 (0.005)	0.530 (0.010)	ATT: 0.332 *** (0.010)
Nonmembers	0.507 (0.002)	0.353 (0.003)	ATU: 0.153 *** (0.003)
Panel B: Household income growth			
Members	0.547 (0.016)	0.349 (0.012)	ATT: 0.198 *** (0.013)
Nonmembers	0.586 (0.005)	0.528 (0.003)	ATU: 0.058 *** (0.004)
Panel C: Land transfer			
Members	0.244 (0.006)	0.017 (0.002)	ATT: 0.227 *** (0.007)
Nonmembers	0.238 (0.002)	0.198 (0.001)	ATU: 0.040 *** (0.002)

Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Agricultural investment growth (Panel A) is a dummy variable that is 1 if the household's agricultural investment is higher than that in the previous survey. Household income growth (Panel B) is a dummy variable that is 1 if the household's income is higher than that in the previous survey. Land transfer (Panel C) is a dummy variable that is 1 if the household had transferred their farmland. Standard errors are shown in parentheses. * ** : significant at 1%; * *: significant at 5%; * : significant at 10

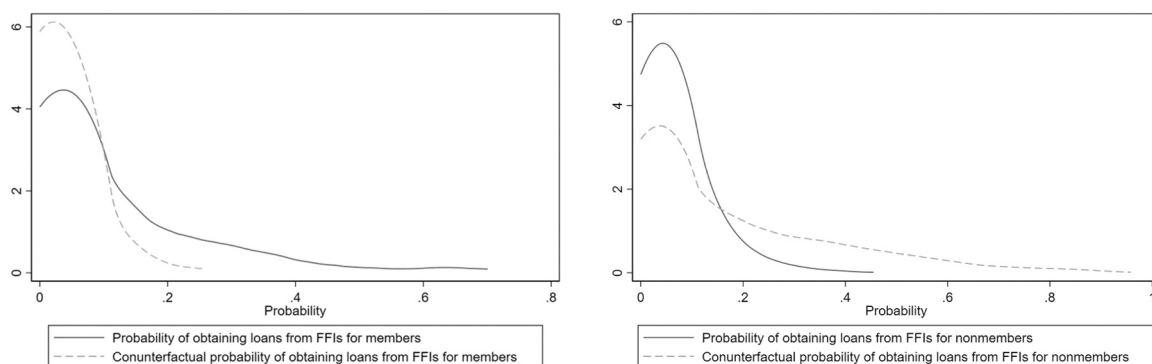
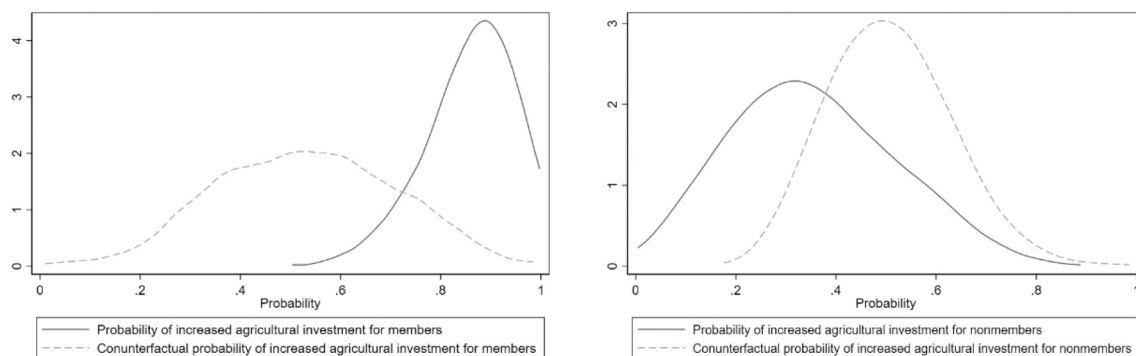
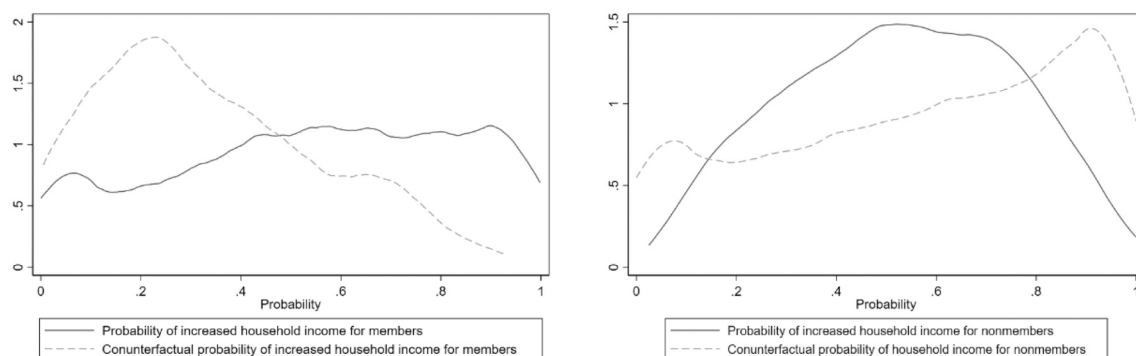


Fig. 4. Probability density function of access to credit. Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Access to credit is a dummy variable that is 1 if the household received loans from banks or credit cooperatives. Real lines represent the probability density functions of access to credit for cooperative members and nonmembers. Dashed lines represent the probability density functions of their counterfactual access to credit. FFIs is the abbreviation for Formal Financial Institutions.

Panel A: Agricultural investment growth



Panel B: Household income growth



Panel C: Land transfer

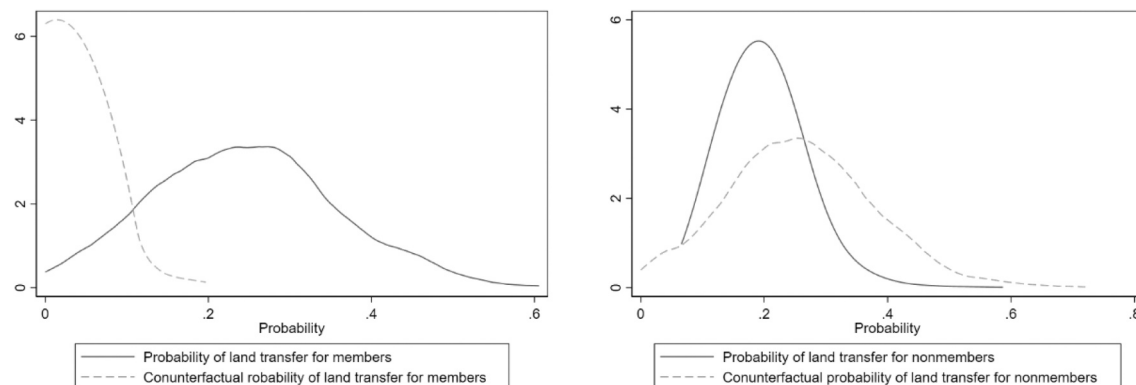


Fig. 5. The probability density function of agricultural investment, household income and land transfer. Note: The data source is from the 2021 waves of the China Household Finance Survey conducted by the Southwestern University of Finance and Economics. Agricultural investment growth (Panel A) is a dummy variable that is 1 if the household's agricultural investment is higher than that in the previous survey. Household income growth (Panel B) is a dummy variable that is 1 if the household's income is higher than that in the previous survey. Land transfer (Panel C) is a dummy variable that is 1 if the household had transferred their farmland. Real lines represent the probability density functions of outcome variables for cooperative members and nonmembers, while dashed lines represent the probability density functions of their counterfactual outcome.

credit allocation issues. As a result, it increases SFs' credit demand and credit supply of financial institutions, ultimately enhancing SFs' credit access. [Hypothesis 4](#) is validated.

7. Conclusion

Achieving agricultural modernization in developing countries such as China is a formidable task. The Chinese government has proposed the organizational approach of small-scale farmer cooperatives to address the production and market challenges faced by these farmers in the context of modern productivity development. Farmers' cooperatives, by transforming the production and social attributes of small-scale farmers, generate financial effects that alleviate the increasingly severe issue of credit constraint in the process of agricultural modernization. This study focuses primarily on the financial effects of farmers' cooperatives. The necessity and long-term nature of farmers' cooperatives are first theoretically analyzed. The current rural credit market, which remains predominantly characterized by limited liability, is then examined. The direct and indirect causes of the financial effects generated by farmers' cooperatives are subsequently theoretically analyzed. Finally, utilizing data from the 2021 CHFS and employing the ESPM model, an empirical analysis is conducted to investigate the impact and mechanisms of agricultural cooperative membership on SFs' access to credit. Robustness checks are conducted through validity checks of the IV, alternative estimation models, and sensitivity analysis. The following conclusions are drawn: First, farmers' cooperatives have financial effects that directly enhance small-scale farmers' access to credit. Second, farmers' cooperatives improve SFs' access to credit by increasing household income, promoting agricultural investment, and enhancing the liquidity of farmland.

In the process of agricultural modernization, which is widespread in developing countries, SFs often face exclusion from modern production forces due to their outdated production methods in raw material procurement, production, and sales. Furthermore, the transition from labor-intensive to capital-intensive production methods in agricultural modernization has led to changes in credit contracts, including larger loan amounts, longer repayment periods, and increasing loan risks. These changes have exacerbated the issue of credit constraint faced by SFs. Farmers' cooperatives, while generating production functions, also create financial effects that mitigate the credit constraint of SFs and align their attributes with modern credit contracts. Therefore, we believe that farmers' cooperatives are an inevitable trend in the agricultural modernization of developing countries, and rural financial institutions should reconsider their traditional rural financial models. They should establish models that engage with organized SFs, in which the adverse selection and moral hazard issues of SFs can be resolved through organization, thereby enhancing their access to credit.

CRedit authorship contribution statement

Yunsheng Mi: Conceptualization, Funding acquisition, Investigation, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Jingrong Li:** Conceptualization, Formal analysis, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing, Data curation. **Meishan Jiang:** Conceptualization, Supervision, Validation, Writing – original draft, Writing – review & editing, Funding acquisition, Project administration, Resources.

Declaration of Competing Interest

The authors declare no competing interests.

Data Availability

The data that support the findings of this study are available freely but under license from the China Household Finance Survey (CHFS).

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.asieco.2024.101746](https://doi.org/10.1016/j.asieco.2024.101746).

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Financial inclusion, land title and credit: evidence from China

Financial inclusion, land title and credit

Meishan Jiang

*College of Economics and Management,
South China Agricultural University, Guangzhou, China*

Krishna P. Paudel

*Department of Agricultural Economics & Agribusiness,
Louisiana State University (LSU) and LSU Agricultural Center,
Baton Rouge, Louisiana, USA, and*

Donghui Peng and Yunsheng Mi

*College of Economics and Management,
South China Agricultural University, Guangzhou, China*

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Abstract

Purpose – The purpose of this paper is to study land title's credit effect from a financial inclusion perspective in China. The focus is both small land holding and poor farmers. Formal and informal finances are considered to test their differences in land title's credit effect.

Design/methodology/approach – The authors use augmented inverse-probability weights of the doubly robust method to test the effect of land titling on the rural credit market by addressing self-selection, endogeneity and heterogeneity concerns.

Findings – Results show that the poor, non-poor and small land holders with land titles are willing to borrow more from formal financial institutions. Land titling increases loan accessibility for non-poor and small land holding farmers. As for informal financing, large land holding and non-poor farmers show a decrease in informal lending. Land titling has a financial inclusion effect for some farmers, but poor farmers' credit restrictions are not entirely solved by land titling.

Originality/value – This is the first study that focuses on the financial inclusion effect of farm land titling in China.

Keywords Doubly robust estimator, Financial inclusion effect, Formal financial resources, Informal financial resources, Land titling

Paper type Research paper

1. Introduction

Vulnerable farmers, including small and poor farmers, are the focus of financial inclusion in developing countries (World Bank, 2019). They encounter credit restrictions because of the high transaction cost associated with processing small loans, and also because of their scattered locations, income instability and lack of liquid collateral. Credit restrictions impact the efficiency of agricultural production, deter farmers from getting involved in high-return generating nonagricultural activities and reduce farmers' income and welfare (Ali *et al.*, 2014; Stiglitz, 2015; Deininger and Ali, 2008). Using data from Peru, Boucher and Guirking (2007) calculate that if credit limits were to be relaxed, it would be possible to increase agricultural output by as much as 25 percent.

There are primarily two ways to resolve the credit restrictions of farmers in China and many other developing countries. The first is to encourage microfinance institutions to lend without collateral, such as through a group lending mechanism. The second is to make non-qualified collateral qualify through institutional innovation. Microfinance is a social relationship-based secured credit. Group lending and government guarantees give microcredit borrowers



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incentives to breach contracts and for banks not to be diligent in the credit review process (Feder *et al.*, 1988; Iqbal *et al.*, 2019). These increase credit risks and restrict microfinance development. Findings from Thailand indicate that among borrowers using institutional sources, 63 percent of farmers selected land collateral credit, and 29 percent of farmers selected group lending (Feder *et al.*, 1988). These authors report that land-based collateral is the emerging favorite direction of rural financial institutions in developing countries.

Collateral is an important component of the credit contract employed by financial institutions to close the information gap associated with borrowers. Land is considered as an appropriate tangible asset by financial institutions because it is immobile and maintains value compared to other farm assets. Land titling and land transfer qualify land as collateral because these provide liquidity and signal the credit worthiness of a holder[1]. The credit supply effect of land titling has attracted the attention of policy makers in China. Initially, the land market was not able to provide a perfect land property right and liquidity situation (Wang *et al.*, 2018; Zhang *et al.*, 2019), which prevented financial institutions from considering land as valid collateral. With the implementation of land titling in China in 2013, farmers have land property right. However, if land titling has no impact on a farmer's loan application amount or frequency, its validity as collateral will be ineffective (Huang and Du, 2018).

Small land holders may not be able to take advantage of land-based credit worthiness because of their small size even in a complete land market environment. Small loan size implies a high transaction cost associated with collateral processing, foreclosure and resale (Deininger and Ali, 2008). Location dispersion adds a further cost to loan disbursement. Using data from Paraguay, Carter and Olinto (2003) indicate that land titling has a credit supply function for large land holding farmers only. They highlight that institutional and organizational innovation and policy are necessary to protect the welfare of small land holding farmers. Mission drift has impacted vulnerable farmers, including small land holding farmers and poor farmers.

We study land title's credit effect from a financial inclusion perspective that has not been studied in China previously. Our focus is both small farmers and poor farmers. Formal and informal finances are considered to test their differences in land title's credit effect. Institutional and policy suggestions of this paper hold important value for implementing land collateral credit in China or in other developing countries with similar issues related to land titling.

Our results show that the poor farmers, non-poor farmers and small land holders with land titles are willing to borrow more from formal financial institutions. Similarly, land titling increases loan accessibility for non-poor farmers and small land holding farmers. As for informal financing, large land holding and non-poor farmers show a decrease in informal lending, as they need to fund their own production-enhancing agricultural investments after land titling. Land titling has a financial inclusion effect for some farmers, but the poor farmers' credit restrictions are not entirely solved by land titling.

The remainder of this paper is organized as follows. Section 2 presents the conceptual framework, wherein we describe the link between land collateral credit, land titling and financial inclusion. We also provide a short review of the land management system in the paper. Section 3 provides the method used in the paper. Section 4 details the data and variables used. Results are presented in Section 5. The last section provides conclusions and departing thoughts on solving the rural credit problem in China. Supporting materials are relegated to online appendix.

2. Conceptual framework

2.1 Land collateral credit, land titling and financial inclusion

Collateral provides a signal and alternative mechanism to lenders who lack information about borrowers[2]. Lenders can sort borrowers to identify separate equilibriums, as

high-risk borrowers without collateral receive credit at a higher interest rate, whereas low-risk borrowers with collateral get credit at a lower interest rate (Berger *et al.*, 2011; Jimenez *et al.*, 2006). If the information is symmetrical, and if there is no collateral, loan disbursement to poor borrowers will increase the interest rate for all borrowers because of the small loan size and default risk[3]. Interest rate instrument has limited effectiveness in agriculturally dependent communities in developing countries. So lenders rely on collateral to sort low-risk borrowers, or else there is no credit for farmers.

Information asymmetry makes the interest rate lose its ability to sort borrowers prior to the emergence of interest rate boundary. Therefore, variations in interest rate are not sufficient to clear the financial markets. Moral hazard and adverse selection determined credit rationing is the major mechanism through which financial institutions can resolve the credit disbursement issue in the rural credit market (Stiglitz and Weiss, 1981). Tangible asset (land) and intangible asset (relationship-based lending, group lending and third-party guarantees) collateral can eliminate credit rationing in a competitive equilibrium (Bester, 1985; Menkhoff *et al.*, 2012). Lending on the basis of a tangible asset is more effective than intangible asset including relationship-based lending and third-party guarantees. Relationship-based lending is popular in developing countries, where low-transparency, weak law enforcement and highly strategic default are common. Relationship-based lending depends on soft information and individual interactions, but tangible asset provides hard and public information. Group lending and third-party guarantees rely on effectiveness of structural arrangement, which does not work often and brings more debt and collapse of social capital to borrowers. So, tangible asset collateral is more efficient to loosen farmers' credit restriction.

Land is good collateral, as it is immobile and does not depreciate easily. Land titling and land transfer qualify land as collateral. Land title is a necessary but not sufficient condition for the rural credit market (Barham *et al.*, 2008; Murguia *et al.*, 2018). There are several financial implications for land titling (Huang and Du, 2018; Jiang *et al.*, 2018, 2019). We capture the impact mechanism in Figure 1. First, land title signals farmers' information, including asset quality, ability to repay, ability to participate in credit markets and the ability to understand and follow formal rules. Households with a land title can obtain credit easily because the title assures financial institutions that farmers have formal property rights to their land, which prevents the land from being reallocated or expropriated (Zhang *et al.*, 2019). Land title also affects borrowers' other characteristics to improve credit supply, including increased income through agricultural investment and land transfer (Ali *et al.*, 2014; Jacoby *et al.*, 2002). Increased agricultural investment comes from improving credit accessibility and stable land tenure (Deininger and Ali, 2008). Second, lenders are encouraged to accept land for collateral, and as a result the availability of collateral can reduce the risk premium, interest rates and the agency problem to improve credit supply in rural credit market (Nizalov *et al.*, 2016). Third, land titling

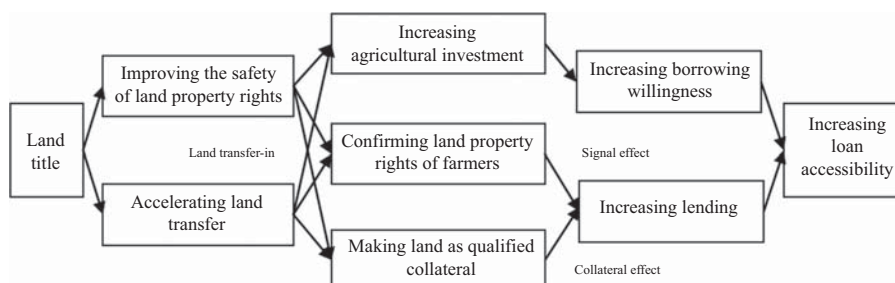


Figure 1.
The impact of land
title on financial
inclusion

can increase loan demand, which comes from an increase in agricultural investment (Dower and Potamites, 2014). So land titling increases the credit supply, credit demand and credit availability to farmers and decreases credit rationing. Access to credit and other financial resources is more powerful than land titling and land transfer (Chirwa and Chinsinga, 2008). If the land cannot be mortgaged, land titling is ineffective.

Land titling should not impact how the informal sector provides loans (Field and Torero, 2006). Informal finance uses social networks and other information instead of collateral to circumvent moral hazards and adverse selection, thereby appropriately balancing the debt amount and risk concerns. The advantage of informal finance lies in its capacity to monitor the borrower without collateral. Informal finance serves two types of borrowers: the first are those without any collateral, and the second are those who are unwilling to mortgage anything. Because farmers are afraid of losing land, they often select informal financing. To some extent, this restricts land collateral credit development in the rural credit market (Boucher and Guirkinger, 2007).

Financial inclusion is a concept promoting inclusive growth through a financial means beyond those provided by microfinance. Financial inclusion focuses on vulnerable groups, including the poor, women and farmers. We study how land titling impacts farmers' financial characteristic, specifically those of poor and small land holding farmers.

Land collateral provides farmers an alternative way to access loans (Barham *et al.*, 2008). Farmers can obtain more credit with land collateral than with group or government guarantees (Feder *et al.*, 1988; Deininger and Ali, 2008). Group lending's weakness as intangible asset collateral has been interpreted in previous paragraphs. Several negative aspects of the government guarantee are that it incentivizes farmers to default and banks not to be diligent in checking credit worthiness, both of which increase credit risk (Armendáriz de Aghion and Morduch, 2010).

It is financially challenging for formal financial institutions to deal with poor households seeking small size loans and using land as collateral because of the high transaction cost (foreclosures, resale and collateral transfer) (Field and Torero, 2006). This makes land collateral credit and investment demand scale restrictive. For large land holding farmers, land title increases total capital because there is a credit supply effect, but this effect does not exist for small land holding farmers. Having a land title changes the capital structure of small land holding farmers, but their total capital does not change (Carter and Olinto, 2003; Deininger and Ali, 2008). Even in the current round of land reform in China, small land holders and poor farmers are excluded from lending by profit driven formal financial institutions.

Small land holding farmers do not get sufficient credit even if they have land rights (Field and Torero, 2006). Land titling generates social exclusion and a mission drift effect. If the goal of land reform is to develop scale efficient agricultural operations, the interests of small land holding farmers should not be neglected. Through rural credit market reforms, small land holders can obtain the benefits of land reform (Carter and Olinto, 2003; Gottlieb and Grobovsek, 2019).

2.2 Land management system of China

In 2008, the Chinese Government extended the contract duration and promised through party documents that the existing land contract relationship would remain stable and unchanged for a long time[4]. Based on experiments that started in a few counties in 2008, the land titling policy was implemented all through the country in 2013. The basic motive of promoting the new round of land titling stems from the ambiguity of the definition of the original property rights to the collective farm land. Its purpose is to define clearly the property rights, their legal guarantee and boundary and not "confirmation and registration" only (Zhang *et al.*, 2019). Through land titling, separation of "three land powers" structures

are made clear, i.e., that farmers have land contract rights and management rights and the village collective has ownership rights. Farmers can transfer out and mortgage land management rights, but they cannot change the contract rights or ownership rights situation. The aim of such an institutional arrangement is to protect farmers' interests, which produces new credit risk to financial institutions because land management and contract rights cannot be transferred together.

Before 232 experiment counties were selected in 2015, land management rights collateral credit had been tried in Guizhou province in China in 1988. Party documents issued in 2010 allowed the implementation of land collateral credit. Then 11 cities, including Wuhan city, were given official permission to implement land collateral credit in 2011. Official documents issued in 2013 promoted the all-round development of land collateral credit.

So far we have provided descriptions of how poverty and small land holding are disadvantageous in the rural credit market from the perspective of collateral, land title, financial inclusion and land collateral credit. There is a lack of research connecting the impact of land titling on credit disbursement to poor and small land holding farmers from formal and informal credit sources. This paper assesses land titling's credit market effect on small land holders and the poor in rural settings and tests the financial inclusion effect of land titling.

3. Method and data information

3.1 Study design

We analyze land title as a treatment policy and the credit effects of land title as outcome to study the impact of land title on the financial inclusion effect. Heterogeneity and self-selection of farmers impact land titling and financial behavior, that is, land titled farmers can get loans and have loan willingness (borrowing or lending) even if they did not have a land title. We select the doubly robust method (DR) to estimate average treatment effect (ATE) of land title, as it combines reweighting (through an inverse-probability regression) and regression adjustment to estimate the treatment effects and provides parameter robustness (Cerulli, 2015). DR includes inverse-probability weighted regression adjustment (IPWRA) and augmented inverse-probability weights (AIPW). We use AIPW, as it provides coefficients with more robust characteristic than IPWRA. AIPW specifies outcome model (credit model) and treatment model (land title model) together. Treatment model is used to match counterfactual observation and reweight outcome result for avoiding self-selection and wrong specifications of the outcome model. Bias-corrected term in AIPW is arranged for avoiding wrong specifications of the treatment model. Our study proceeds as follows.

The first step is to specify the treatment model (TITLE) (Table I)[5]. Its result is employed to identify homogeneous farmers to confirm land title and non-land title farmers' counterfactual situations, which can address the heterogeneity and self-selection concerns. The land title model is specified as follows:

$$\text{TITLE} = \mathbf{x}_1\boldsymbol{\varphi} + \varepsilon_1, \quad (1)$$

here TITLE is a vector of dependent variable, $\mathbf{x}_1$ is a matrix of explanatory variables (LABORRATIO, AINCOME, IDLINGLAND, VILLAGEC, RELATIVE, INSURANCE and ECONOMY), $\boldsymbol{\varphi}$ is a vector of parameters associated with these explanatory variables and ε_1 is a vector of the error term. The second step is to specify the outcome models. The outcome models, including borrowing (LOAN) and borrowing willingness (LOANW) through formal sources, borrowing (BORROWP) and lending (LENDP) through informal sources, long term agricultural investment (AINVEST) and land transfer-in

Variable	Definition	Mean	SD
<i>Dependent variable in treatment model</i>			
TITLE	Household land has been titled (yes = 1, or else 0)	0.539	
<i>Dependent variables in outcome models</i>			
TRANSFERIN	Household transfers land in (yes = 1, or else 0)	0.122	
LOAN	Household has loan from financial institutions (yes = 1, or else 0)	0.195	
LOANW	Household hopes to borrow more (yes = 1, or else 0)	0.301	
BORROWP	Household borrows money from relatives and friends (yes = 1, or else 0)	0.370	
LENDP	Household lends to other farmers (yes = 1, or else 0)	0.318	
AINVEST	Household food crop and cash crop equipment and machine value	5,759.286	20,575.2
<i>Independent variables</i>			
Education and other household-related variables			
JUNIORH	The number of laborers with junior high school level education	2.257	1.291
HIGHS	The number of laborer with high school level education	0.808	1.024
LABORRATIO	The ratio of laborers to total family members	0.725	0.254
FARMING	The number of individuals who are involved only in farming activities in a given household	1.049	1.052
Social relationship-related variables			
RELATIVE	Household has few relatives and friends (yes = 1, or else 0)	0.056	
VILLAGEC	There is a village cadre in the household (yes = 1, or else 0)	0.126	
Economic situation-related variables			
LANDS	The area of household lands	6.814	19.946
AINCOME	The ratio of household agricultural income and total income	36.589	33.127
IDLINGLAND	The number of uncultivated land in your household	0.609	3.298
INSURANCE	Household buy agriculture insurance (yes = 1, or else 0)	0.216	
Location-related variables			
ECONOMY	This county economic development level is very low on this province (yes = 1, or else 0)	0.062	
TRANSPORT	Transportation level of this village is very good (yes = 1, or else 0)	0.072	

Table I.
Variable definitions
and descriptive
characteristics

(TRANSFERIN), are specified as below:

$$\text{LOANW} = \mathbf{x}_2\alpha + \varepsilon_2, \quad (2)$$

$$\text{LOAN} = \mathbf{x}_2\beta + \varepsilon_3, \quad (3)$$

$$\text{BORROWP} = \mathbf{x}_2\gamma + \varepsilon_4, \quad (4)$$

$$\text{LENDP} = \mathbf{x}_2\delta + \varepsilon_5, \quad (5)$$

$$\text{AINVEST} = \mathbf{x}_2\theta + \varepsilon_6, \quad (6)$$

$$\text{TRANSFERIN} = \mathbf{x}_2\mu + \varepsilon_7, \quad (7)$$

here α , β , γ , δ , θ and μ are parameter vectors, ε_i are error vectors and $\mathbf{x}_2$ is a matrix of explanatory variables. Explanatory variables used in Equations (2)–(7) are LABORRATIO, JUNIORH, LANDS, BORROWP, FARMING, INSURANCE, ECONOMY and TRANSPORT.

AIPW can calculate the causal effect when the outcome variable is binary because AIPW sets the outcome model and treatment model separately. Except for agricultural investment, our dependent variables of outcome models are all binary.

The third step is to calculate the ATE. We use TITLE to weight the financial inclusion effect of land titled farmers with $1/TITLE$ and no land titled farmers with $1/(1-TITLE)$. AIPW adds a bias-corrected term that is effective only when the treatment model is specified incorrectly. Therefore, AIPW can provide better estimates when the conditional mean function and the conditional probability function are specified incorrectly (Tan, 2010).

4. Data and descriptive characteristics

Data for this study come from face-to-face interviews with 2,880 randomly selected households from 576 villages located in nine provinces (Sichuan, Shanxi, Liaoning, Ningxia, Jiangsu, Henan, Guizhou, Jiangxi and Guangdong) representing the eastern, central and western parts of China (see Figure 2). The field survey was conducted between January 2015 and February 2016. To ensure a nationwide representative sample, we selected five indicators: total population, per capita GDP, total cultivated area, the proportion of cultivated land area to total land agricultural population accounting for the proportion of the total population and the proportion of agricultural output to regional GDP[6]. Moreover, we took into account the seven major geographical partitions (East China, South China, North China, Central China, Southwest China, Northwest China and Northeast China) in mainland China. According to the above principles, the final selected provinces were Guangdong, Guizhou, Henan, Jiangsu, Jiangxi, Liaoning, Ningxia, Shanxi and Sichuan.

Nine provinces were selected at first and then 54 counties were selected in these nine provinces. In total, 578 villages were selected in 54 counties and then 2,880 farmer households were randomly selected in the villages. Only observations from 2,700 farm households had complete and valid answers which are used in this paper. The survey



Figure 2.
Map of China
with study areas
highlighted in yellow

collected information about household characteristics as well as land and financial market situations to represent both the poor and the non-poor, small and large land holding farmers and formal and informal financial sources.

Based on the definition provided by the China National Development and Reform Commission, there are 260m small land holding farmers (based on a 8μ per household size). The State Council Leading Group Office of Poverty Alleviation and Development of China has classified a farmer earning 2,736 yuan per year (adjusted for purchasing parity with a base level from 2013) as poor. We follow this income category to define poor vs non-poor households.

Among all observations, 721 households did not have land title (26.7 percent), 1,454 households had obtained their land title (53.86 percent) and the rest, 525 (19.44 percent) households, did not know if their land was titled. We consider farmers who did not know about the land titling status in the same category as the individuals who did not have a land title, as they would not have been able to use land as collateral to apply for loan. After land titling, 613 (22.7 percent) households transferred land out and 326 (12.17 percent) households transferred land in. Since only 53.86 percent of total households obtained their land title, there was also a low proportion of farmers who had transferred land. Households have on average 5,759 yuan worth of farm equipment and machinery. The number of households without a loan is 80.52 percent, of which 22.91 percent have the willingness to apply for a loan, but another 77.09 percent do not have the willingness to apply for a loan. Informal financial sources are an important outlet for farmers because of credit constraints and credit rationing by formal financial sources; 37.04 percent of households borrow from private sources, and 31.74 percent lend to others.

Overall, at the households there are in average two laborers with a junior high school education level or below, and 0.8 laborers with a high school degree. The households' average land holding size is found to be 6.814μ ($1\mu = 0.067$ hectares), of which uncultivated land is 0.609μ (8.94 percent). Agriculture provides an average of 36.59 percent of total income; migrant workers provide 48.59 percent of total income; business ventures provide 4.29 percent of income and other sources provide 5.17 percent of total income. The number of households with family members either currently serving or having served in the village cadre as social capital proxy variable is 12.63 percent. Agriculture insurance as policy insurance can be a proxy of whether the village collective can implement central government policy effectively or not. Land title also is a central government policy that needs the village collective for implementation. In our sample, only 21.56 percent of households have insurance. Among laborers within a household, an average of 1.05 laborers are strictly involved in farming; 0.81 laborers are part time migrant workers and part time farm workers.

5. Results

The common support and covariate balance hypothesis test are shown in Figures 3–5. Table II provides the rationality for the covariate and sample selection in our study. Given that most of the observations are in the common support area, when we look for a matching farmer's estimator we lose only a few observations (see Figures 3 and 4). Covariate balance degrees show that the standardized % bias across covariates of land titling is under 10 percent for the matched sample, only the insurance variable has a 13.4 percent balance degree (see Figure 5 and Table II). Balance results also can be observed from Figure 3. *t*-Test results of the matching and non-matching groups show no significant difference (see Table II), confirming that our treatment effects are consistent. Figure 4 shows estimated density overlaps with a probability between 0 and 1. This figure shows that the overlap assumption is not violated (Mendola and Simtowe, 2015; StataCorp, 2019).

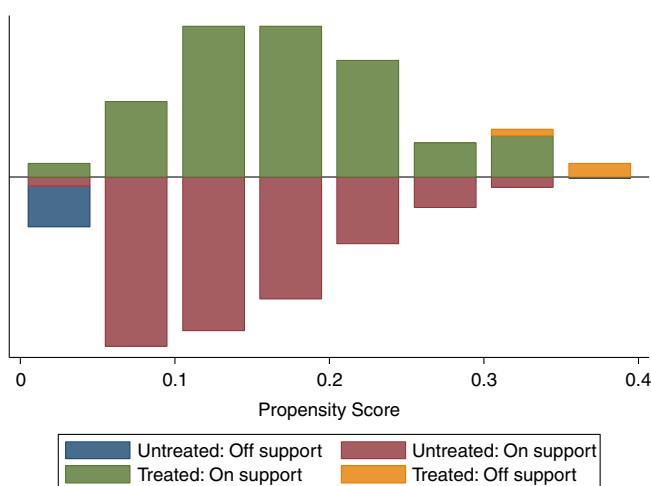


Figure 3.
Land title and
common support of
propensity score

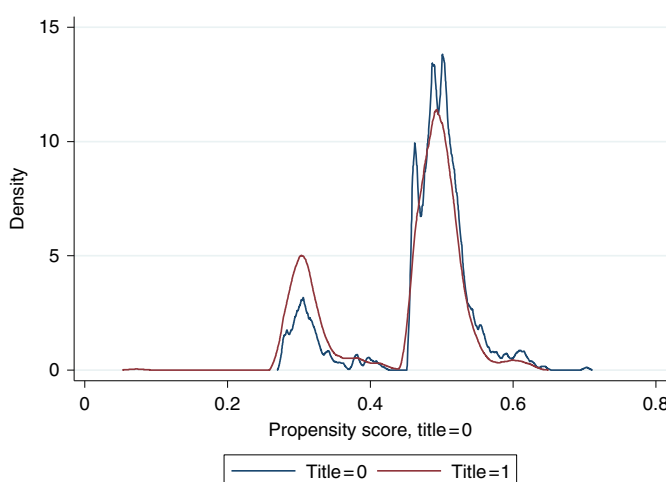


Figure 4.
Propensity score
overlap between land
titled and no land
titled farmers

5.1 Effects of land titling on credit supply and demand by poor and non-poor farmers

Land titling has an impact on the latent credit demand to increase agricultural productivity and investment, and to secure land transfer-in. Land titling has an impact on credit supply because farmers have more valuable assets to provide qualified collateral to financial institutions. Results presented in Table III show that land titling causes poor and non-poor farmers to demand more loans from financial institutions, 13 and 4.6 percent more than non-land titled farmers. Land titling's collateral and signal function does not make formal financial institutions provide more credit to titled poor farmers, but increases by 4.3 percent more credit to titled non-poor groups compared to non-titled non-poor farmers (Table III). These findings further verify the credit constraints faced by rural residents, especially by poor farmers in China. Barham *et al.* (2008) have found that even though microcredit and land titling have been implemented together for several decades, the rural credit market is still weak in Latin American countries (Table IV).

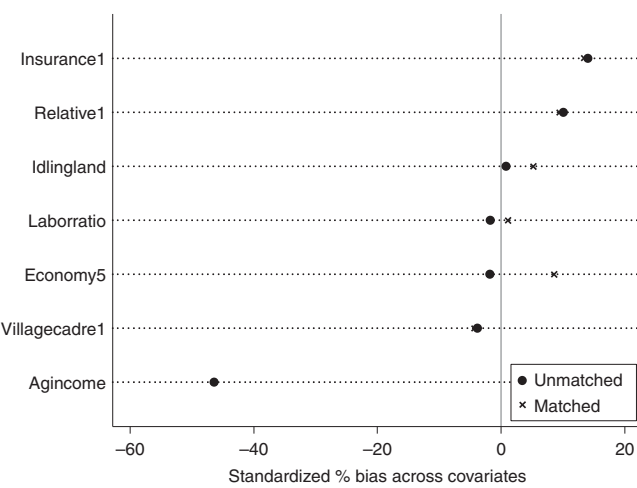


Figure 5.
Standardized % bias
across covariate of
land titling

Variable	Sample	Mean		% bias	t-test	
		Treated	Control		t-stat.	p-value
LABORRATIO	Unmatched	0.732	0.736	-1.7	-0.15	0.880
	Matched	0.739	0.737	1.1	0.07	0.943
AINCOME	Unmatched	28.352	42.215	-46.4	-3.74	0.000
	Matched	29.294	27.415	6.3	0.46	0.648
IDLINGLAND	Unmatched	0.524	0.510	0.8	0.06	0.951
	Matched	0.472	0.381	5.2	0.40	0.688
VILLAGEC	Unmatched	0.136	0.150	-3.8	1.26	0.208
	Matched	0.141	0.156	-4.4	0.86	0.393
RELATIVE	Unmatched	0.068	0.045	10.0	0.94	0.347
	Matched	0.071	0.049	9.4	0.60	0.552
INSURANCE	Unmatched	0.261	0.202	14.0	1.26	0.208
	Matched	0.271	0.214	13.4	0.86	0.393
ECONOMY	Unmatched	0.034	0.037	-1.8	-0.15	0.877
	Matched	0.035	0.019	8.5	0.63	0.528

Notes: Covariates of the treatment model balancing test need %bias below 10 percent after being matched

Table II.
Balancing tests for
beneficiaries and
matched controls

Variable	Willingness to borrow		Loan disbursement rate	
	Poor farmer	Non-poor farmer	Poor farmer	Non-poor farmer
Land title vs no land title	0.131*** (0.047)	0.046** (0.019)	0.007 (0.034)	0.043*** (0.016)
No land title (POM)	0.263*** (0.033)	0.270*** (0.014)	0.149*** (0.026)	0.180*** (0.012)
Observations	383	2,316	383	2,316

Table III.
Impact of land titling
on loan willingness
and disbursement rate
by financial
institutions (poor and
non-poor farmers)

Notes: We report average treatment effects obtained from the augmented inverse-probability weighting estimator (AIPWATE). The POM for each treatment level is an average of each potential outcome. Robust standard errors are shown inside parentheses. **,***Indicate that the null hypothesis is rejected at the significant level of 5 and 1 percent, respectively

Collateral distribution in Table V gives us more information about the difference between loan supply from financial institutions to poor and non-poor farmers. Collateral used by farmers include houses, residential land, fixed assets, crops, agricultural orders, land management rights, land contract rights, deposit certification and other collaterals. Land collateral credit (combined land management rights and land contract rights) accounts for 3.47 percent compared to other collateral in our data. Residential land (with 11.53 percent) and houses (with 33.02 percent) are often used as collateral irrespective of whether the borrowers are poor or non-poor. The reason for using these credit collateral types is that the People's Bank of China's has a focus on the rural credit market, together with land contract and management collateral rights reform. However, houses and residential land are not good credit collateral from the perspective of formal financial institutions because the government document stipulates that the land contract rights and basic housing rights of farmers must be protected. This means that if a farmer using these as collateral defaults, the financial institution cannot foreclose against the house that farmers reside in, but it can transfer secured land management rights. This policy leakage encourages farmers to use their house and residential land as collateral. No collateral, house and land contract rights collateral are preferred by the poor more than the non-poor. Microcredit without collateral, implemented since the 1990s, accounts for 27.49 percent of the loans to poor farmers; that is more than the 24.87 percent that goes to non-poor farmers. These facts indicate that the rural credit market can be guided by institutional innovation and policy.

Results presented in Table VI show that land titling has no impact on borrowing by poor and non-poor farmers, and it results in non-poor farmers decreasing their lending to

Table IV.
Impact of land titling
on loan willingness
and disbursement rate
by financial
institutions (small
land holding and large
land holding farmers)

Variable	Willingness to borrow		Loan disbursement rate	
	Small land holding farmer	Large land holding farmer	Small land holding farmer	Large land holding farmer
Land title vs no land title	0.076*** (0.019)	-0.036 (0.045)	0.030* (0.016)	0.034 (0.040)
No land title (POM)	0.228*** (0.014)	0.452*** (0.035)	0.152*** (0.012)	0.282*** (0.031)
Observations	2,081	518	2,081	518

Notes: We report average treatment effects obtained from the augmented inverse-probability weighting estimator (AIPWATE). The POM for each treatment level is an average of each potential outcome. Robust standard errors are shown inside parentheses. *,***Indicate that the null hypothesis is rejected at the significant level of 10 and 1 percent, respectively

Collateral	Total		Poor households		Non-poor households	
	No.	Percent	No.	Percent	No.	Percent
No	164	25.91	69	27.49	95	24.87
House	209	33.02	90	35.86	119	31.15
Residence land	73	11.53	27	10.76	46	12.04
Fixed asset	48	7.58	17	6.77	31	8.12
Crops	7	1.11	0	0	7	1.83
Agricultural order	3	0.47	1	0.40	2	0.52
Land management right	4	0.63	1	0.40	3	0.79
Land contract right	18	2.84	9	3.59	9	2.36
Deposit certification	26	4.11	4	1.59	22	5.76
Others	81	12.8	33	13.14	48	12.56
Total	633	100	251	100	382	100

Notes: This table shows types of collateral used in number and percentage by total surveyed households, only poor households and only non-poor households

Table V.
Types of collateral
used by farmers

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individuals by 4 percent compared to non-land titled non-poor farmers from informal financial sources (see Table VI). Non-poor farmers are generally the providers of informal financing (Table VII). They increase agricultural investment after they receive their land title, which is evident from Table VIII. These non-poor land titled farmers make up needed agricultural investment funds, either through formal financial institutions or from their own savings (see Table III). With the lessening of lending by private sources, land titling further aggravates the credit shortage faced by poor farmers. Poor farmers' income share from agriculture is 46.37 percent, while non-poor farmers' share of income from agriculture is 26.90 percent. Agriculture income provides a significant source of income to poor farmers. Land titling causes farmers to demand more credit to invest in fixed asset, moveable asset and transfer-in land. Poor farmers, however, do not have enough funds to increase

Table VI.
Impact of land titling on borrowing and lending by private sources (poor and non-poor farmers)

Variable	Borrowing		Lending	
	Poor farmer	Non-poor farmer	Poor farmer	Non-poor farmer
Land title vs no land title	0.024 (0.049)	−0.027 (0.020)	−0.060 (0.047)	−0.040** (0.020)
No land title (POM)	0.371*** (0.036)	0.384*** (0.015)	0.309*** (0.036)	0.348*** (0.015)
Observations	383	2,316	383	2,316

Notes: We report average treatment effects obtained from the augmented inverse-probability weighting estimator (AIPWATE). The POM for each treatment level is an average of each potential outcome. Robust standard errors are shown inside parentheses. **,***Indicate that the null hypothesis is rejected at the significant level of 5 and 1 percent, respectively

Table VII.
Impact of land titling on borrowing and lending by private sources (small land holding and large land holding farmers)

Variable	Borrowing		Lending	
	Small land holding farmer	Large land holding farmer	Small land holding farmer	Large land holding farmer
Land title vs no land title	−0.005 (0.022)	−0.059 (0.043)	−0.031 (0.020)	−0.091** (0.044)
No land title (POM)	0.386*** (0.016)	0.370*** (0.033)	0.326 (0.015)	0.434*** (0.035)
Observations	2,081	518	2,081	518

Notes: We report average treatment effects obtained from the augmented inverse-probability weighting estimator (AIPWATE). The POM for each treatment level is an average of each potential outcome. Robust standard errors are shown inside parentheses. **,***Indicate that the null hypothesis is rejected at the significant level of 5 and 1 percent, respectively

Table VIII.
Impact of land titling on investment by farmers

Variable	Non-poor farmer	Poor farmer	Small land holding farmer	Large land holding farmer
Land title vs no land title	0.288* (0.157)	−0.110 (0.106)	0.282** (0.133)	−0.051 (0.299)
No land title (POM)	7.516*** (0.105)	0.284*** (0.090)	7.169*** (0.104)	8.554*** (0.223)
Observations	551	98	473	124

Notes: We report average treatment effects obtained from the augmented inverse-probability weighting estimator (AIPWATE). The POM for each treatment level is an average of each potential outcome. Robust standard errors are shown inside parentheses. *, **,***Indicate that the null hypothesis is rejected at the significant level of 10, 5 and 1 percent, respectively

investment toward the purchasing of fixed assets and land transfer-in, as shown in our study result (see Tables VIII and IX). Credit constraint becomes an important cause of poverty that drives young adults from rural areas to urban areas. Although temporary migration to cities has been providing opportunities to increase income to poor farmers, at the same time it creates many social issues, including lack of support for the elderly, left-behind children and the extended separation of spouses.

Financial inclusion can be obtained by non-poor farmers only from land titling and its credit effect. Land titling increases more latent credit demand from the poor, but it is not satisfied through formal financial institutions. Meanwhile, farmers with idle funds decrease their lending to other farmers. The financial situation of poor farmers is more restricted because of land titling.

5.2 Effects of land titling on credit supply and demand by small and large land holders

In addition to poverty, small land holding farmers are vulnerable from many other aspects in rural China. If land can be secured to increase liquidity through land titling, it can eventually loosen the small land holding farmers' credit restrictions. Large land holding farmers can obtain more credit than small land holding farmers, which makes large land holding farmers even larger and the small land holding farmers even smaller for land transfer-in. Alternatively put, land transfer can redistribute land, resulting in an endowment equilibrium and land-scale operation at the same time. Compared to a land rental market, land trade cannot create an endowment equilibrium and land-scale operation effect because land purchase requires more funds and a well-functioning credit market (Ali *et al.*, 2015). In our sample, transfer land is rented at an average rate of 287 yuan per μ , per year. Land titling is supposed to create more land transfer and increase the scale of operation among farmers in rural China. In fact, these were the major reasons for envisioning the land titling policy in China.

Regression results in Table IV show that land titling causes small land holding farmers to have 7.6 percent more willingness to get credit from formal financial institutions than small land holding farmers without a title. Land titling has no impact on the willingness to obtain credit by large land holding farmers. Land titling's latent loan demand effect is created by the loan supply availability from formal financial institutions. The loan disbursement rate from financial institutions for those with land titles is increasing to small land holding farmers (see Table IV). The availability of credit provides small land holding farmers much needed funds to invest in land productivity enhancement and further land transfer-in. Land titling increases 2,820 yuan in fixed agricultural asset investment by small land holding farmers (Table VIII). We find owning a land title not to have any impact on loan disbursement to large land holding farmers, and these farmers do not increase investment on land due to land titling.

Our results contrast with the findings by Carter and Olinto (2003). They indicate that land title changes small land holding farmers' agricultural capital structure, while at the

Variable	Transfer-in
Land title vs no land title	-0.035 (0.036)
No land title (POM)	0.157*** (0.028)
Observations	379

Notes: We report average treatment effects obtained from the augmented inverse-probability weighting estimator (AIPWATE). The POM for each treatment level is an average of each potential outcome. Robust standard errors are shown inside parentheses. ***Indicate that the null hypothesis is rejected at the significant level of 1 percent

Table IX.
Impact of land titling
on land transfer-in by
poor farmers

same time increasing agricultural capital purchases by large land holders. Our results are that the large land holders have land for collateral after titling, but their willingness to borrow and the actual amount borrowed by them do not increase. The Chinese farm land and rural credit market can help to explain the result. First, these findings prove that land transfer restrictions and land market capacity constraints make financial institutions reluctant to accept land as collateral. Second, credit effects on small land holders are entirely driven by land titling policy. At the beginning phase, when the land market is just developing, policy makers can implement several supporting frameworks to make the policy sustainable in the long run. Rural cooperatives are the main formal financial institutions in Chinese rural areas. They have more service functions for farmers than other financial institutions, which means the service function will overshadow the profit maximization goal. The People's Bank of China gives policy directives to provide more credit to small land holding farmers to develop the land collateral credit market, including land title, land transfer and land collateral credit, but without focusing on poor farmers. Institutional innovation based on the characteristics of small land holding farmers and the profit maximization goals of financial institutions diverge.

Informal financial resources are not impacted by land titling except that large land holding farmers decrease lending (see Table VII), and the latter happens to be the main financial resource outlet for small land holding farmers. Small land holding farmers borrowed 19.54 percent from formal financial institutions, but a substantially large number of them (37.04 percent) borrowed from relatives and friends.

Land titling affects small land holding groups' loan worthiness in rural areas. Alternatively, financial inclusion can reach the vulnerable farmers through land titling, which implies that the rural credit market is policy driven, not profit driven. The development of a credit market based on land collateral is impeded by imperfect land law, the land market and other constraints in China. Policy-driven financial institutions may not have the desired longevity. Therefore, we suggest mechanism innovation to loosen credit restrictions to farmers by decreasing transaction costs associated with loan disbursement by financial institutions and to adapt to different market and institutional settings. One of those mechanism innovations is Tongxin mode, which combines and collateral with microcredit loans within the domain of a collective[7].

6. Conclusions

Financial inclusion pays attention to the three groups of farmers, the poor and women. Small land holding and poor farmers are most vulnerable groups in rural China, who need to be covered by financial inclusion. Land titling provides another opportunity for them to access loans, which to some extent have been provided by informal sources or microcredit in rural China. Land can be mortgaged after the land title is obtained, and the titled land provides a signal to the lender about the borrowers' ability to pay and the property he owns.

Based on results obtained from analyzing the data collected from the nine provinces of China, we found that land titling has a financial inclusion effect as farmers, including non-poor and small land holding farmers, obtain more loans from formal financial institutions. However, financial institutions are more concerned about these farmers' ability to repay. Land titling had no impact on latent loan demand from informal financial resources, irrespective of a farmer's classification, but it decreased loan supply. Land titling resulted in an increase in small land holding farmers' willingness to borrow and to their loan accessibility from formal financial institutions. However, land titling had no impact on the willingness to borrow and loan accessibility of large land holding farmers. Land titling has a loan demand effect and a loan accessibility effect. Loan accessibility causes an endowment equilibrium effect.

Credit restriction is still a serious concern in rural China. Loan accessibility falls far too short of loan demand even for large land holding farmers. The land market is not mature enough to provide needed liquidity to decrease financial institutions' transaction cost. It needs synergetic development of the market related to the agricultural factors of production across different entities. Intermediary organizations like Tongxin represent a system innovation to enable poor and small land holding farmers to access more credit after they secure a land title under circumstances of high asset specificity and transaction uncertainty and low transaction frequency (Williamson, 1996).

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Notes

1. China implemented land titling on a pilot basis in 2008 and unveiled the program nationwide in 2013 (Jiang *et al.*, 2018, 2019; Zhu *et al.*, 2018). See Section 2.2 for details.
2. We provide a figure depicting the role of collateral in rural credit market in the online appendix.
3. This is evident from the many microcredit loans disbursed around the world. The global average annual interest rate for a microcredit loan is 35 percent, although there is a wide variation in the interest rate charged. Interest rates are found to be as low as 17 percent (Sri Lanka) to as high as 80 percent (Uzbekistan). Source: www.cgap.org/sites/default/files/researches/documents/CGAP-Brief-Variations-in-Microcredit-Interest-Rates-Jul-2008.pdf
4. We provide more detail information on land management system of China in the online appendix.
5. Variable definitions are shown in Table I. We have provided justifications for variable selections in the online appendix.
6. Sampling procedures are shown in detail in Figure 2 of the online appendix of this paper.
7. Please see descriptions of the Tongxin mode of credit structure in the online appendix of this paper.

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Appendix

The online appendix available at: <https://sites.google.com/site/paudellsu/home/caer-appendix>

Corresponding author

Donghui Peng can be contacted at: pengdh@scau.edu.cn

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第三方组织参与、交易 成本降低与农地抵押贷款可得性

——基于农地经营权处置的视角

姜美善 李景荣 米运生*

摘要: 在耕地细碎化和信息不对称性的条件下,银行处置农地抵押品时面临高昂的单边交易费用,严重制约了中国农地抵押贷款的发展。本文探讨了第三方组织参与降低农地处置交易费用和提高农地抵押贷款可得性的内在机理和实践模式,并基于中国九省份的农户调研数据,利用半参数中介效应模型进行了实证分析。研究发现:内生型组织和外生型组织都能够通过信息优势降低处置农地的交易费用,提高农地抵押贷款可得性。与外生型组织因政策驱动下的间接作用相比,内生型组织在利益驱动下,降低总交易费用的幅度更大。因此,应鼓励内生型组织和外生型组织依据比较优势参与农地抵押贷款的不同环节,实现正规和非正规金融组织的互联;加快建立农地评估体系及产权流转市场,以提高农地可交易性。

关键词: 农地抵押贷款; 交易费用; 外生型组织; 内生型组织

一、引言

信息不对称导致金融市场的信贷分配现象,抵押品则缓解了交易双方的信息不对称程度。然而,农户因难以提供合格的抵押物,造成农村金融市场交易费用过高、贷款利率偏高,农户的资金需求难以得到满足(郭忠兴等,2014)。小额信贷通过小组担保和连带责任的契约设计,将社会资本作为抵押品的替代物。但实践证明,作为微型金融代表的孟加拉格莱珉模式因为过于依赖人际信任和福利主义,在很多国家遭遇发展瓶颈,存在不可持续性(Cull et al., 2018)。中国的小额信贷也因监管混乱、风险控制较差和资金来源不足等因素而无法迅速发展(巴曙松等,2012)。因此,抵押品理论和抵押品替代理论均无法较好地解决中国农户当前的融资困境,缓释农村信贷配给现象亟需新的思路。

中国从 2009 年开始推进新一轮的农地产权制度改革,赋予农地融资权能。同时,在全国范围内开始了农村承包土地经营权抵押贷款(简称农地抵押贷款)试点,缓解农户的信贷

* 姜美善,华南农业大学经济管理学院,邮政编码:510642,电子信箱:jintaotaojiang@163.com;李景荣(通讯作者),暨南大学经济与社会研究院,邮政编码:510632,电子信箱:ljr199311@163.com;米运生,华南农业大学经济管理学院,邮政编码:510642,电子信箱:miyunsheng@163.com。

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约束,以激发农村地区的“德·索托效应”。截至2018年9月末,全国232个试点地区农地抵押贷款余额520亿元,同比增长76.3%,累计发放964亿元。^① 尽管如此,各地区的农地抵押贷款试点仍然存在不少问题:江苏新沂、湖北武汉和山东枣庄等地的农地抵押贷款借款人违约后,农地难以处置的现象增多;新沂的农地抵押贷款业务更是在2014年暂停;四川成都的农地抵押贷款试点则是“没有违约,但规模停滞”(陈东平、高名姿,2018);全国范围内拟农地抵押贷款的现象增加(将存量贷款追加农地抵押)。出现这一情况的主要原因是农地交易市场的滞后(梁虎等,2017)、贷款监督和契约执行的困难(李韬、罗剑朝,2015)、小规模 and 低频交易下的高交易成本(赵振宇,2014)、信息不对称和信息孤岛(胡士华等,2016)等。这些因素推高了农地抵押贷款的交易费用,特别是农地处置^②的交易费用。农地处置的交易费用过高限制了农地融资权的实施,提高了贷款利率,限制了农地抵押贷款的顺利发展。

为降低交易费用,有学者提出,在农地的高资产专用性及其流转的薄市场的背景下,要使农地成为合格的抵押物,需要第三方组织协助金融机构处置农地经营权(郭忠兴等,2014)。第三方组织是指农地抵押贷款中除农户和金融机构外,将贷款供给和需求主体联结起来的中介组织。第三方组织分为内生型组织和外生型组织,前者一般是由具有贷款需求的农户牵头兴办的组织,其组建和运行过程具有自发性和独立性,例如农业企业 and 合作社等;后者则是独立于贷款群体,依托政府部门兴办的组织,协助农户贷款只是其功能的一部分(陈浩天,2012;陈姝洁等,2015)。实践表明,同心县农地抵押贷款通过“农户+土地合作社+银行”的农地反担保贷款模式,成功解决了农地处置难题。引入金融机构和农户以外的第三方组织,将“资产”和“关系”,即抵押品和抵押品替代,两个维度融合在一起降低农地处置的交易费用,从而使农地抵押贷款可行,符合迂回交易的内在逻辑(罗必良,2019)。

现有研究以“同心模式”为案例,从制度设计、治理结构、缔约条件和履约机制方面深入剖析了第三方组织对农地抵押贷款的作用(赵翠萍等,2015;汪险生、郭忠兴,2016),但其大多是基于交易费用经济学的视角对农地抵押贷款困境及引入第三方组织的重要性进行了研究(李宁等,2016;汪险生、郭忠兴,2014),对于第三方组织的模式和不同模式的运作机理缺乏理论和实证研究。本文通过内在的理论逻辑论证第三方组织参与如何降低农地处置的交易费用,并采用半参数中介效应模型,分析不同类型的第三方组织如何降低农地处置的交易费用,从而为第三方组织参与农地抵押贷款的机制和模式提供理论和实证基础。

本文的创新之处在于:其一,从研究内容和深度看,首先,已有的国内文献侧重于定性判断,鲜有相关的实证研究,特别是对于第三方组织参与农地抵押贷款的模式和发生作用的机制的实证研究,因此很难提出可操作的实践方案;其次,已有文献并未对参与农地抵押贷款的第三方组织进行分类研究。本文对第三方组织进行了分类,并实证研究其作用机制,得出的结论是:不同类型的第三方组织参与方式和作用路径是存在差异的。内生型组织的参与路径是:内生型组织参与——信息搜寻费用降低(或监督执行费用降低)——农地抵押贷款可得性提高;外生型组织的参与路径是:外生型组织参与——信息搜寻费用降低——农地抵

①资料来源于第十三届全国人民代表大会常务委员会第七次会议上《国务院关于全国农村承包土地的经营权和农民住房财产权抵押贷款试点情况的总结报告》。

②农地处置包括丧失抵押品赎回权、重新销售、抵押品转移。

押贷款可得性提高。其二,从研究方法上看,已有文献缺乏多种研究方法的综合使用,因此没有科学地规避内生性、自选择和异质性问题,特别是误差项设定错误导致的估计结果不一致问题没有得到解决。本文使用了半参数中介效应方法,并使用多种方法进行稳健性分析,对于规避上述问题进行了有效的尝试。其三,从研究对象看,已有文献局限于一地或试点县的样本,缺乏对全国各地农户的综合数据的实证研究。本文基于2015年来自中国九省份农村的调研数据,即尚未确定试点县时的数据进行分析,结果更具普适性。

本文余下部分以如下结构展开:第二部分以内在的理论逻辑证明第三方组织能够降低农地抵押贷款中农地处置的交易费用,第三部分基于中国九省调研数据进行实证分析,第四部分是结论和政策建议。

二、第三方组织参与降低农地抵押贷款交易费用的内在机理

(一) 农地处置的交易费用高昂导致农地抵押贷款的发展困境

农地处置的交易费用包括信息搜寻费用、谈判签约费用以及监督执行费用。在碎片化的市场约束下,农地处置的交易费用高昂。农地资产专用性、低交易频率、交易不确定性是产生高昂交易费用的主要原因。

资产专用性与交易费用之间存在显著的正向关系(Williamson, 2000)。农地的资产专用性程度高,源于地理区位固定和农地用途管制(郭忠兴等,2014),资产专用性限制了农地市场的深度和广度。农地交易频率随着流转规模的增加,因农业生产的长周期性、农地评估机构的缺失、流转市场的不完善而下降。加之农地的地理位置固定与用途管制,随着交易半径的扩大,农地流入者的边际生产成本会提高,从而降低了缔结契约的概率。这意味着银行处置农地时,买方市场几乎限定在了村内集体成员或周边村镇,导致农地处置的薄市场,增加了银行处置农地的交易费用。农地交易的不确定性既有初级不确定性,也有次级不确定性^①(罗必良,2005):首先,政策层面的不确定性增加了处置农地的不确定性;其次,有限理性和继发不确定性诱发了借款人行为的不确定性,银行只能诉诸法院强制处置农地;再次,农业生产信息的不对称导致银行在处理农地时容易被转入方压低交易价格,产生次级不确定性;最后,我国农地具有规模小且细碎化的特征,这意味着产权公域与产权领域增多,而这些信息在事前往往难以观测。因此一旦农户违约,银行处置土地时容易出现纠纷,增加处理抵押物时的不确定性,进而提高交易费用(王翌,2019)。

此外,我国目前农地权能不完全、农地评估体系和土地流转市场不完善,导致土地评估、流通和变现更加困难(罗兴、马九杰,2017)。农地处置费用的高昂导致农地的低折现率,这意味着银行需负担较高的交易费用和放贷成本,从而降低了均衡时农户能够获得的农地抵押贷款数额,甚至停贷,造成农地抵押贷款困境。

(二) 第三方组织参与提高农地抵押贷款的可得性

第三方组织参与能够降低农地处置的交易费用,提高农地抵押贷款的可得性,贷款额度

^①初级不确定性是指由于自然的随机变化和消费者偏好不可预料的变化所带来的不确定性;次级不确定性是指由于信息不对称引起的不确定性,也就是一个决策者无法了解其他决策者对同一事件作出的决策和计划。

也会随着农地处置交易费用的降低而提高。

1. 第三方组织的迂回交易降低了农地处置的交易费用

农地处置的交易过程包括搜寻交易对象、谈判和签约、合约监督和执行(李孔岳,2009)。三个交易阶段均存在交易费用,分别对应搜寻费用、谈判签约费用和监督执行费用。任意阶段的交易费用变化都可能引起总交易费用的变化,而这三个阶段的交易费用主要受农地价值评估体系和流转市场发育程度的影响。

治理是实现秩序、化解冲突、获得共同利益的行为(陈东平、高名姿,2018)。最优的治理结构能够在最小化缔约和履约成本的情况下,有效率地完成交易(Williamson,2002)。治理结构分为市场、混合和层级^①。现阶段而言,我国农地的高资产专用性、高不确定性和低交易频率导致了农地流转市场仍是一个薄市场。在农户违约后,银行处置农户的农地经营权会面临不菲的交易费用,故在现阶段企图通过市场机制实现农地抵押贷款是不现实的。有第三方组织参与的混合治理结构是降低交易费用的现实选择,“市场+层级”的混合治理结构可以激发农地的信贷效应。纯粹通过农户和银行的直接联结实现的农地抵押贷款,会由于定价太高而使其交易费用过高,面临发展瓶颈。

农户和金融机构之间通过第三方组织的迂回交易修正和改变了制度与交易费用的关系,实现了间接定价费用取代并降低直接定价费用的格局(诺思,2014)。迂回交易和交易装置理论认为当A交易因交易费用过高难以实行时,可通过B交易来改善A交易的交易效率,使A交易可行(罗必良,2019)。第三方组织参与降低农地处置交易费用的B交易的内在逻辑是:首先,第三方组织可以通过整合农地,提高地块相邻的可能性,使其更加集中,从而降低农地的地理位置专用性;其次,第三方组织将契约执行嵌入农户所处的关系网络中,通过声誉机制有效地监督和促使农户履约,减少交易过程的不确定性;再次,农地可以在组织内流转,将农地评估和信息搜寻的交易费用内部化,减少因农地价值评估体系缺失和流转市场不完善造成的不良影响。根据以上分析本文提出如下假说:

假说1:在农地资产专用性和交易不确定性较高、农地评估体系和土地流转市场不完善的背景下,第三方组织参与能够降低银行处置农地的交易费用,提高农地抵押贷款的可得性。

2. 外生型组织和内生型组织都能够降低农地处置的交易费用

外生型组织(例如村委会)能够在三个阶段都起到降低交易费用的作用:第一,外生型组织具有独特的社会网络优势,能够帮助银行在本村甚至跨区域寻找交易对象,降低农地地理位置专用性程度,进而降低银行的信息搜寻费用(罗必良、李尚蒲,2010);第二,农村土地流转是掺杂地缘、亲缘和人情关系的特殊市场,不同的社会关系形成了农地流转的“差序信任格局”。借款人、银行与农地转入者可能体现为弱关联关系或无关联关系,谈判环节可能复杂繁琐。但是,借款人和银行能够通过村集体等外生型组织与农地转入者建立联系,减少对书面正式合约的依赖,转向口头非正式合约,进而减少谈判签约环节,节省单边交易费用(陈殊洁等,2015);第三,外生型组织可以凭借政府的公信力对农地交易进行担保,进而降低银行的监督执行费用。根据以上分析本文提出如下假说:

^①农地处置这一交易过程中的层级机构是指各类第三方组织,如政府、土地合作社、土地协会等。

假说2: 外生型第三方组织的参与能够降低银行处置农地时的信息搜寻费用、谈判签约费用和监督执行费用, 提高农地抵押贷款的可得性。

内生型组织(例如土地合作社)也能够农地处置的三个阶段起到降低交易费用的作用: 首先, 内生型组织通过农地连片化处理, 降低农地地理位置专用性, 帮助银行快速寻找到需要转入农地的农户, 减少信息搜寻费用; 其次, 农户通过参与土地合作社降低了借款人、银行与农地转入者三者的信息不对称程度, 进而降低对书面契约的要求, 通过人情治理改善谈判效率和效果, 进而减少谈判费用; 最后, 第三方组织可以通过较强的声誉惩罚机制减少合约执行时的纠纷, 降低了银行监督执行费用。根据以上分析本文提出如下假说:

假说3: 内生型组织的参与能够降低银行处置农地时的信息搜寻费用、谈判签约费用和监督执行费用, 提高农地抵押贷款的可得性。

组织是基于既有制度约束有目的地创立的, 是促成制度变迁的核心(诺思, 2014)。而组织促成制度变迁的动力是报酬激励。参与农地抵押贷款的内生型组织是在农地产权和农村融资制度约束下产生于贷款群体内部的组织, 与外生型组织相比具有更强的报酬主观感知和匹配性, 有利于克服农地的资产专用性、不确定性和交易频率问题, 以及后契约机会主义问题, 最终降低交易费用, 形成适应性效率(Williamson, 1975)。而村委会等外生型组织是否参与农地抵押贷款更多取决于金融机构的话事能力和村委会的偏好。据此本文提出如下假说:

假说4: 在降低银行处置农地的交易费用、提高农地抵押贷款的可得性方面, 内生型组织的作用要优于外生型组织。

三、实证分析

(一) 模型设定

本文采用半参数的中介效应模型, 研究第三方组织如何通过降低银行处置农地的信息搜寻费用、谈判签约费用和监督执行费用, 提高农地抵押贷款可得性的问题。一般的模型都假定误差项服从标准正态分布, 从而进行普通的参数估计。如果误差项不服从标准正态分布, 使用上述方法会导致参数估计结果的不一致。通常我们无法事先得知扰动项的真实分布, 而使用半参数估计可以放宽对扰动项的假定, 得到与扰动项分布无关的估计量(王春超、周先波, 2013)。然后在稳健性检验^①中, 采用似然比检验和系数对比方法判断使用半参数估计的必要性和有效性, 并证明回归结果的稳健性。

总效应模型用来定义外生型组织(*exoor*)和内生型组织(*endoor*)对农地抵押贷款可得性(*lloan*)的影响, 其影响方程表示如下(变量定义见表1):

$$lloan_i^* = \alpha_0 + \alpha_1 exoor_i + \alpha_2 endoor_i + X_i' \alpha + \varepsilon_i \quad (1)$$

中介变量模型用来界定农地处置的信息搜寻费用、谈判签约费用和监督执行费用的影

^①半参数模型设定检验的统计量已在后文的表2列出。针对样本选择偏差和互为因果的内生性问题, 本文分别使用了Heckman两步法和工具变量法进行了回归, 检验结果显示本文的实证结果是稳健的。但限于文章篇幅, 模型的稳健性检验部分未在正文中列出, 有需要的读者可与作者联系。

响因素。我们分别用“成功转出农地(*trout*)”“转出农地时是否签订书面契约(*fcontract*)”和“转出农地过程中是否有纠纷(*dispute*)”来衡量农地处置过程中因寻找交易对象、达成和履行交易而产生的信息搜寻费用、谈判签约费用和监督执行费用。三个中介变量的二值选择模型如下所示:

$$trout_i^* = \beta_0 + \beta_1 exoor_i + \beta_2 endoor_i + Z_i' \beta + u_i \quad (2)$$

$$fcontract_i^* = \gamma_0 + \gamma_1 exoor_i + \gamma_2 endoor_i + W_i' \gamma + v_i \quad (3)$$

$$dispute_i^* = \delta_0 + \delta_1 exoor_i + \delta_2 endoor_i + \Pi_i \delta + \tau_i \quad (4)$$

将信息搜寻费用、谈判签约费用和监督执行费用纳入总效应模型中,推出中介效应模型:

$$lloan_i^* = \theta_0 + \theta_1 exoor_i + \theta_2 endoor_i + \theta_3 trout_i + \theta_4 fcontract_i + \theta_5 dispute_i + X_i' \theta + \xi_i \quad (5)$$

在得到所有模型的估计系数后,我们可以计算中介效应量及其占比,并用 Sobel 检验法计算其显著性水平。以外生型组织参与和信息搜寻费用为例,如果 α_1 显著,则外生型组织参与对农地抵押贷款具有中介效应。如果 α_1 和 β_1 都显著,则外生型组织参与通过降低信息搜寻费用提高农地抵押贷款可得性的间接效应显著。如果 θ_1 显著,则外生型组织参与的直接效应显著,继而可比较 $\beta_1 \theta_3$ 和 α_1 的符号,如果它们是同号,外生型组织参与属于部分中介效应,中介效应占总效应的比例是 $\beta_1 \theta_3 / \alpha_1$ 。如果 θ_1 不显著,说明外生型组织参与只有中介效应(温忠麟、叶宝娟,2014)。不同方程得到的回归系数只有量尺相同,才具有可比性,继而计算中介效应(MacKinnon,2012)。已有文献对于所有方程均采用受限被解释变量模型,但并未明确说明是否需要等量尺化(Iacobucci,2012),故本研究直接使用边际影响和显著性进行中介效应分析。在对被解释变量的中介效应估计中,系数乘积法得到的结果优于系数差异法(刘红云等,2013),故我们使用系数乘积法计算中介效应量及其占总效应的比重。

(二) 数据说明与变量选择

本文样本来自国家自然科学基金政策研究重点支持项目于 2015 年对全国 9 个省份 54 个县 576 个村的农户进行分层聚类的随机问卷调查。聚类指标是调研地区的总人口、人均生产总值、耕地总面积、耕地面积占国土面积的比例、农业人口占总人口的比例和农业增加值占地区生产总值的比例。首先根据 6 个聚类指标在全国 31 个省区市中,分东、中、西部地区各抽取 3 个省份,包括东部地区的辽宁、江苏和广东,中部地区的山西、河南和江西,西部地区的宁夏、四川和贵州。然后再根据聚类指标,将 9 个省域内的县城分为三类,每一类中抽取 2 个县,一共抽取了 54 个县。继而将 54 个县中所有的乡镇根据经济发展水平分成 4 类,每一类中随机抽取 1 个乡镇,每个样本县抽取 4 个乡镇。广东和江西各抽取 10 个样本乡镇。在样本镇中抽取 1 个具有代表性的行政村,在该行政村中再随机抽取 2 个自然村。在每个自然村根据农户收入将村民分为 5 组,每个组随机抽取 1 户作为调研对象,共 2 880 户,回收问卷 2 700 份。根据相同的抽样原则,课题组后续又对广东、江西两省进行了补充调研。最终根据本文的研究需要保留了有效样本 2 698 份。

1. 被解释变量的选择

我们使用“农户是否以农地经营权或承包权抵押贷款”作为农地抵押贷款可得性的代理

变量,并作为总效应模型和中介效应模型的被解释变量。样本中有 1.5% 的农户持有农地抵押贷款。农地抵押贷款可得性是信贷供给和信贷需求共同作用的结果。信贷需求包括名义信贷需求、有效信贷需求和潜在信贷需求(张龙耀等,2015)。名义信贷需求是根据投资收益率和贷款利率的比较分析,认为有利可图,从而产生的信贷需求。如果向金融机构申请贷款,名义信贷需求成为有效信贷需求。如果农户考虑到抵押农地丧失的可能性和金融机构信贷分配的可能性等因素没有申请贷款,则名义信贷需求成为潜在信贷需求。农地抵押贷款可得性模型中考虑了有效信贷需求中被银行获批的贷款可得性,其参照系是没有农地抵押贷款的农户。

2. 中介变量的选择

处置农地的过程包括搜寻交易对象、达成协议和履约三个步骤。如果第三方组织能够促进农户转出土地、口头协议转出土地和减少转出土地的纠纷,就能够帮助银行降低处置农地时的信息搜寻费用、谈判签约费用和监督执行费用。因此本文采用“农户是否成功转出农地”“农户转出农地时是否签订书面合约”和“在转出农地时是否发生过纠纷”变量衡量信息搜寻费用、谈判签约费用和监督执行费用。其合理性在于:首先,若第三方组织能提高农户成功转出农地的概率,则可帮助银行在处理抵押物时找到交易对象,从而降低银行在处理抵押物时搜寻交易对象的交易费用;其次,若第三方组织能够促进农户以口头协议而非书面合约的方式实现农地转出,说明第三方组织能够减少农户间谈判签约费用,以关系型契约的方式实现农地处置的低交易费用;最后,使用“在转出农地时是否发生过纠纷”衡量监督执行费用,若第三方组织能够有效减少农地转出中的纠纷,则说明其能够降低银行在处置农地时产生的监督执行费用。样本中有 13.5% 的农户成功转出了农地,2.4% 的农户转出农地时签订了书面合约,10.8% 的农户在转出农地时发生了纠纷。

3. 核心解释变量的选择

第三方组织可以通过熟人社会治理机制,促进农户缔约和履约,增加农村地区的金融深度,改善农户的交易环境。我们把第三方组织分为两类:第一,外生型组织,用“是否与村集体流转过农地”来衡量,样本中有 11.4% 的农户与村集体流转过农地。第二,内生型组织,用“家里是否有人参与过土地合作社”来衡量,样本中有 4.7% 的农户参与过土地合作社。

4. 控制变量的选择

在总效应模型和中介效应模型中分别采用农户的个人特征、经济特征、地理特征、社会资本特征和金融发展水平作为控制变量(见表 1),减少因遗漏变量而带来的内生性问题^①。

个人特征包括性别、年龄、受教育程度;经济特征包括劳动力占比、家庭年收入、家庭规模、农业收入占比、农地特征(农地确权、农地租金、农地面积、土壤肥力、期望转出农地的年限、地权稳定性);地理特征包括交通便利程度、地区经济发展水平;社会资本特征包括亲缘型社会资本、政治型社会资本;金融发展水平包括向朋友、亲戚和银行借款的困难程度(Carter and Olinto,2003; Jiang et al., 2019; 曹璨、罗剑朝,2015; 李景荣等,2018; 刘瑞峰等,2018)。

各变量的名称、定义及其简单的描述性统计见表 1 所示。

^①限于篇幅,选用控制变量的合理性问题未在正文中列出,有需要的读者可与作者联系。

表 1 变量说明及描述性统计

变量	变量定义	均值	标准差	最小值	最大值
被解释变量					
农地抵押贷款可得性(<i>lloan</i>)	农户是否有农地经营权或承包权抵押贷款(是=1,否=0)	0.015	0.125	0	1
中介变量					
信息搜寻费用(<i>trout</i>)	农户是否成功转出农地(是=1,否=0)	0.135	0.342	0	1
谈判签约费用(<i>fcontract</i>)	农户转出农地时是否签订书面合约(是=1,否=0)	0.024	0.155	0	1
监督执行费用(<i>dispute</i>)	在转出农地时是否发生过纠纷(是=1,否=0)	0.108	0.310	0	1
核心解释变量					
外生型组织(<i>exoor</i>)	是否与村集体流转过农地(是=1,否=0)	0.114	0.318	0	1
内生型组织(<i>endoor</i>)	家里是否有人参与过土地合作社(是=1,否=0)	0.047	0.211	0	1
控制变量					
个体特征					
性别	户主是否为男性(是=1,否=0)	0.637	0.481	0	1
年龄	户主年龄(岁)	43.471	15.138	18	90
受教育程度	户主受教育程度(小学=1;初中=2;高中=3;高中以上=4)	2.078	0.987	1	4
经济特征					
劳动力占比	家庭劳动力人数占家庭总人数的比例	0.724	0.254	0	1
家庭年收入	家庭总收入(10000元以下=1;10000元~30000元=2;30000~50000元=3;50000~100000元=4;100000元以上=5)	2.669	1.125	1	5
家庭规模	家庭总人数	4.514	1.862	1	21
农业收入占比	农业收入占家庭总收入的比重	0.359	0.332	0	1
农地确权	农地是否确权(是=1,否=0)	0.532	0.499	0	1
农地租金	转出农地收入的对数值	6.107	0.972	2.302	11.512
农地面积	家庭拥有的农地面积的对数值	1.347	1.111	-2.303	7.377
土壤肥力	土地肥沃程度,从“很差”到“很好”5级赋值	3.148	1.091	1	5
期望转出农地的年限	希望转出农地的年限(1年以内=1;1~3年=2;4~5年=3;5年以上=4;不定期=5)	3.420	1.464	1	5
地权稳定性	家庭拥有的土地5年内是否有过调整(是=1,否=0)	0.151	0.358	0	1
地理特征					
交通便利程度	所处地区的交通条件,从“很差”到“很好”5级赋值	3.259	0.899	1	5
地区经济发展水平	所处地区的经济发展水平,从“很差”到“很好”5级赋值	2.799	0.801	1	5
社会资本特征					
亲缘型社会资本	农户的亲戚朋友多不多(较多=1,否=0)	0.457	0.498	0	1
政治型社会资本	是否有家庭成员担任村干部(是=1,否=0)	0.359	0.480	0	1
金融发展水平					
向朋友贷款的困难程度	向朋友贷款时是否感到困难,从“很不同意”到“非常同意”5级赋值	3.195	1.052	1	5
向亲戚借款的困难程度	向亲戚借款时是否感到困难,从“很不同意”到“非常同意”5级赋值	3.075	1.060	1	5
向银行借款的困难程度	向银行借款时是否感到困难,从“很不同意”到“非常同意”5级赋值	3.838	1.067	1	5

(三) 实证结果与分析

表2汇报了半参数 Probit 模型的估计结果。参数模型和半参数模型的似然比检验的卡方统计量及相关 P 值显示,总效应模型和中介效应模型均能在 5% 的显著性水平下拒绝“扰动项服从正态分布”的原假设^①,故与参数模型相比,使用半参数模型更为合理。

1. 第三方组织参与对农地抵押贷款可得性的总效应分析

第三方组织参与对农地抵押贷款可得性的总效应分析的结果显示,村集体等外生型组织的参与使农户获得农地抵押贷款的概率提高 1.3%,说明外生型组织的参与具有提高农户农地抵押贷款可得性的总效应。土地合作社等内生型组织的参与使农户农地抵押贷款可得性提高 3.9%,说明内生型组织也具有提高农户农地抵押贷款可得性的总效应,而且内生型组织参与的效应大于外生型组织。

2. 第三方组织参与对交易费用的影响分析

外生型组织对农地处置的信息搜寻费用、谈判签约费用与监督执行费用影响的估计结果显示,村集体等外生型组织的参与使农户转出土地的概率提高 5.6%。银行在处置农地时,外生型组织的参与使其更容易寻找到交易对象,从而降低信息搜寻费用。村集体等外生型组织的参与使农地交易以口头协议形式完成的概率提高 3.1%,说明村集体能将借款者、银行和农地转入者联系起来,将银行在处置农地时的一般交换转向人情法则,节省繁琐的签约过程,提高谈判效率。但是,村集体并不能减少农地转出的纠纷,说明外生型组织无经济目标或政治目标的激励,在没有持续参与的情况下,监督和帮助合约执行方面的作用较小。

对内生型组织参与的估计结果显示,与没有参与土地合作社的农户相比,参与的农户转出农地的概率提高 20.7%,农地交易中达成口头协议的概率提高 5.0%,发生纠纷的概率降低 5.9%。这说明内生型组织能够通过农地连片化和内部化处理,使银行易于寻找到交易对象,降低信息搜寻费用,促进农地的转出。其次,内生型组织在相关利益的驱动下,能够减少书面契约签订,节省谈判签约费用。最后,内生型组织还能够通过声誉惩罚机制保障合约的执行。合作社社员联系的紧密程度和利益相关度大于村庄农户,而且内生型组织的参与具有持续性,因此对惩罚机制的敏感度更强。将表2横向比对我们还能发现,内生型组织降低的总交易费用较外生型组织要高,因此内生型组织比外生型组织更能够提高农地抵押贷款可得性。

3. 第三方组织参与的中介效应分析

结合第三方组织参与对农地处置的信息搜寻费用、谈判签约费用与监督执行费用的影响,以及第三方组织和交易费用对农地抵押贷款可得性的影响,可以估计出第三方组织影响农地抵押贷款可得性的路径,即中介效应。

第三方组织参与和农地处置的交易费用对农地抵押贷款可得性影响的估计结果显示,信息搜寻费用与监督执行费用对农地抵押贷款可得性的影响分别为 0.01 和 -0.041,且均在

①我们对参数方法和半参数方法所估计的模型系数大小进行了比较,结果显示两种方法得出的模型系数具有显著性差异,说明模型的扰动项很可能不服从标准正态分布。进而对半参数模型残差的偏度、峰度和标准差的分析显示其明显异于标准正态分布。最后,对参数模型和半参数模型进行了似然比检验,发现半参数估计模型显著异于正态分布假定下的 Probit 模型。半参数估计能够放宽对扰动项的分布假定,所以半参数估计的结果要比 Probit 模型估计的更加精确。

5%的显著性水平上显著,但谈判签约费用对农地抵押贷款可得性的影响并不显著。结合第三方组织参与对农地处置的三类交易费用的影响结果,可以得出如下结论:

第一,对于外生型组织而言,“外生型组织参与——信息搜寻费用降低——农地抵押贷款可得性提高”的中介效应显著。故外生型组织可以降低银行处置农地时的单边交易费用,提高银行的放贷意愿,在需求不变的情况下提高农地抵押贷款可得性。且外生型组织不存在提高农地抵押贷款可得性的直接效应,只有降低农地处置交易费用的中介效应。

第二,对于内生型组织而言,“内生型组织参与——信息搜寻费用降低——农地抵押贷款可得性提高”和“内生型组织参与——监督执行费用降低——农地抵押贷款可得性提高”两条中介效应路径是显著的。故内生型组织能降低总交易费用,从而银行增加了信贷供给,提高了农地抵押贷款可得性。且内生型组织既存在提高农地抵押贷款可得性的直接效应,也存在降低农地处置交易费用的中介效应。

第三,无论是外生型组织还是内生型组织,其“第三方组织参与——谈判签约费用降低——农地抵押贷款可得性提高”的作用路径都不显著。虽然外生型和内生型组织对谈判签约费用都能起到显著的降低作用,但谈判签约费用对农地抵押贷款可得性的影响并不显著,这说明在贷款交易过程中,谈判签约费用占总交易费用的比例较少。

表 2 半参数 Probit 模型估计结果

变量	农地抵押 贷款可得 性(总效应 模型,公式 (1))	信息搜寻 费用(中介 变量模型, 公式(2))	谈判签约 费用(中介 变量模型, 公式(3))	监督执行 费用(中介 变量模型, 公式(4))	农地抵押贷 款可得性 (中介效应 模型,公式 (5))
核心解释变量					
外生型组织	0.013 *** (0.004)	0.056 *** (0.021)	-0.031 ** (0.016)	-0.015 (0.011)	0.005 (0.004)
内生型组织	0.039 *** (0.006)	0.207 *** (0.027)	-0.050 * (0.031)	-0.059 *** (0.017)	0.023 *** (0.003)
中介变量					
信息搜寻费用					0.010 ** (0.005)
谈判签约费用					-0.016 (0.021)
监督执行费用					-0.041 ** (0.019)
控制变量					
个体特征					
性别	-0.002 (0.003)	0.001 (0.014)	-0.002 (0.007)	-0.002 (0.007)	-0.001 (0.003)
年龄	-0.000 (0.000)	-0.001 (0.001)	-0.000 (0.000)	0.001 *** (0.000)	-0.000 (0.000)
受教育程度	0.006 *** (0.002)	-0.025 *** (0.009)	-0.003 (0.005)	0.015 *** (0.006)	0.008 *** (0.002)
经济特征					
劳动力占比	0.002 (0.004)	0.081 *** (0.029)		0.005 (0.013)	0.002 (0.003)
家庭年收入	0.006 *** (0.001)			-0.004 (0.003)	0.005 *** (0.001)
家庭规模	-0.001 (0.001)				0.002 ** (0.001)

续表 2

半参数 Probit 模型估计结果

变量	农地抵押贷款可得性(总效应模型,公式(1))	信息搜寻费用(中介变量模型,公式(2))	谈判签约费用(中介变量模型,公式(3))	监督执行费用(中介变量模型,公式(4))	农地抵押贷款可得性(中介效应模型,公式(5))
农业收入占比		0.010 (0.021)	0.004 (0.011)	0.004 (0.011)	
农地确权	-0.000 (0.003)	0.001 (0.014)			-0.000 (0.003)
农地租金			0.006* (0.004)	-0.007* (0.004)	
农地面积	-0.000 (0.000)	0.006*** (0.001)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)
土壤肥力			-0.000 (0.003)	-0.005 (0.003)	
期望转出农地的年限			0.001 (0.003)		
地权稳定性			0.002 (0.010)		
地理特征					
交通便利程度	0.001 (0.002)	-0.030*** (0.008)	-0.001 (0.004)		0.003 (0.002)
地区经济发展水平	-0.001 (0.002)	-0.001 (0.009)			-0.003 (0.003)
社会资本特征					
亲缘型社会资本	-0.002 (0.004)	0.007 (0.014)	0.012* (0.007)	-0.002 (0.010)	-0.001 (0.003)
政治型社会资本	0.000 (0.003)	0.006 (0.014)	-0.011 (0.008)	-0.004 (0.008)	0.001 (0.003)
金融发展水平					
向朋友借款的困难程度	0.000 (0.002)				-0.001 (0.002)
向亲戚借款的困难程度	0.001 (0.002)				0.002 (0.002)
向银行贷款的困难程度	0.000 (0.001)				-0.001 (0.001)
模型似然比检验的卡方值	21.995	65.322	9.554	14.913	23.812
P 值	0.000	0.000	0.022	0.001	0.000
观测值	2 196	2 175	2 079	2 079	2 175

注: 括号内为估计系数的标准误。*、**、*** 分别表示在 1%、5%、10% 的显著性水平上显著。

表 3 中,通过分析中介效应占总效应的比重可知,村集体等外生型组织降低信息搜寻费用的中介效应占总效应的比重为 4.3%^①,其主要功能体现在节约信息搜寻费用上。内生型组织降低信息搜寻费用和监督执行费用的中介效应占总效应的比重分别为 5.3% 和 6.2%^②,其功能主要体现在通过声誉资本监督农户履约、降低银行的监督执行费用上。因此两种类型的第三方组织都可以为提高农户的农地抵押贷款可得性发挥各自的比较优势。

① 村集体等外生型组织降低信息搜寻费用的中介效应占总效应的比重是 $\beta_1\theta_3/\alpha_1$ 。

② 内生型组织降低信息搜寻费用和监督执行费用的中介效应占总效应的比重分别是 $\beta_2\theta_3/\alpha_2$ 和 $\delta_2\theta_5/\alpha_2$ 。

表 3 交易费用中介效应量及其占总效应的百分比

变量	信息搜寻费用 (转出行为)	谈判签约费用 (书面契约)	监督执行费用 (纠纷情况)
外生型组织	$5.6 \times 10^{-4}^{**}$ (4.3%) ^{**}	5.0×10^{-4} (3.8%)	6.2×10^{-4} (4.7%)
内生型组织	$2.1 \times 10^{-3}^{**}$ (5.3%) ^{**}	8.0×10^{-4} (2.1%)	$2.3 \times 10^{-3}^*$ (6.2%) [*]

注: 括号内为中介效应量占总效应的比重。

4. 影响农地抵押贷款可得性的其他因素

除第三方组织参与与否以外,我们还发现农户的受教育程度、家庭年收入和家庭规模对农地抵押贷款可得性有显著的正向影响(见表2)。受教育程度增加1个等级,农户获得农地抵押贷款的概率会增加0.8%。受教育程度较高的农户通常更愿意投资先进农业技术,有较高的贷款需求,并且对未来不确定情形下的收益有良好判断,抵抗风险能力强,违约概率低。而且受教育程度高,外出务工获得收入更高,在项目失败的情况下,还款的可能性越高,因此获得贷款的可能性更高。家庭年收入增加1个等级,农户获得农地抵押贷款的概率会增加0.5%。家庭收入作为发放贷款的评估标准之一,自然与贷款可得性具有正向的相关关系。家庭中每增加1名家庭成员,农户获得农地抵押贷款的概率会增加0.2%。在我国现有的农业现代化水平下,劳动力仍是农业生产力的保障。家庭规模越大,能投入到农业的潜在劳动力越多,项目失败的概率就越低。从另一个角度看,家庭规模越大,在项目失败的情况下,外出务工偿还贷款的可能性也越高,故贷款可得性更高。

四、结论与建议

农地经营权处置的交易费用高昂是我国农地抵押贷款陷入困境的主要原因之一。根据资产专用性强、频率低和不确定性强的农地交易特征,选择“市场+层级”的混合治理结构的原理,本文提出了第三方组织参与的迂回交易模式来解决农地抵押贷款困境。经半参数中介效应分析方法的验证,本文得出如下结论:村集体等外生型组织和土地合作社等内生型组织都能够降低农地处置的交易费用,外生型组织的功能体现在降低农地处置的信息搜寻费用,而内生型组织的功能体现在降低农地处置的信息搜寻费用和监督执行费用。内生型组织可以直接提高农地抵押贷款可得性,也可通过降低农地处置的交易费用间接提高农地抵押贷款可得性。而外生型组织只通过降低农地处置的交易费用间接提高农地抵押贷款可得性。所以,内生型组织较外生型组织更能有效降低农地处置的总交易费用,缓释农地抵押贷款困境,提高农户贷款可得性。上述结论蕴含的政策建议如下:

(一) 鼓励第三方组织参与农地抵押贷款

在农地细碎化、农地价值评估和处置困难的背景下,依托村集体等外生型组织,联合土地合作社、生产合作社等内生型组织是开展农地抵押贷款的最佳模式。村集体可以在村级范围内置换整合土地,将抵押农地先进行村民间的置换,突破细碎格局,实现连片抵押,提高农地的可交易性,进而实现和推高农地的抵押价值和贷款额度。内生型组织可以在合作社内部寻找交易对象,对农地处置合约的执行进行监督。为激励合作社参与,需要银行和合作社实现利益联结,包括合作社资金参与、累进贷款、动态激励和小组贷款等合约模式。这有利于农地处置交易费用的降低、农户农地抵押贷款可得性的提高,进而改善农户的信贷配给状况。

(二) 加快建立农地评估体系及其产权流转市场

第三方组织并不能代替市场机制,缓解农地抵押贷款困境的根本途径还是在于建立完善的农地评估体系及其产权流转市场。“市场+层级”的农地抵押贷款机制在农地市场薄弱的情况下,第三方组织起了主导作用。随着农地市场的发展和完善,市场的交易和定价功能将起到主导作用,而第三方组织更多起到了整合土地和监督契约执行的功能。应确立农地评估准则,推动形成行业公认的评估方法,建立专业的参考体系。在此基础上,全国各地区按照实际情况科学评估,设立线上和线下的农地产权交易信息平台,为当地的农地产权流转提供备案登记、活动场所等服务。

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Participation of Third-Party Organizations, Reduction of Transaction Cost and Availability of Farmland Mortgage: Based on the Perspective of Farmland Disposal

Jiang Meishan¹, Li Jingrong² and Mi Yunsheng¹

(1: School of Economics & Management, SCAU;

2: Institute for Economic and Social Research, Jinan University)

Abstract: Under the farmland fragmentation and information asymmetry, the high unilateral transaction cost faced by banks when disposing farmland restricts the development of China's farmland mortgage. This paper explores the inherent mechanism of the third-party organizations in reducing transaction cost of farmland disposal and improving the availability of farmland mortgage. Based on the data from the farmland mortgage in nine provinces of China, the results of the semi-parametric intermediary effect model show that endogenous and exogenous organizations can improve the accessibility of farmland mortgage through reducing transaction cost. Compared with the indirect effect driven by the policy incentive of exogenous organizations, the reduction of total transaction cost of endogenous organizations driven by the interest incentive is more significant. Therefore, we suggest that, in order to interconnect the formal and informal financial organizations, endogenous and exogenous organizations should be encouraged to participate in different parts of farmland mortgage according to their comparative advantages. We should also establish the farmland evaluation system and farmland market to loosen farmers' loan constraints.

Keywords: Farmland Mortgage, Transaction Cost, Exogenous Organization, Endogenous Organization

JEL Classification: Q14, C21

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农地确权对小农户信贷可得性的影响 ——基于双稳健估计方法的平均处理效应分析

姜美善 米运生*

(华南农业大学 经济管理学院, 广州 510642)

摘要 基于我国9省小农户调查数据,运用双稳健的平均处理效应模型,研究了农地确权对小农户信贷可得性的影响及其作用机理。结果表明:农地确权可以提升小农户信贷可得性。进一步研究发现,需求方面的影响路径是:确权提高了小农户的土地安全性,增加了农业长期投资,并提高了信贷意愿。供给方面的影响路径是:确权增加了小农户的财产权并使其拥有了可流转大额财产,传递了还款可能性增加的信号;而且可将农地作为抵押品获得农地抵押贷款,增加了金融机构的贷款供给。不过,农地的信号传递作用大于抵押作用,农地抵押作用的发挥需要进行进一步的制度和组织创新。

关键词 农地确权; 信贷可得性; 小农户; 双稳健估计方法

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Impact of farmland titling on credit availability of small farmers: Average treatment effect analysis based on doubly robust estimation

JIANG Meishan, MI Yunsheng*

(College of Economics and Management, South China Agricultural University, Guangzhou 510642, China)

Abstract The impact and mechanisms of farmland titling on credit availability of small farmers is investigated based on the survey data of small farmers from nine provinces in China. A doubly-robust average treatment effect estimation model is used in this study. The results show that titling increases farmers' credit availability. Further analyses find that the impact path of demand is: Farmland titling improves land security, increases the long-term investment of small farmers and ultimately increases their loan willingness. The impact path of supply is: Farmland titling increases the property rights of small farmers and makes them possess large amount of transferable property, which transmits the signal that the possibility of repayment increases. Farmland also can be used as collateral to obtain land mortgage loan, which increases the loan supply of financial institutions. However, the role of the signal is greater than mortgage. The role of farmland mortgage needs further institutional and organizational innovation.

Keywords farmland titling; credit availability; small farmers; doubly-robust estimation

为形成界定清晰、权属明确的农地产权制度,我国从2009年开始进行了新一轮的农地产权制度改革试点,并于2013年在全国范围内推广。确权明确

了农户的土地权利,为农地经营权的转移提供了制度和法律基础。农地的确权和转让又为农地抵押贷款、规模经营、社会化经营和劳动力转移等一系列农

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第一作者: 姜美善, 副教授, 主要从事农村金融研究, E-mail: jintaojiang@163.com

通讯作者: 米运生, 教授, 主要从事农村金融研究, E-mail: miyunsheng@163.com

村新型的生产和融资模式提供了基础,尤其促进了融资模式的变革。基于农村金融市场信贷供给的角度,农地确权实现了农地外部收益的内部化,赋予了农户财产增加的信号,使金融机构评估农户的可贷性提高。同时农地经营权权属明确,可作为抵押品发放农地抵押贷款,放松了农户的信贷限制。基于农村金融市场信贷意愿的角度,农地确权增加了农户的农业投资^[1-4],从而提高了信贷意愿。产权分割和农地确权促进了农地流转,农地转入使农户的农业投资增加,也提高了信贷意愿。如果农地确权带给农户的信贷效应来自上述4个路径,那么小农户因为农地规模小和农地转移的固定交易费用使其信贷限制并未放松。

小农户是持有土地的规模小,生产中主要利用家庭劳动,劳动生产率低,农产品交易率低的农户^[5]。截至2016年底,我国经营规模在3.34 hm²(50亩)以下的小农户有近2.6亿户,占农户总数的97%左右,经营的耕地面积占全国耕地总面积的82%左右,户均耕地面积0.334 hm²(5亩)左右。而经营规模在3.34 hm²(50亩)以上的新型农业主体经营耕地总面积约0.233亿hm²(3.5亿亩),平均经营规模达到6.67 hm²(100亩)^[6]。小农户是我国农业生产经营的主要组织形式,并将长期与现代农业并存。公平的金融参与机会既关系个人发展,也通过金融普惠而体现了社会主义核心价值观^[7]。然而,那些罗尔斯式“最不利者”的小农,却普遍遭遇正规机构的金融排斥^[8]。尽管金融参与程度自改革开放以来大幅度提高,但因金融发展的不充分不平衡,我国仍有大量小农被金融排斥(Financial exclusion)所困扰^[9]。2006年实施的农村金融新政在很大程度上改善了农村金融组织体系,增加了农村金融供给能力,但使命漂移问题并未得到根本性缓解^[10]。对此问题,学者们通常将之归因于Rajan等^[11]所提出来的“抵押品暴政(Tyranny of collateral)”:社会征信体系的缺乏和契约执行机制的失灵等因素,使正规金融机构在解决信息和违约风险问题时,因难以采用发达国家所常用的交易信用,而不得不诉诸于不动产等抵押品。正是商业银行的这一“无情”措施,使小农等弱势者很容易遭遇金融排斥。

Carter等^[12]、Boucher等^[13]以及Field等^[14]分别对拉丁美洲、非洲地区农地确权的信贷效应进行了实证研究。结果表明,农地确权确实提高了富裕

农户和大土地所有者的信贷可得性,但小土地所有者的贷款数量不增反降。中国农地确权的改革已基本完成,关于此项改革的金融普惠效果问题,已有的少量研究却显示了令人不安的信息:贷款主要为专业大户等主体所获得;对小农来说,信贷可得性并未增加^[15-18]。也有学者认为农地确权是能够缓解小农户金融排斥的制度创新模式^[19-20]。农地确权是否提高了小农户信贷可得性?我国小农户在确权后的信贷可得性及其机制方面的专门研究数量很少。已有的研究都集中在农地抵押贷款的使命漂移问题^[17-18],确权的信贷需求效应^[15],确权的信贷效应的案例分析^[21]等,没有对小农户确权的信贷效应及其传导路径进行全面的实证研究。只有验证了农村土地产权制度改革传导到农村金融市场的有效路径,才能对我国小农户在农地确权后的信贷状况的改变进行全面的了解,并疏通贷款路径,放松小农户的信贷限制。本研究以来自2015年我国9省的随机调研数据为基础,验证小农户农地确权的信贷效应,特别是对传递机制对小农户的有效性进行验证。

确权对小农户的信贷效应需要对确权农户在没有确权情况下的信贷状况进行反事实推断,然后再与其在确权情况下的信贷状况进行比较分析,平均处理效应模型可以对农户的反事实结果进行推测。本研究采用了双稳健估计方法分析平均处理效应模型,将农地确权视作干预措施,设定干预模型,将农户信贷可得性,贷款需求,农业投资等视作干预结果,设定结果模型。基于干预模型的倾向匹配得分克服了农户的自选择和异质性对结果的干扰,并加入偏差修正项(Bias-corrected term),获得优于目前政策效应分析经常使用的PSM(Propensity matching score)和DID(Difference in difference)等方法的双重稳健的分析结果,即使干预模型或结果模型设定错误也可以获得一致性结果。实证检验的结果显示,农地确权使小农户的产权获得了安全性,增加了农户的农业投资,特别是长期投资,最终增加贷款需求。农地确权通过信号传递和农地抵押使金融机构对农户的可贷性评价提高,增加了小农户的信贷可得性,农地确权的信贷效应存在,但和确权产生的信贷需求相比,信贷效应因农地的抵押作用不足而受限,需要进行进一步的制度创新。因此本研究旨在通过分析农地确权对小农户信贷可得性的影响,实现制度创新,缓解小农户的信贷限制。

1 假说提出:农地确权影响小农户信贷可得性的内在逻辑

1.1 理论假说

小农户农地确权的信贷效应因小农的土地规模小、贷款额度少等特点,体现出不同于大农户的特点。

1.1.1 确权后的土地可作为抵押品缓解小农户的金融排斥

非正式金融有信息优势,当借款人违约时,可以用社会准则、压力和暴力去谴责违约。而正式金融只能使用和处理抵押物,抵押是缺乏信息的替代物^[22]。缺乏抵押物的情况下,金融机构将减少贷款额度和期限,并以增加利率来替代抵押品。如果逆向选择限制贷款人提高利率,信贷配给就会发生^[22]。信息不对称下,缺乏抵押物的农村信贷市场的均衡是逆向选择和信贷配给^[23]。

农地确权使农地具有了正式的财产权,并通畅了流转渠道,增加了土地的净抵押价值,降低了杠杆率^[15]。通过减少代理人问题,农地抵押的使用可以缓解信贷配给,并使风险贴现和利率降低。Barham等^[8]推测确权减少了农户信贷配给的可能性可以达到11.8%。如果没有土地抵押贷款,银行会花费更多的时间进行可贷性调查,提高了交易成本,并减少了农户贷款^[24]。从没有抵押品到有抵押品,农村金融市场最终形成分离均衡,持有高质量项目的客户选择抵押贷款和低利率,而持有低质量项目的客户选择非抵押贷款和高利率^[25]。这是信息劣势的一方提出一组合约,供信息优势的一方市场筛选的结果。

但由于丧失抵押品赎回权、重新销售和抵押品转移问题,导致了农地抵押贷款的高交易成本,特别是细碎化的小块土地。因此小农户的小额贷款很难实行农地抵押^[18]。如果政治、法律和道义因素阻碍产权的重新持有时,成本就更高了,所以确权对土地抵押贷款的影响是有规模限制的。小农户即使有确权的土地也会被信贷市场出清。学者研究发现我国农地抵押的规模限制在 6.67 hm^2 (100亩)以上,低于这个规模更多是属于政策性贷款^[15]。由此可得:

假设1:农地确权通过抵押效应提高小农户信贷可得性的效果是有限的。

1.1.2 确权后的土地可传递小农户的资产信号

土地确权的价值不只在将其作为抵押品,

而且还在于贷款交易本身^[14]。依靠抵押物的贷款是金融不发展的象征,抵押给借贷双方都带来了成本,对于贷款人来说,成本在于抵押物评价、监督、违约后抵押物的处理。对于借款人来说,成本在于抵押物的机会成本和抵押物本身价值的变化带来的支撑资金的变化^[26]。理想的贷款是依靠未来盈利能力^[27],确权使农户未来的盈利能力提高,并且使其内部化。因此任何减少借款人和贷款人之间信息不对称的市场发展和政策创新都可以通过减少对抵押品的依赖来提高信贷市场的效率。

确权传递给金融机构的信息流在于如下途径:首先,农地确权的家庭拥有了更多免于征用的财产,而且财产的价值和权属可确定;其次,确权后的土地可流通性提高,易于定价,变现能力提高,这些都提高了土地的价值;再次,因为投资安全性提高带来的投资增加,使土地预期未来收益提高,并实现了内部化^[15];第四,土地确权也影响了借款人的其他特点包括工作时间、工作变化、收入和参与社会活动的的能力等,从而产生农地确权-资产信号传递-贷款供给增加的路径。因此,在农地的抵押作用需要嵌入高额的交易费用的情况下,农地确权的信号传递对小农户更具意义,因为信号传递是增量,传递单纯的正向影响,其影响的高低则取决于小农户本身的农地持有量。由此可得:

假设2:农地确权能够通过资产的信号传递而提高小农户的信贷可得性。

1.1.3 确权对小农户信贷意愿的影响

确权对农户信贷意愿的影响来源于以下几个方面:首先农地确权实现了农业长期投资外部收益的内部化,投资安全性的提高使农户增加了农业投资^[2,8],包括农业经营规模扩大、家庭农业劳动力数量、家庭农业生产时间以及农业经营投入的增加^[4]、有机肥的施用量等长期投资的增加^[1,3],投资增加引发了信贷意愿的增加;其次,农户的预期投资收益率提高,在预期投资收益率高于贷款利率的情况下,农户的信贷意愿会提高。预期投资收益率的提高也来自农地确权后,农地流转使农地流通到生产率更高的农户手中;再次,土地确权如果增加了金融机构对农户的贷款供给,示范效应可以使自我排斥的农户产生信贷意愿^[15]。

小农户的土地持有量少,承担风险的能力低,对于土地的依赖性大于大农户,风险配给导致小农户

的信贷意愿低。长期的信贷配给导致的自我排斥也是影响小农户信贷意愿低的原因。农地确权后,小农户存在长期投资效应,辅以金融机构信贷供给增加的示范作用,则小农户的信贷意愿会增加,继而潜在的信贷需求增加。由此可得:

假设3:农地确权通过提高土地的安全性而促进了农业长期投资,进而提高了小农户的信贷需求意愿和信贷可得性。

1.2 机理分析:基于农地流转的角度

在一个自由竞争的市场里,假定存在一家金融机构(贷款供给主体)与若干户农户家庭(贷款需求主体),作为贷款需求主体的农户家庭是谋求收入最大化的,农户家庭除土地确权存在不同以外,其余都是同质的,即农户家庭风险中性,都拥有初始财富额度 W 。假定农户面临投资额度为 T 元的投资选择,投资所需资本超出其初始财富额度 ($T > W$),需要从金融机构借款 C 元,贷款利率为 r ,需要以价值为 V_{cl} (cl 表示抵押土地)的土地作为抵押。投资成功的概率为 p ,成功则能够获得收益 G (Y);投资失败的概率为 $1-p$,失败则收益为 0 , V_{tl} (tl 表示流转土地)是流转土地产生的资金量,土地转入时 $V_{tl} < 0$,土地转出 $V_{tl} > 0$ 。土地转入需要资金支付租金和投资的金额,而土地转出获得租金收入。以 Cobb-Douglas 函数形式表示农业生产过程^[28-29],则:

$$\begin{aligned} G &= AL^\alpha T^\beta D^\gamma \\ \text{s. t. } T &= W + C + V_{tl} \\ A > 0, L > 0, W > 0, C > 0, 0 < \alpha < 1, \\ 0 < \beta < 1, 0 < \gamma < 1 \\ \alpha + \beta + \gamma &= 1 \end{aligned} \quad (1)$$

式中: A 表示农户现有生产能力; L 表示劳动力数量(假定不考虑雇佣劳动力),因为农户家庭劳动力数量短期不会有变化,而且农地确权并非农户是否从事非农就业的原因,因此土地确权并不影响 L ,故假定 L 不变。 D 是农户的种植面积,会因为土地的转出转入发生变化。于是对于农户来说,预期收益为:

$$B = [AL^\alpha T^\beta D^\gamma - (1+r)C]p + (-V_{cl})(1-p) \quad (2)$$

作为贷款供给主体的金融机构在预期利润为正的前提下,提供贷款。目前我国的农村信贷市场是卖方市场,金融机构持有大量的资金缺乏贷出路径。假如抵押土地都取得了土地确权颁证,则金融机构

的预期利润 R_f 应该为:

$$R_f = [(1+r) - (1+i)]Cp + [\theta_1 V_{cl} - (1+i)C - \theta_2](1-p) \quad (R_f > 0) \quad (3)$$

$$R_f = (r-i)Cp + [\theta_1 V_{cl} - (1+i)C - \theta_2](1-p) \quad (R_f > 0) \quad (4)$$

其中: i 是金融机构发放贷款的成本, θ_1 ($0 < \theta_1 < 1$) 为处置抵押土地的变现率, θ_2 ($\theta_2 > 0$) 为土地抵押贷款下存在的固定交易成本,小农户的贷款额度可能 $< \theta_2$ 。上述非线性规划问题可描述为:

$$\begin{aligned} \text{Max}_D & [AL^\alpha T^\beta D^\gamma - (1+r)C]p + (-V_{cl})(1-p) \\ \text{s. t. } & (r-i)Cp + [\theta_1 V_{cl} - (1+i)C - \theta_2](1-p) \geq 0 \end{aligned} \quad (5)$$

构造拉格朗日函数:

$$L = [AL^\alpha T^\beta D^\gamma - (1+r)C]p + (-V_{cl})(1-p) + \lambda \{ (r-i)Cp + [\theta_1 V_{cl} - (1+i)C - \theta_2](1-p) \} \quad (6)$$

由 KKT 条件可得:

$$\begin{aligned} \frac{\partial L}{\partial C} &= \beta AL^\alpha T^{\beta-1} D^\gamma p - (1+r)p + \lambda \{ (r-i)p + [-(1+i)](1-p) \} = 0 \end{aligned} \quad (7)$$

$$\begin{aligned} \frac{\partial L}{\partial \lambda} &= (r-i)Cp + [\theta_1 V_{cl} - (1+i)C - \theta_2](1-p) \\ (1-p) &\geq 0 \end{aligned} \quad (8)$$

$$\begin{aligned} \lambda \{ (r-i)Cp + [\theta_1 V_{cl} - (1+i)C - \theta_2](1-p) \} &= 0 \quad \lambda \geq 0 \end{aligned} \quad (9)$$

可推出农户最优贷款计划为:

$$C^* = \left[\frac{(1+r)p\theta_1 + (1+i)(1-p) - (r-i)p}{pA\beta L^\alpha D^\gamma \theta_1} \right]^{\frac{1}{\beta-1}} - \frac{W - V_{cl}}{p} \quad (10)$$

确权使土地转让的交易费用降低,转出收入增加。农地抵押贷款时,土地处置的变现率提高。确权强化了土地收益的内部化,农户投资增加。

η_1 是土地确权颁证时的土地变现率, η_2 是土地没有确权颁证时的土地变现率,并假设 $0 < \eta_2 < \eta_1 < 1$ 。假定农户所抵押的土地取得土地确权颁证比率为 σ ,则 $\theta_1 = \eta_1 \sigma + \eta_2 (1-\sigma)$ 。此时,金融机构的预期利润 R_f 和农户的预期收益 B 可改写为如下形式:

$$R_f = (r-i)Cp + [\theta_1 V_{cl} - (1+i)C - \theta_2](1-p) \quad (11)$$

$$\begin{aligned} R_f - (r-i)Cp + (1+i)C(1-p) + \theta_2(1-p) &= \theta_1 V_{cl}(1-p) \end{aligned} \quad (12)$$

$$V_{cl} = \frac{(1+i)(1-p)C + \theta_2(1-p) - (r-i)Cp + R_f}{\theta_1(1-p)} \quad (13)$$

$$B = [AL^a(C+W+V_{cl})^\beta D^\gamma - (1+r)C]p - \frac{(1+i)(1-p)C + \theta_2(1-p) - (r-i)Cp + R_f}{[\eta_1\sigma + \eta_2(1-\sigma)](1-p)} (1-p) \quad (14)$$

$$B = [AL^a(C+W+V_{cl})^\beta D^\gamma - (1+r)C]p - \frac{(1+i)(1-p)C + \theta_2(1-p) - (r-i)Cp + R_f}{[\eta_1\sigma + \eta_2(1-\sigma)]} \quad (15)$$

由一阶条件 $\partial B/\partial C = 0$, 推出该类农户最优贷款计划为:

$$C^{**} = \left[\frac{(1+r)p[\eta_1\sigma + \eta_2(1-\sigma)] + (1+i)(1-p) - (r-i)p}{pA\beta L^a D^\gamma [\eta_1\sigma + \eta_2(1-\sigma)]} \right]^{\frac{1}{\beta-1}} - W - V_{cl} \quad (16)$$

式(10)中: $\theta_1 = \eta_1, \sigma = 1, C^*$ 是抵押土地全部确权的情况下农户的最优贷款量, 而 C^{**} 是部分土地确权情况下农户的最优贷款量, 比较农地确权的信贷效应, 将式(16)与式(10)相除得到:

$$0 < \frac{C^{**}}{C^*} < 1 \quad (17)$$

从式(17)可知: 1) 土地确权颁证通过信贷需求和供给路径使农户的信贷可得性提高。2) 在传导路径中土地持有量 D 和信贷可得 C 正相关, 小农户面对土地持有量少, 在固定交易成本 θ_2 面前, 确定了其弱势地位。3) 农地流转关系到农地的变现率、定价、信贷需求、贷款交易成本等一系列问题, 成为确权的信贷效应的核心环节。土地转入时 $V_{cl} < 0$, 贷款额度增加; 土地转出 $V_{cl} > 0$, 贷款额度减少。土地流转市场的发展对小农户确权的信贷效应具有促进作用。

2 双稳健估计方法的平均处理效应估计结果和分析

2.1 双稳健估计方法的平均处理效应模型

本研究的数据来自非实验数据, 非实验数据的干预政策评估问题是微观计量经济学的最重要的问题之一。非试验数据难以避免考察对象的异质性和自选择问题, 农户基于本身不同特质而非政策干预进行的不同选择对评估政策影响产生了干扰, 从而使估计出来的政策影响有偏, 错误的政策影响评估对于干预政策的优化起到了干扰作用。因此解决农户的异质性和自选择问题变得异常重要, 目前解决该问题的办法主要有 PSM (Propensity matching score), DID (Difference in difference) 和 DR (Doubly robust estimation 双稳健方法) 等, PSM 因为只设定了一个干预模型, 在干预模型设定错误的情况下, 不可避免地产生有偏误的估计结果。DID 无法解决

随时间变化的变量对估计结果的内生性影响, 而且要求面板和重复截面数据的支持, 对数据的要求高。双稳健方法 (DR) 是逆概率加权的回归调整方法 (The inverse probability weighting estimator with regression-adjustment, IPWRA) 和增广的逆概率加权方法 (The augmented inverse probability weighting estimator, AIPW) 的统称。双重稳健性来自于 IPWRA 和 AIPW 都同时设定了干预模型和结果模型, 干预模型用于匹配样本, 而结果模型用于确定匹配后的反事实结果。由于加权项或偏差修正项的加入, 使 DR 方法在其中一个模型设定错误的情况下, 也可以获得一致性的因果分析结果^[30]。

IPWRA 是逆概率加权估计方法 (The inverse probability weighting estimator, IPW) 和回归调整方法 (The regression-adjustment, RA) 的结合。IPW 估计方法只有干预模型, 没有结果模型, 使用干预模型计算出来的概率 (p_i) 作为权数去计算干预政策的平均处理效应, 即用 $\frac{1}{p_i}$ 对确权的农户的干预

结果进行加权, 而用 $\frac{1}{(1-p_i)}$ 对没有确权的农户的干预结果进行加权。这样确权农户的加权值变小, 而不确权农户的加权值变大, 平衡了结果模型, 获得了干预政策的处理效应。RA 没有干预模型, 只有结果模型, 缺乏倾向匹配得分过程, 采用单个协变量匹配, 依据结果模型获得反事实结果, 进行处理效应的衡量。IPWRA 结合了 IPW 和 RA 的优势, 同时设定了干预模型和结果模型, 使用干预模型的倾向匹配得分对来自 RA 的结果进行加权调节。

AIPW 估计方法在设定干预模型和结果模型的同时, 又加入了一个偏差修正项, 如果干预模型设定正确, 这个偏差修正项等于 0。如果干预模型设定错误而结果模型设定正确, 则偏差修正项可以修正

这个错误,使结果更加稳健。因为这个特点使 AIPW 在结果模型或干预模型设定错误时,可以获得比 IPWRA 更好的结果^[31]。本研究运用 stata 软件,选择 AIPW 方法分析农地确权的信贷效应,以农地确权作为干预政策,以信贷可得性和信贷意愿作为政策影响进行评估,以农村的土地市场的制度创新带动信贷市场的匹配。

2.2 实证研究设计

基于双稳健估计方法的平均处理效应的思想,实证分析是这样设计的:

第一步,我们运用 logistic 模型设定确权和确权情况下的结果模型 $O_{1i}(x_i)$ 和 $O_{0i}(x_i)$, 结果模型的被解释变量为信贷意愿(Loanw)和贷款可得性(Loana)。而结果变量农业长期投资(Ainvest)设定了多元线性回归模型。协变量包括农户人口特点,经济特点和地理位置特点(变量定义见表1):

$$O_i^{\text{Loana}}(x_i^{\text{Loana}}) = \alpha_0 + \alpha_1 \text{Laborr}_i + \alpha_2 \text{Junior}_i + \alpha_3 \text{Highs}_i + \alpha_4 \text{Aland}_i + \alpha_5 \text{Aincome}_i + \alpha_6 \text{Relative}_i + \alpha_7 \text{Insurance}_i + \alpha_8 \text{Transport}_i + \epsilon_i^{\text{Loana}} \quad (18)$$

$$O_i^{\text{Loanw}}(x_i^{\text{Loanw}}) = \beta_0 + \beta_1 \text{Laborr}_i + \beta_2 \text{Junior}_i + \beta_3 \text{Highs}_i + \beta_4 \text{Aland}_i + \beta_5 \text{Aincome}_i + \beta_6 \text{Relative}_i + \beta_7 \text{Insurance}_i + \beta_8 \text{Transport}_i + \epsilon_i^{\text{Loanw}} \quad (19)$$

$$O_i^{\text{Ainvest}}(x_i^{\text{Ainvest}}) = \gamma_0 + \gamma_1 \text{Income}_i + \gamma_2 \text{Parcel}_i + \gamma_3 \text{Foodc}_i + \gamma_4 \text{Cashc}_i + \gamma_5 \text{Relative}_i + \gamma_6 \text{Transferin}_i + \gamma_7 \text{Vcadre}_i + \gamma_8 \text{Labor}_i + \gamma_9 \text{Junior}_i + \gamma_{10} \text{Highs}_i + \gamma_{11} \text{Aland}_i + \gamma_{12} \text{Aincome}_i + \gamma_{13} \text{Iland}_i + \gamma_{14} \text{Transport}_i + \epsilon_i^{\text{Ainvest}} \quad (20)$$

第二步,干预政策是农地确权,农户境况可分为农地确权和没有确权。干预模型设定为 logistic 模型,协变量包括农户人口、经济、地理位置特点等。

$$T_i(x_i^{\text{Title}}) = \varphi_0 + \varphi_1 \text{Relative}_i + \varphi_2 \text{Vcadre}_i + \varphi_3 \text{Aincome}_i + \varphi_4 \text{Laborr}_i + \varphi_5 \text{Insurance}_i + \varphi_6 \text{Land}_i + \varphi_7 \text{Economy}_i + \epsilon_i^{\text{Title}} \quad (21)$$

第三步,用来自式(21)的概率对式(18)~(20)的条件均值进行逆概率加权。权数 $1/T_i(x_i)$ 是对农户的确权状态 $D_i = 1$ 进行加权,而权数 $1/[1 - T_i(x_i)]$ 是对农户的非确权状态 $1 - D_i$ 进行加权, N 是总体样本数(以结果变量是连续变量 Ainvest 为例):

$$\min \sum_{i=1}^N \{D_i [(y_i - O_{1i}(x_i))]^2 / T_i(x_i) + (1 - D_i) [(y_i - O_{0i}(x_i))]^2 / [1 - T_i(x_i)]\} \quad (22)$$

$$\min \sum_{i=1}^N \{D_i [(y_i - O_{1i}(x_i))]^2 / T_i(x_i) + (1 - D_i) [(y_i - O_{0i}(x_i))]^2 / [1 - T_i(x_i)]\} \quad (23)$$

最终得到农地确权对农户信贷需求、信贷可得性和农户投资的影响。我们将报告总体平均效应(Average treatment effect, ATE), ATE 是对总体样本平均处理效应的估计结果,样本中既包括确权农户,也包括没有确权农户,两组样本的反事实的结果同样都是通过 PSM 确定^[30,32]

$$\hat{ATE} = 1/N \sum_{i=1}^N [O_{1i}(x_i) - O_{0i}(x_i)] \quad (24)$$

2.3 数据来源和描述

数据来自 2015 年按照分层抽样的方法对中国华南、华中、东北、西北的广东、江西、贵州、河南、江苏、宁夏、辽宁、山西和四川 9 个省份, 67 个市, 578 个村的农户进行的随机的问卷调查, 收回有效样本 2 704 份。《第三次全国农业普查方案》中规定, 种植业规模农户是在一年一熟地区持有 6.67 hm² (100 亩) 及以上耕地, 一年两熟或以上地区持有 3.34 hm² (50 亩) 及以上耕地的农户, 而少于这个亩数的为小农户。根据各省的熟制, 即宁夏和辽宁省(自治区)为一年一熟, 江西、贵州、河南、江苏、山西和四川省为一年两熟或两年三熟, 广东为一年两熟或三熟, 选取一年一熟省份持有 6.67 hm² (100 亩) 以下耕地, 一年两熟或以上省份持有 3.34 hm² (50 亩) 以下耕地的种植业小农户样本进行分析。

数据描述依据本研究的变量分类进行, 本研究选取的变量分为干预变量、结果变量和协变量三大类:

1) 干预变量为农地确权。样本中 53.96% 的农户的土地已确权, 46.04% 的农户的土地未获得确权颁证。

2) 结果变量包括信贷意愿, 信贷可得性和农业长期投资。样本总体中有信贷意愿的农户占 29.99%, 确权农户中有信贷意愿的农户占 32.71%, 非确权农户中有信贷意愿的农户只占 26.80%。样本总体中 19.44% 的农户持有正规金融机构的贷款, 确权农户中 20.73% 持有正规金融机构的贷款, 没有确权的农户中却只有 17.92% 持有贷款。本研究以小农户对粮食作物和经济作物的农机具和设施的投资作为农业长期投资的代理变量, 平均长期农业投资为 0.57 万元(见表 1)。

3) 协变量包括家庭人口特点, 社会资本, 家庭经济变量和外部变量。家庭人口特点包括教育水平, 家庭劳动人口比例和专门从事农业生产的人口数。

对于社会资本变量本研究用家里亲戚朋友情况(Relative)、家人是否是村干部或做过村干部(Vcadre)来表示。家庭经济变量用农户家庭承包耕地的面积(Aland)、农户家庭收入中农业收入所占的比重(Aincome)、闲置土地的面积(Iland)、是否购

买了农业保险(Insurance)等作为代理变量。外部变量用农户所在县的经济发展水平在本省所处的水平、农户所在村的交通条件作为农户所处的外部环境的代理变量,用以控制外部环境对农户行为产生的影响。

表1 变量含义表

Table 1 Variable definition

变量 Variable	定义 Definition	均值 Mean	标准差 SE	最小值 Minimum	最大值 Maximum
被解释变量 Dependent variable					
信贷可得性 Loana	农户获得了金融机构的贷款(是=1, 否=0)	0.194 4	0.395 8	0	1
信贷意愿 Loanw	农户还想获得金融机构的贷款(是=1, 否=0)	0.299 9	0.458 3	0	1
农业长期投资 Ainvest	农户用于经济作物和粮食作物的农机具和装备的价值(万元)	0.571 4	2.055 1	0	40
农地确权 Title	农户农地确权(是=1, 否=0)	0.539 6	0.498 5	0	1
人口特点 Demography					
初中及以下教育水平 Junior	农户家中劳动力具有初中及以下文化水平的人数	2.259 4	1.290 1	0	20
高中及以上教育水平 Highs	农户家中劳动力具有高中及以上文化水平的人数	0.807 5	1.024 3	0	7
劳动力比率 Laborr	农户家庭劳动力人数/家庭人口	0.725 1	0.253 8	0	6
劳动力数量 Labor	农户家庭劳动力总数	3.117 1	1.322 7	0	20
农业劳动力 Farm	农户家庭劳动力中专门从事农业生产的人数	1.046 5	1.052 0	0	16
社会关系 Social relationship variable					
亲戚朋友 Relative	农户家里亲戚朋友很少(是=1, 否=0)	0.056 5	0.230 9	0	1
村干部 Vcadre	家里有人做或做过村干部(是=1, 否=0)	0.703 8	0.456 7	0	1
经济变量 Economy variable					
耕地 Aland	农户家里承包耕地的面积/hm ²	0.402 1	0.498 2	0	5.333 3
耕地的块数 Parcel	农户家里承包耕地的块数/块	4.668 4	3.597 7	0	20
农业收入 Aincome	农户家庭收入中农业收入所占的比重	36.534 8	33.106 1	0	100
收入水平 Incomec	您家收入水平要比村子里其他农户高很多	0.011 1	0.105 0	0	1
闲置农地 Iland	农户家中闲置土地的面积(hm ²)	0.002 6	0.012 0	0	0.302 4
农业保险 Insurance	农户家中是否购买农业保险(是=1, 否=0)	0.215 2	0.411 0	0	1
粮食作物 Foodc	家中是否种粮食作物(是=1, 否=0)	0.772 2	0.419 5	0	1
经济作物 Cashc	家中是否种经济作物(是=1, 否=0)	0.367 6	0.482 2	0	1
转入农地 Transferin	家中是否转入土地(是=1, 否=0)	0.120 6	0.325 7	0	1
位置变量 Location variable					
经济水平 Economy	农户所在县的经济发展水平在本省处于最低水平(是=1, 否=0)	0.061 7	0.240 6	0	1
交通状况 Transport	农户所在村的交通条件很好(是=1, 否=0)	0.071 7	0.258 1	0	1

2.4 双稳健估计方法的平均处理效应分析

2.4.1 干预模型的合理性分析

根据研究设计的步骤,本研究将调研的农户数据分为干预组(确权农户)和控制组(非确权农户),对于干预组(或控制组)在没有确权时(或确权时)的信贷意愿、农业投资和信贷可得的反事实情况,依据协变量计算出倾向匹配得分(条件概率),在控制组(或干预组)中找到具有相近倾向匹配得分的农户进行配对比较。干预模型(式(21))的回归结果(见表2)显示,农地是否确权受农户是否购买保险和当地经济状况的显著影响。购买了农业保险的农户确

权的可能性高于没有购买农业保险的农户,而农户所在县的经济水平在本省低的农户和其他地方的农户相比更趋向于没有确权。农业保险是村镇、县、乡等干部的工作能力、对中央政府政策的推行力度和农户的支持力度的代理变量,而农地确权作为中央政府的政策,需要各级干部的落实和农户的配合。因此地方领导对中央政策的推行力度和能力,以及农户对此积极的应对态度,对农地确权具有正向影响。而经济较发达的农村农地确权的可能性越大,说明了这一政策选取试点时是具有倾向性的。这一点可以从农业部等部门就农地确权试点地区确定条件的文件中可以看出。

根据表2的倾向匹配得分的结果进行匹配,并分析平均处理效应前需要对协变量的选取是否正确,控制组和干预组的共同取值范围是否足够,控制组和干预组的差异是否过大等问题进行检验。匹配后数据平衡的结果显示(见表3),调整后的大部分标准化偏差(The standardised percentage bias)在10%以下,证明匹配后数据是平衡的。进一步的偏差 t 检验的结果是接受原假设,证明了确权的干预组和非确权的控制组无系统性差异(见表3)。

共同取值范围的验证结果显示(图1),数据中大部分观察值都在共同取值范围内,在进行倾向得分匹配时损失的样本很少,符合倾向匹配得分方法对大数据的要求。以上的事实都证明干预模型的协变量的选取符合平均处理模型分析所需的假定条件,可以进行影响分析。

2.4.2 农地确权对小农户信贷可得性的影响:资产的信号效应与抵押效应

将式(21)得出的概率进行逆概率加权并加入一个偏差修正项,得到AIPW估计结果。回归结果显示确权小农户的信贷可得性超出没有确权小农户3.09%(见表4)。农地确权通过产权分割,在保证农地集体所有的前提下确定了农户对农地的承包经营权,使其拥有了农地的财产权,成为农户向金融机构传递还款能力的信号。财产权因为可以流通变现并具有收益权而成为金融机构合格的抵押品,可以使小农户因此获得农地抵押贷款。信贷可得性是信贷需求和信贷供给均衡的结果,在我国农村长期信贷限制的情况下,确权小农户的信贷可得性超出没有确权小农户,说明确权的信号作用和抵押作用存在。

表2 农地确权的影响因素

Table 2 Determinants of land title

变量名 Variable	农地确权(稳健标准误) Land title (Robust SE)
劳动力比率 Laborr	0.127 4 (0.152 4)
农业收入 Aincome	-0.000 6 (0.001 2)
村干部 Vcadre	-0.090 0 (0.086 5)
亲戚朋友 Relative	-0.025 8 (0.167 6)
农业保险 Insurance	0.698 5*** (0.099 6)
经济水平 Economy	-0.372 2*** (0.164 3)
耕地 Aland	0.004 2 (0.005 5)
常数项 Constant	0.005 3 (0.139 1)
观察值 Observations	2 691
P 值 Prob>chi ²	0.000 0

注:***表示显著性低于1%,**表示显著性低于5%,*表示显著性低于10%。表4和6同。

Note: *** represents significance below 1%; ** represents significance below 5%; * represents significance below 10%. The same in Tables 4 and 6.

表3 匹配后的数据平衡检验
Table 3 Data balance test after matching

变量名 Variable	匹配 Matching	标准化偏差% Bias	t 检验 t test	
			t 统计量 t statistic	P 值 P value
劳动力比率	Unmatched	5.0	1.28	0.200
Laborr	Matched	-0.8	-0.21	0.834
农业收入	Unmatched	-0.3	-0.08	0.932
Aincome	Matched	3.2	0.86	0.392
村干部	Unmatched	-3.3	-0.84	0.399
Vcadre	Matched	0.0	0.00	1.000
亲戚朋友	Unmatched	-0.7	-0.17	0.865
Relative	Matched	4.2	1.18	0.238
农业保险	Unmatched	27.6	7.08	0.000
Insurance	Matched	1.4	0.34	0.736
经济水平	Unmatched	-6.5	-1.70	0.089
Economy	Matched	2.0	0.58	0.559
耕地	Unmatched	4.2	1.09	0.277
Aland	Matched	-1.7	-0.44	0.662

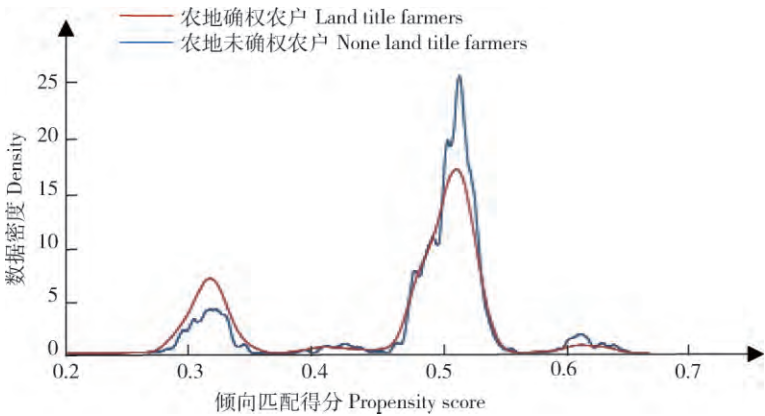


图1 倾向得分的共同取值范围
Fig. 1 Common support area of propensity score

从小农户获得金融机构贷款的方式(有些农户可能使用过多种抵押品形式,见表5看出,不设置抵押品的贷款和房屋抵押贷款是目前小农户获得金融机构贷款的主要形式。农房抵押贷款是目前央行鼓励各金融机构发放的主要的抵押贷款形式,具有政策引导作用,是目前农村金融创新的主要内容。农房因为仅限本村居民买卖而缺乏流动性,很多地方正在推进农房使用权抵押贷款,利用农房租赁收入抵押贷款,

这种形式更类似于未来收入流的变现。而农地抵押贷款,包括农地承包权和经营权抵押贷款,因为农地市场的不完善,限制了农地的流动性,目前还没有大规模开展,只有4.35%的占比,所以确权的信号传递效应在确权的信贷效应中起了主导作用。综上所述,假设1和2成立,即农地确权能够通过资产的信号传递而提高小农户的信贷可得性,而农地确权在通过抵押效应提高小农户信贷可得性的效果是有限的。

表 4 农地确权对小农户的影响
Table 4 Impact of land title for small farmers

变量名 Variable	信贷意愿 (稳健标准误) Loan willingness (Robust SE)	贷款可得性 (稳健标准误) Loan availability (Robust SE)	农业长期投资 (稳健标准误) Agricultural long term investment (Robust SE)
农地确权与没有确权的农户对比 Comparing land title and none land title farmers	0.056 6*** (0.017 5)	0.030 9** (0.015 1)	0.294 3** (0.130 5)
没有确权农户的平均值 Mean value of none land title farmers	0.268 1*** (0.012 7)	0.177 3*** (0.011 0)	7.390 0*** (0.102 8)
观察值 Oberservations	2 165	2 165	495

表 5 小农户贷款的抵押品分布
Table 5 Distribution of loan collateral of small farmers
%

抵押品 Collateral	分布 Distribution
无抵押 None	31.95
房屋 House	41.35
宅基地 Homestead	14.54
固定资产 Fixed assets	9.56
农作物 Crops	1.40
农业订单 Agricultural order	0.60
农地承包权 Land contract right	3.59
农地经营权 Land management right	0.80
存单质押 Deposit receipt pledge	5.20
其他抵押 Others	16.14

2.4.3 确权通过农业投资对小农户的信贷意愿的影响

回归结果显示确权的小农户和没有确权的小农户相比具有更高信贷意愿,超出 5.66%(见表 4)。农地确权是通过农业长期投资的增加和信贷可得性的增加而增加了小农户的信贷意愿。农地确权对农户的长期投资会有影响^[1-3],土地安全性低会阻碍农业投资。拥有土地的期限越长,越有利于投资,所有权比其它权利更有利于农业投资的增加^[2]。用小农户家中用于经济作物和粮食作物的农机具和装备的

表 6 小农户潜在的信贷需求的影响因素
Table 6 Determinants of potential credit
demand of samll farmers

变量名 Variable	小农户潜在的信贷需求 (标准误) Potential credit demand of samll farmer (SE)
农业投资 Ainvest	0.239 2* (0.129 1)
劳动力比率 Laborr	-0.408 4 (0.257 6)
初中及以下教育水平 Junior	0.048 7 (0.047 6)
高中及以上教育水平 Highs	0.113 4* (0.060 8)
农业收入 Aincome	0.001 0 (0.001 9)
亲戚朋友 Relative	-0.556 6** (0.277 4)
农业保险 Insurance	0.262 2* (0.141 9)
交通状况 Transport	0.436 6 (0.280 6)
常数项 Constant	-2.197 3** (0.862 1)
观察值 Observations	621
模型显著性检验的 P 值 P value of significance of model	0.000 5

价值表示小农户长期投资的价值,回归结果显示(见表4)确权的小农户和没有确权的小农户相比,长期投资显著增加,说明确权的长期投资效应同样适用于小农户。我国小农户对于农机具和装备的自家拥有的比例显著高于来自社会化服务这一渠道。平均68.29%的小农户的粮食作物的农机具和装备来自自家拥有,22.09%来自个体户服务,和其他人共同拥有占6.40%,来自农业企业占0.05%,来自专业服务队占3.18%。这一点可以证明代理变量选取的合理性。长期投资增加后,小农户的信贷意愿是否增加?从表6对小农户的信贷意愿影响因素的分析中可知,在剔除了亲朋好友的非正规金融后,投资增加仍能够提高农户对金融机构的信贷意愿。

确权农户信贷可得性的增加,产生了示范作用,成为确权农户信贷意愿大于非确权农户的另一个原因。信贷意愿做为潜在的信贷需求,在小农户克服自我排斥和风险排斥,金融机构减少繁杂的贷款手续、关系贷款和抵押品设置的情况下,潜在的信贷需求可以成为有效的信贷需求,从而在金融机构增加信贷供给的情况下,提高农户的信贷可得性,形成良性循环。由此可知,假设3得到了验证,即农地确权通过土地安全性的提高而促进了投资,进而提高小农户的潜在的信贷需求,并促进小农户信贷可得性的提高。

3 结论和政策建议

新一轮的农地确权,为土地市场的变革传递到金融市场,实现农户金融行为的改变,提供了制度基础。小农户在这场变革中,是否因其农地规模小面临市场出清的弱势地位?本研究证明小农户的土地安全性的提高增加了小农户的农业长期投资,从而提高了信贷意愿。小农户的财产权增加,并拥有了可以流转的大额财产,本身传递了还款可能性增加的信号,使小农户的可贷性增强,并可将农地作为抵押品获得农地抵押贷款,最终小农户信贷可得性因农地确权而提高。但农地的信号传递作用大于抵押作用。

土地产权改革是农村生产力增长的关键因素。如果公共政策能够增强个人土地产权的安全性,则可以促进经济增长和收入平等。但必须使产权改革放松小农户在投资和生产提高上的限制。否则产权改革必然令人失望,只能使大农户获得权力。信贷限制是小农户在投资和生产提高上的限制,打破恶

性循环需要进一步的制度和组织创新。因此本研究建议:

1)提高农地财产权的价值,需要加快土地流转的制度创新和组织创新。小农户的细碎的土地分布特征和信息特点,使农地的信号作用远远大于抵押作用,而信号作用的增强,需要农地流动性的加强,使市场获得土地的定价和价格的实现。

2)小农户农地抵押贷款的破局,需要农地合作社、土地协会等第三方组织的参与。农地抵押贷款的市场型交易费用和管理型交易费用的存在产生了金融机构的沉没成本,在交易费用和有限理性背景下^[33],通过组织的参与降低交易费用是必要的。特别是小规模农地的抵押贷款在存在固定交易费用的情况下,更需要组织创新降低交易费用。第三方组织的参与能够在小农户和金融机构之间通过合约的重组、信息流的获取、违约农户土地流通的实现而降低交易费用。即使正规农地市场发展,农地流动性增强,小农户的农地抵押贷款也需要组织参与来解决地块小和分散而面临的流动性差,以及额度小和交易费用高的问题。如何通过组织创新和合约重组降低交易费用是本研究后续的研究内容。

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阅读与赏析

科技金融创新协同发展路径分析/马克思经济思想当代价值的再探索/乡村振兴战略下农业产业化发展对农户的影响

传统金融与数字普惠金融的减贫增收效应:差异性与互补性

姜美善, 梁泰源

(华南农业大学 经济管理学院, 广东 广州 510642)

摘要:金融科技对传统金融的深度赋能具有重要价值和广阔前景,为农村居民减贫增收注入了新动能。运用2011—2021年中国290个城市的面板数据,实证检验传统金融与数字普惠金融对农村居民收入的影响。结果表明:传统金融没有发挥出应有的服务效能,其对农村居民收入的影响比较微弱;数字普惠金融显著促进了农村居民收入增长,其增收效应远远大于传统金融,其使用深度和数字化程度具有显著的增收效应,但其覆盖广度的影响并不显著;传统金融与数字普惠金融在促进农村居民增收方面存在协同互补关系,传统金融发展对数字普惠金融的减贫增收产生了正向调节效应;传统金融与数字普惠金融的农村居民收入效应具有非线性 and 阶段性特征,且随着经济发展水平和城镇化水平的提高呈阶梯式上升趋势。数字普惠金融显著弱化了门槛效应约束,增收效应相比传统金融具有绝对优势。因而应大力推动传统金融数字化转型,促进两种金融模式协调互动,以助力农村居民收入增长和共同富裕的顺利实现。

关键词:传统金融;数字普惠金融;农村居民收入;减贫增收;协同互补

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一、引言

当前我国贫困治理的重心已从消除绝对贫困转向缓解相对贫困。据测算,2017年全国、农村和城镇的相对贫困发生率分别为28.31%、53.83%和10.22%(汪晨等,2020)^[1],农村地区的相对贫困比城市地区更为严重。相比于恩格尔系数、人均消费支出、贫困发生率等指标,农村居民收入水平偏低是农村相对贫困问题的直观表达和症结所在。在贫困农户既是生产者又是消费者的情况下,任何收入的增加均将减少贫困(Abraham,2018)^[2]。根据国家统计局数据,我国城乡居民收入比常年高于2,意味着农村居民收入水平不及城镇居民的50%^①。如果城乡收入分配不平等格局长期存续,收入分配领域的

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■作者简介:姜美善(1972-),女,吉林和龙人,华南农业大学经济管理学院副教授,博士;梁泰源(2000-)(通讯作者),男,广东江门人,华南农业大学经济管理学院研究生。

①参见:国家统计局官网, <http://www.stats.gov.cn/sj/>。

矛盾和风险将不断积累,对经济发展、社会稳定、居民福利和健康将产生严重的负面影响(Bourguignon和Morrisson,1998;Gustafsson等,2008)^[3-4],甚至可能使国家滑向“中等收入陷阱”(陈宗胜,2020)^[5]。农村居民收入作为一个重要的统计指标,不仅可以全面反映农村居民的经济能力、福利水平和生活质量,而且为农村返贫风险动态监测提供了重要的判断依据。2022年国务院印发的《“十四五”推进农业农村现代化规划》指出,农业农村发展面临促进农民持续增收存在较大压力、巩固拓展脱贫攻坚成果任务比较艰巨的现实挑战。《中共中央 国务院关于做好2023年全面推进乡村振兴重点工作的意见》再次强调,要巩固拓展脱贫攻坚成果,拓宽农民增收致富渠道。在这一背景下,对后扶贫时代农村居民增收难题进行理论与实证研究,符合当前我国巩固和扩大脱贫攻坚成果的需要,对构建共同富裕的长效支持机制也具有重要意义。从贫困治理到共同富裕,是中国式现代化的重要特征,也是一个遵循经济社会发展规律的循序渐进的科学过程。因此,如何促进农村居民收入增长,有效治理相对贫困,进而完成共同富裕的阶段性目标,成为新时期我国面临的重大时代课题。

农村居民收入水平低是由多重原因造成的。公共卫生服务、人力资本、地理条件和劳动力流动等均是重要影响因素(Yang等,2022;Sun等,2022;Wang等,2020;刘一伟,2018)^[6-9];此外,金融发展水平低、金融市场不完善也是重要诱因(胡宗义等,2014;孙玉奎等,2014)^[10-11]。2023年10月,国务院发布《关于推进普惠金融高质量发展的实施意见》,明确提出要积极推动数字普惠金融在农村地区的发展,提高农村基础金融服务的覆盖面和保障能力。当前,金融科技的前沿颠覆性底层技术,如大数据、云计算、人工智能、区块链等对传统金融的高效赋能,推动传统金融行业迎来了数字化转型升级的历史机遇期。金融创新旨在增加以农民为代表的弱势群体获得金融服务的机会,以此作为一种适应性战略(Benson,等2012)^[12]。数字普惠金融的出现能否助力农村居民收入增长,缓解农村相对贫困?未来,数字普惠金融是全面替代传统金融还是与传统金融深度合作、发挥减贫增收的协同互补效应?这些问题值得深入思考,对于未来金融发展规划的制定和共同富裕的实现具有深远意义。

从传统金融向数字普惠金融演变和进化,为社会总体福利的改善尤其是居民收入增加带来了全新契机。不同金融模式的经济社会绩效会因为资源配置方式的改变和服务对象的调整而发生较大变化,因此,传统金融与数字普惠金融对经济社会的诸多影响均具有差异性,但当前对于传统金融与数字普惠金融的收入效应的比较研究较少,也缺乏对数字普惠金融与传统金融部门之间关系的深入研究。明晰不同金融模式在某一领域的差异和互动关系,有助于深化对金融发展规律和相关金融理论的认识,也是科学谋划金融发展策略以实现经济社会发展目标的关键。因此,本研究的目标是:(1)研究传统金融与数字普惠金融对农村居民收入的影响,并比较两者的收入贡献差距;(2)确定传统金融与数字普惠金融在收入效应上的“互补—替代”关系;(3)检验传统金融与数字普惠金融对农村居民收入影响的结构性差异和阶段性特征,并提供合理解释。

本文的边际贡献和创新性主要体现在:第一,在数字经济高速发展背景下,通过比较分析重新理顺了金融发展与居民收入之间的逻辑关系,并以促进农村居民收入增长的功能性视角,对传统金融与数字普惠金融的关系进行了有益探索。第二,聚焦于金融的收入效应,运用熵值法构建传统金融指数并与北京大学数字普惠金融指数相匹配,实证检验传统金融与数字普惠金融对农村居民收入的差异化影响,并揭示两者的“互补—替代”关系,明晰了两者在收入分配领域的服务效能、效力差距和相互关系。第三,分别以人均GDP、城镇化率作为门槛变量,通过多视角门槛效应检验,揭示了传统金融与数字普惠金融对农村居民收入的非线性影响和阶段性特征,为探讨金融创新的经济绩效提供了全新视角。

二、文献综述、理论分析与研究假设

(一) 传统金融发展与农村居民收入

关于传统金融对农村居民收入的影响, 主流研究存在正反两派观点。第一种观点是“金融促进论”。Geda 等(2008)^[13]基于埃塞俄比亚的数据研究, 发现信贷、储蓄等金融服务的改善显著提高了低收入人群的收入水平, 促进了消费平滑, 增进居民福利, 降低了落入贫困陷阱的概率; 苏基溶和廖进中(2009)^[14]指出, 金融发展能够同时改善效率与公平, 在收入总量增长效应和收入不平等收敛效应的双重作用下, 最终提高了贫困家庭的收入水平; 张荣(2017)^[15]认为, 农村金融服务可为农业结构调整提供资金支持, 不仅有利于提升农业技术和生产效率, 也能提高农民的人力资本水平, 最终促进农民收入增长; Abraham(2018)^[2]对尼日利亚的研究发现, 正规金融机构和农民储蓄俱乐部提供的金融服务帮助了最底层的五分之一贫农增加收入; Yu 和 Lu(2021)^[16]在建立城乡两部门嵌套模型的基础上, 运用面板数据验证了农村信贷投入可通过劳动力转移机制增加农村居民收入。

第二种观点是“金融抑制论”。首先, 在中国经济转型过程中, 传统金融成为优先支持国家工业化和城市化战略实施的政策工具, 并持续向外输出农村经济资源与经济剩余, 导致中国金融发展对农民收入的显著负效应(温涛等, 2005)^[17]。其次, 农村金融规模小、金融结构差、金融效率低, 削弱了金融对居民收入的促进作用。金融资源在农村地区的稀缺性和低效率阻碍了农民收入的增长(叶志强等, 2011)^[18]。再次, 农村金融机构信贷供给与农村实体金融需求之间的结构性不平衡已成为制约农村经济发展和农民收入增长的重要因素(Mei 等, 2022)^[19]。最后, 传统金融发展过程中出现的“使命漂移”“嫌贫爱富”等现象, 导致金融资源配置扭曲和金融效率受损, 制约了金融对减贫增收的功能发挥(Sehrawat 和 Giri, 2015)^[20]。

综合两方面观点来看, 结论产生分歧的核心在于双方对传统金融发展水平的差异性假设以及传统金融服务效能的差异性理解。当传统金融发展水平较高时, 金融的资源配置功能、风险管理功能、信息传递功能和价格发现功能得以有效发挥, 并对其所覆盖区域产生正外部性, 由此促进居民收入增长。当传统金融发展水平较低时, 农村地区的金融基础性功能基本处于失效状态, 金融资源的逐利性和稀缺性将导致市场失灵、供需失衡、配置错位, 由此对其服务范围内的弱势群体产生负外部性, 抑制了农村居民收入增长。此外, 传统金融机构基于成本与收益之间的博弈, 往往选择退出无利可图的农村金融市场。金融机构服务农村地区需要付出较高的物理网点建设成本、运营管理成本和信贷交易成本, 但是预期获得的经济收益比较微薄, 收益低与成本高导致金融机构缺乏开发农村金融市场的内在激励与动力。因此, 即便传统金融发展水平再高, 处于相对贫困状态的农村家庭和个体仍然难以得到合理的金融支持和充分的金融服务, 即弱势群体从传统金融发展中受益可能存在“锁定效应”。据此提出如下假说:

假说 1: 传统金融发展对农村居民收入的影响具有不确定性, 预期促进作用比较微弱。

此外, 传统金融对农村居民收入的影响可能具有阶段性特征, 即两者表现为非线性关系。Greenwood 和 Jovanovic(1990)^[21]通过构建一个动态模型讨论了金融发展、经济增长和收入分配之间的内在联系, 指出因金融发展具有门槛效应, 只有财富超过门槛值的高收入群体才能享受金融服务, 低收入群体被排斥在外而无法获取金融服务, 从而拉大了收入差距, 但随着经济发展与金融深化, 门槛逐渐降低, 更多低收入人群能够获取金融服务, 收入不平等得到缓解, 因此金融发展与收入差距表现为倒 U 型关系。Aghion 和 Bolton(1997)^[22]、Kim 和 Lin(2011)^[23]、周慧珩和龚六堂(2020)^[24]等研究均支持金融发展与收入差距呈倒 U 型关系。换言之, 当一国或地区经济处于欠发达阶段时, 金融服务对贫困阶层没有显著的增收效应; 只有当经济发展达到一定程度时, 金融服务才能显著提升低收入人群

的收入水平,从而缓解相对贫困和收入不平等。据此提出如下假说:

假说2:传统金融对农村居民收入具有非线性影响,随着经济发展水平的提高,传统金融的收入效应持续增强。

(二)数字普惠金融与农村居民收入

普惠金融(Financial Inclusion)的概念最早由联合国在“2005年国际小额信贷年”宣传中提出,旨在以可负担的资金成本为社会所有阶层提供便捷的金融服务(郭峰等,2020)^[25]。此后,依托金融科技和移动互联网发展起来的数字普惠金融实现了数字技术和普惠金融的有机融合,深刻改变了传统的金融模式和金融生态,成为传统金融的重要补充。作为传统金融模式的深度创新,数字普惠金融为家庭贫困缓解、居民收入增长、城乡收入差距缩小提供了新的机遇而被寄予厚望(张志元和李胖,2022;张小锋和王菁彤,2022)^[26-27]。数字普惠金融依托移动终端与互联网即可提供金融服务,具有强大的地理穿透性和区域渗透性,打破了传统金融服务的时空局限,极大降低了对传统金融物理网点的实体依赖,克服传统金融物理网点覆盖不足和空间分布不均衡的短板,有效提升了金融服务的覆盖广度和触达范围,助力欠发达地区经济增长与居民收入提升。Das和Chatterjee(2023)^[28]研究发现,以数字金融形式在银行业应用信息和通信技术对减少城乡贫困具有积极作用;He等(2022)^[29]研究发现,数字普惠金融改善了农村金融服务的需求和供给,提高了金融服务的包容性,不仅促进了农村居民收入增长,也缓解了气候变异对农村居民收入增长的负面影响;张勋等(2019)^[30]的研究发现,数字普惠金融为农村家庭创业提供了平等的融资机会,有助于提高农村家庭收入,促进了中国的包容性增长。此外,数字技术的应用与互联网特性使得数字普惠金融的边际成本趋近于零,大幅降低了金融交易成本和服务门槛(刘锦怡和刘纯阳,2020)^[31],有效缓解了金融排斥,从而可以为更广泛的长尾群体提供金融服务,使得传统金融难以兼顾的低收入人群、贫困阶层、弱势群体也能以合理的价格获取正规金融服务(尹志超和张栋浩,2020)^[32]。因此,数字普惠金融对于弱势群体改善金融服务、增加经济机会具有天然优势。针对农村地区的信贷配给和金融服务供给不足问题,数字普惠金融利用其在交易成本、信息获取和支付方式等方面的优势,牢牢抓住“三农”金融服务的制高点,能够解决农村地区金融供给和金融需求之间的结构性失衡,促进农村居民收入增长。据此提出如下假说:

假说3:数字普惠金融发展能够显著促进农村居民收入增长。

然而,数字普惠金融的收入效应也可能受到宏观因素的影响而表现出阶段性特征。傅利福等(2021)^[33]的研究发现,地区人均GDP、城镇化率和金融市场化程度的区域差异使得数字普惠金融对包容性增长的促进作用存在明显的区制转换效应;陈慧卿等(2021)^[34]的研究显示,数字普惠金融可降低农村贫困发生率,但其减贫效果随经济发展水平的提高而减小,随城镇化水平的提高而增大。究其原因,数字普惠金融对农村居民的服务效能依赖于当地经济发展水平和城镇化进程。随着经济发展水平的提高和城镇化的推进,数字化基础设施不断完善,居民的数字金融素养日益提升,数字普惠金融的服务效能将得到强化。此外,数字普惠金融发展促进了技术创新与地区创业,进而推动了经济增长(钱海章等,2020)^[35]。在经济发展水平和城镇化水平更高的地区,数字普惠金融的创新创业效应能够得到更好地发挥,其就业拉动效应为贫困群体提供了就业机会,增加了工资性收入以摆脱贫困。据此提出如下假说:

假说4:数字普惠金融对农村居民收入的影响受当地经济发展水平和城镇化进程的制约而呈非线性特征,且增收效应呈阶梯式上升趋势。

(三)数字普惠金融与传统金融的关系

数字普惠金融作为新兴的金融生态给传统金融系统带来了深刻变革,有利于克服传统金融发展

对于促进农村居民收入增长乏力的问题。首先,数字普惠金融通过技术创新具备“成本低、覆盖广、速度快”的显著优势,可以为传统金融难以触及的边缘群体提供服务,克服了传统金融的局限性。其次,数字金融在产品创新、供需匹配、成本控制等方面有效弥补了传统金融的短板(黄益平和黄卓, 2018)^[36],其与传统金融相互竞争的过程中,将会推动金融结构变革与金融效率提升(吴晓求, 2015)^[37],从而增强金融减贫增收的服务效能。再次,借助人工智能、大数据、云计算、区块链等先进技术手段,数字普惠金融在拓宽风险评估的信息来源、挖掘用户的潜在需求、提高风险定价效率等方面对传统金融模式产生了颠覆性影响(Arjunwadkar, 2018)^[38],提升了信贷风险评估与控制的有效性,降低了风控成本,也有效缓解了借贷双方信息不对称及其导致的道德风险和逆向选择问题,有助于实现金融资源的更均衡分配,缩小金融服务的差距,让更多弱势群体享受到金融服务,促进社会经济的可持续发展。因此,相比传统金融,数字普惠金融具有显著的信息优势、成本优势、效率优势和匹配优势。理论上,数字普惠金融的收入效应与其在各方面的优势应保持一致性,即在同等条件下,数字普惠金融对农村居民收入的促进作用会明显大于传统金融的作用效果。据此提出如下假说:

假说 5: 数字普惠金融对农村居民的增收效应显著大于传统金融的作用效果。

数字普惠金融对传统金融痛点和难点的有效解决,是两者存在“互补—替代”关系的重要前提。传统金融机构若要扩大金融服务范围、提升金融服务深度需要较高的成本。首先,金融机构需要扩展其物理网点,深入到农村地区提供服务,从而增加了运营成本(赵慧倩, 2021)^[39]。其次,农村贷款人群与银行之间的信息不对称、难以提供标准化抵押品等问题均会提高银行的信贷风险评估难度,增加银行的信息成本。但这些成本均将转嫁给贷款者,导致农村居民很难以低成本获得金融服务。数字普惠金融通过线上交易平台能够显著降低金融服务的固定成本,并且突破时间和空间的限制扩大金融服务范围、提高金融服务的覆盖率,有助于解决传统金融为农村地区服务的规模不经济问题,在一定条件下甚至可以产生规模经济效益。此外,数字技术的赋能让数字普惠金融拥有更低的业务拓展成本,其只需要在软件上增加相应功能便可使新的产品和服务触及海量用户,即集合性应用软件能够以极低的边际成本开拓市场。根据上述分析,数字普惠金融在降低传统金融市场的各项成本方面具有显著优势,有效克服了商业运营逐利性和金融普惠性的内在矛盾,从而在供给侧填补了传统金融服务的缺位,因而这两种金融模式存在“互补—替代”关系。

传统金融与数字普惠金融的互补关系或替代关系很大程度上取决于两者的协调匹配程度。Qi 等(2022)^[40]的研究发现,金融科技的发展对传统银行市场力量的影响具有明显的 U 型效应;张岳和彭世广(2021)^[41]则发现数字普惠金融发展水平与村镇银行盈利能力之间呈 U 型曲线关系。依此推知,数字普惠金融对传统金融的影响轨迹表现为“冲击—融合”过程,两者在市场竞争与相互博弈的过程中将经历从替代关系向互补关系的转化。一方面,传统金融发展为数字普惠金融的成长提供了基础设施、资源保障和经验积累;另一方面,数字普惠金融发展的“鲑鱼效应”带动了传统金融规模扩张、效率提升与结构优化。传统金融与数字普惠金融的各种组成要素通过选择性搭配、系统性优化与创造性融合以最合理的结构形式组合在一起,可以使金融系统的整体功能发生质的跃变,形成强大的服务能力和竞争优势,两者优势互补从而开启正反馈循环的内生发展路径,成为金融业在高质量发展过程中促进农村居民收入增长的重要实践形态。从现实上看,首先,由于我国农村居民受教育程度普遍不高,金融素养与数字技术应用能力有限,“数字鸿沟”在短期内难以有效弥合,加上农村地区数字基础设施不完善、居民对金融服务获取方式的惯性依赖等因素,使得数字普惠金融服务无法完全替代传统金融服务。如郭峰和王瑶佩(2020)^[42]的研究发现,农户的传统金融需求与数字金融需求具有一致性,传统金融的参与度越高,使用数字金融服务的可能性就越大。其次,从供需动态转化角度看,传统

金融机构的丰富客户资源为数字普惠金融带来强劲的需求支撑;而数字普惠金融通过高质量供给又可以创造大量传统金融需求,为传统金融发展带来更大的市场空间。最后,传统金融与数字普惠金融在解决信息不对称问题和风险评估方面具有各自的特点和不可替代的作用(许月丽等,2022)^[43],因而数字普惠金融的发展并不排斥传统金融,两者具有长期共存、深度融合的趋势。根据上述分析,传统金融与数字普惠金融存在互补关系的可能性更大,“协同互补”观点更符合两者的发展趋势与经验事实。据此提出如下假说:

假说6:传统金融与数字普惠金融在促进农村居民增收的过程中存在协同互补关系。

(四)文献评述

纵观已有研究,关于金融收入分配效应的研究存在对传统金融作用认识模糊的问题,导致结论存在分歧,而基于数字普惠金融视角的研究结论则具有较高的一致性。产生多样性结论的原因在于:第一,理论逻辑不同。金融发展的收入分配效应涉及到复杂的作用机制及多种金融理论的组合,基于不同的理论演绎可以得到多样化的研究结论。第二,研究对象不同。不同国家金融发展水平的空间非均衡性、同一国家在不同发展阶段金融发展水平的非一致性以及市场经济环境的动态性和复杂性,使得基于不同数据的研究结论难以统一。第三,指标选取不同。针对传统金融,学者们可采用金融规模、金融效率、金融结构等不同指标作为代理变量;针对数字普惠金融,我国学者几乎一致性地借鉴北京大学数字金融研究中心课题组的研究成果。另外,以往针对金融收入分配效应的研究主要聚焦于收入不平等或城乡收入差距视角,而对处于经济弱势地位的农村居民减贫增收机制关注不足,且数字普惠金融的相关研究也鲜有涉及农村居民收入。现阶段,研究如何促进农村居民收入增长具有更直接的现实意义,不仅有助于缩小城乡收入差距,也能有效缓解相对贫困。因此,本文将农村居民作为研究对象,研究不同金融模式对农村居民收入的作用效果,为推进新时期经济和金融高质量发展提供有益的思路。

三、变量选择、模型设定与数据说明

(一)数据来源与说明

本文采用北京大学数字金融研究中心和蚂蚁金服集团联合编制的中国数字普惠金融指数进行研究,具体包括普惠金融的覆盖广度、使用深度和数字化程度三个子维度以及省、市、县三个层面的指数。该指数基于蚂蚁金服的交易账户大数据,采用层次分析法和逐层加权法编制而成,可以在很大程度上准确刻画我国数字普惠金融的发展现状与趋势。指数测算过程与具体构成详见郭峰等(2020)^[25]的研究。农村居民收入、传统金融构建指数的原始数据和其他控制变量来自《中国城市统计年鉴》《中国金融统计年鉴》,以及各城市国民经济和社会发展统计公报和CEIC数据库。本文的研究对象覆盖中国31个省市自治区的290个地级市,时间跨度为2011—2021年。经过数据预处理,最终整理出2823个有效样本。

(二)传统金融指数构建

衡量传统金融发展水平的指标和角度较为多样。中国的银行部门规模远远超过证券市场规模,信贷市场占据金融市场的主导地位(Liu和Zhang,2020)^[44],因此采用金融机构存贷款总额占GDP的比重来衡量金融规模较为合理。在以银行业为主导的金融体系下,金融效率代表着信贷交易和信贷资源转化的效率,所以用贷款与存款的比值衡量金融中介将储蓄转化为信贷的效率较为理想。衡量传统金融发展水平以金融规模和金融效率这两个指标最为常用,并被许多实证研究所采纳(叶志强等,2011;乔海曙和陈力,2009;张应良和徐亚东,2020)^[18,45-46]。本文参考已有文献,采用熵值法将金融规模和金融效率合并为一项综合指数(见表1),以减少指标性质的差异和观察角度的分歧,更好地

从整体上量化传统金融发展水平。熵值法是一种多指标综合评价的科学方法,它通过各指标提供的信息量大小客观地为指标赋予权重,能最大程度对事物进行概述和区分,具有较好的自适应性。

表 1 传统金融发展评价指标体系

指标名称	指标测度	指标解释	指标权重
金融规模(<i>Size</i>)	金融机构存贷款总额 / GDP	表征金融市场资金流通量的相对大小	0.75
金融效率(<i>Effi</i>)	贷款总额 / 存款总额	表征储蓄转化为信贷的效率	0.25

(三) 基准模型设定

为了控制不可观测因素对实证结果的干扰,采用双向固定效应模型研究传统金融与数字普惠金融对农村居民收入的影响,基准回归方程设定如下:

$$Income_{ijt} = \beta_0 + \beta_1 FIN_{ijt} + \beta_2 DFI_{ijt} + \varphi_1 City_{ijt} + \mu_j + I_t + \varepsilon_{ijt} \quad (1)$$

$$Income_{ijt} = \theta_0 + \theta_1 FIN_{ijt} + \theta_2 DFI_{ijt} + \theta_3 FIN_{ijt} \times DFI_{ijt} + \varphi_2 City_{ijt} + \mu_j + I_t + \varepsilon_{ijt} \quad (2)$$

其中, i 为省份下标, j 为城市下标, t 为年份下标; $Income_{ijt}$ 为省份 i 城市 j 在第 t 年的农村居民人均可支配收入; FIN_{ijt} 为传统金融发展指数; DFI_{ijt} 为数字普惠金融指数; $City_{ijt}$ 为影响农村居民收入的城市控制变量,包括人均GDP、产业结构、教育水平、财政投入、外商投资、经济开放度、城镇化率、基础设施; β_0 和 θ_0 为常数项; ε_{ijt} 为随机扰动项; μ_j 为城市固定效应,用于吸收非时变的城市特征对农村居民收入的影响,降低遗漏变量偏误; I_t 为时间固定效应,用于吸收不随城市变化的地区共同趋势和波动。

为了使回归结果具有可比性,需要将传统金融指数与数字普惠金融指数的量纲保持一致,同时为了避免引入交互项产生的多重共线性问题,本文在回归分析前对所有变量进行标准化处理。方程(1)用于分析传统金融与数字普惠金融对农村居民收入的影响,并比较二者的边际收入效应之大小。方程(2)用于分析传统金融与数字普惠金融在促进农村居民收入方面的互补关系或替代关系,若 θ_3 显著为正,说明二者存在互补效应;若 θ_3 显著为负,则存在替代效应;若 θ_3 不显著,说明二者在收入效应上相互独立。通过建立两个方程分别进行检验,可降低多重共线性对结论的潜在影响,提高实证策略的稳健性和有效性。

(四) 面板门槛模型

从理论分析推出,传统金融、数字普惠金融对农村居民收入的影响可能是非线性和阶段性的,其作用可能会随着经济发展水平、城镇化率处于不同区间而呈现不同特点,从而隐含了两种金融模式收入效应差异的深层次原因。鉴于此,拟采用面板门槛回归模型进行检验(Hansen, 1999)^[47],设定模型如下(以单门槛情形为例)^①:

$$Income_{ijt} = \alpha_0 + \alpha_1 FIN_{ijt} \cdot I(P_{GDP} \leq \gamma) + \alpha_2 FIN_{ijt} \cdot I(P_{GDP} > \gamma) + \alpha_3 DFI_{ijt} \cdot I(P_{GDP} \leq \gamma) + \alpha_4 DFI_{ijt} \cdot I(P_{GDP} > \gamma) + \varphi_1 City_{ijt} + \mu_j + I_t + \varepsilon_{ijt} \quad (3)$$

$$Income_{ijt} = \beta_0 + \beta_1 FIN_{ijt} \cdot I(UR \leq \delta) + \beta_2 FIN_{ijt} \cdot I(UR > \delta) + \beta_3 DFI_{ijt} \cdot I(UR \leq \delta) + \beta_4 DFI_{ijt} \cdot I(UR > \delta) + \theta_1 City_{ijt} + \mu_j + I_t + \varepsilon_{ijt} \quad (4)$$

方程(3)(4)中, $I(\cdot)$ 代表示性函数,当括号中表达式为真时,取值为1,反之取值为0。根据门槛变量人均GDP(P_{GDP})、城镇化率(UR)是否大于门槛估计值 γ 、 δ ,将样本分为两个区制,以便于分析传统金融和数字普惠金融对农村居民收入的边际影响的结构性差异。方程中其他符号的含义与基准模

①在对具体问题进行分析时,运用面板门槛模型可能会检测到多个门槛值。多重门槛模型的估计原理与单一门槛模型类似,均是在固定已知门槛值的情形下估计得出最后一个门槛值。为节省篇幅,此处不再讨论双门槛模型,具体可参见Hansen(1999)^[47]的研究。

型中的设定一致^①。

(五)变量定义与描述性统计

文中所有变量的定义见表 2,变量的描述性统计特征见表 3。通过相关分析发现,传统金融指数与数字普惠金融的相关系数仅为 0.383 7,说明传统金融与数字普惠金融确实存在一定的关联和差异,因而有对比研究的必要性,同时也说明本文所采用的指标对于这两种金融模式具有较好的区分度,不存在指标过度重合的问题。

表 2 变量说明

变量属性	变量名称及符号	度量方式
被解释变量	农村居民收入(<i>Income</i>)	农村居民人均可支配收入(元)
核心解释变量	传统金融指数(<i>FIN</i>)	由金融规模与金融效率依据熵值法合成
	数字普惠金融(<i>DFI</i>)	北京大学数字普惠金融指数
控制变量	人均 GDP(<i>P_{GDP}</i>)	人均地区生产总值(元)
	产业结构(<i>Struc</i>)	第三产业产值/第二产业产值
	教育水平(<i>Educ</i>)	每千人中高校师生数占比
	财政投入(<i>Fiscal</i>)	财政支出/财政收入
	外商投资(<i>FDI</i>)	规模以上外商投资企业工业总产值/GDP
	经济开放度(<i>Open</i>)	进出口总额/GDP
	城镇化率(<i>UR</i>)	城镇常住人口/城市总人口
	基础设施(<i>Infras</i>)	城市建设用地面积/行政区域面积

表 3 变量的描述性统计

变量	观测值	均值	标准差	最小值	最大值
<i>Income</i>	2 823	13 616.944	6 252.496	2 620.803	62 522.390
<i>FIN</i>	2 823	0.000	1.000	-1.716	13.560
<i>DFI</i>	2 823	179.258	72.582	17.020	359.683
<i>P_{GDP}</i>	2 823	55 048.457	36 732.396	6 457.000	467 749.000
<i>Struc</i>	2 823	1.036	0.578	0.114	5.348
<i>Educ</i>	2 823	0.015	0.024	0.000	0.147
<i>Fiscal</i>	2 823	2.884	1.840	0.649	17.508
<i>FDI</i>	2 823	0.068	0.137	0.000	1.310
<i>Open</i>	2 823	0.174	0.277	0.000	2.491
<i>UR</i>	2 823	0.540	0.149	0.175	1.000
<i>Infras</i>	2 823	0.080	0.216	0.000	8.340

注:为提供更多信息细节,对传统金融指数进行了标准化处理。

四、实证结果与分析

(一)基准回归结果

表 4 报告了传统金融与数字普惠金融对农村居民收入的量化影响。其中,第(1)列为普通最小二乘法(OLS)的估计结果,第(2)(3)(4)列为双向固定效应模型的估计结果;第(2)列未添加控制变量

^①按照基准模型的做法,对所有解释变量和被解释变量进行标准化处理,但为了直观展示门槛值的经济意义,本文的门槛变量保留原始值。

但控制了城市固定效应和时间固定效应,第(3)列在第(2)列的基础上添加了控制变量,第(4)列在第(3)列的基础上引入了交互项。

表4 传统金融与数字普惠金融对农村居民收入的影响

变量	OLS		固定效应模型	
	(1)	(2)	(3)	(4)
<i>FIN</i>	0.002 (0.015)	0.009 (0.009)	0.013 (0.009)	0.003 (0.020)
<i>DFI</i>	0.491 *** (0.013)	0.523 *** (0.101)	0.277 *** (0.087)	0.227 *** (0.077)
<i>FIN × DFI</i>				0.047 *** (0.014)
<i>P_{GDP}</i>	0.331 *** (0.028)		0.015 (0.017)	0.011 (0.018)
<i>Struc</i>	0.021 (0.015)		-0.016 (0.016)	-0.034 ** (0.016)
<i>Educ</i>	-0.077 *** (0.016)		0.008 (0.013)	0.028 ** (0.013)
<i>Fiscal</i>	-0.101 *** (0.013)		-0.041 *** (0.014)	-0.028 * (0.015)
<i>FDI</i>	-0.044 ** (0.020)		-0.077 *** (0.014)	-0.070 *** (0.013)
<i>Open</i>	0.264 *** (0.033)		-0.037 (0.025)	-0.021 (0.024)
<i>UR</i>	0.100 *** (0.018)		0.013 (0.028)	0.015 (0.028)
<i>Infras</i>	0.024 * (0.014)		0.007 * (0.003)	0.005 * (0.003)
常数项	-0.000 (0.010)	0.000 *** (0.000)	0.000 *** (0.000)	-0.018 *** (0.005)
城市固定效应	否	是	是	是
时间固定效应	否	是	是	是
R ²	0.727	0.973	0.975	0.977
观测值	2 823	2 821	2 821	2 821

注: *、**和***分别表示10%、5%和1%的显著性水平;括号中是异方差稳健标准误。表5至表7同。

以第(3)列结果分析传统金融与数字普惠金融对农村居民收入的影响。首先,传统金融指数的回归系数为正但不显著,说明传统金融的增收效应比较有限且非常微弱;数字普惠金融的系数估计值在1%的水平上显著为正,说明数字普惠金融对农村居民收入具有显著的提升效果,假说1和假说3得到验证。具体而言,数字普惠金融指数每提高1个标准差,农村居民收入平均提高0.277个标准差,具有相当可观的经济意义,体现了数字普惠金融在减贫增收方面比传统金融有优势,假说5得到验证。

以第(4)列结果检验传统金融与数字普惠金融的“互补—替代”关系。二者的交互项在1%的水平上显著为正,说明传统金融发展程度越高,数字普惠金融对农村居民收入的促进作用越大,也可以

理解为数字普惠金融的发展强化了传统金融对农村居民收入的正面影响。传统金融指数每提高 1 个标准差,数字普惠金融的增收效应平均提高 0.047 个标准差,在边际上增长了 20.7%。由此可见,传统金融与数字普惠金融在改善农村居民收入方面具有互补效应而不是替代效应,研究假说 6 得到验证。传统金融与数字普惠金融的共同发展能够促进地区金融资本的积累和汇聚,形成“涓滴效应”和“扩散效应”^[22],不仅可以帮助农村居民克服流动性约束、抵御风险,而且间接为农村地区经济发展、产业升级、社会福利改善提供充裕的资金支持,最终促进农村居民收入增长。

(二)稳健性检验

1. 替换解释变量

考虑到数字普惠金融的发展推动了传统金融的数字化转型,传统金融机构的经营绩效在一定程度上归属于数字普惠金融的应用成果。为确保核心结论稳健可靠,借鉴许月丽等(2022)^[43]的做法,将回归方程 $FIN = \beta_0 + \beta_1 DFI + u$ 的残差作为传统金融的代理变量。其中, FIN 为金融机构存贷款余额与地区生产总值的比值, DFI 为数字普惠金融指数,回归残差 u 在一定程度上可以反映排除了数字普惠金融影响后的传统金融发展水平^①。具体检验结果见表 5。

表 5 稳健性检验

变量	替换解释变量		核心解释变量滞后一期		变量缩尾处理		排除特殊样本	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FIN	0.016 (0.010)	0.001 (0.015)			0.014 (0.025)	0.004 (0.029)	0.011 (0.009)	0.003 (0.019)
DFI	0.288 *** (0.088)	0.271 *** (0.082)			0.194 *** (0.064)	0.197 *** (0.064)	0.201 ** (0.079)	0.183 ** (0.075)
$FIN \times DFI$		0.034 *** (0.013)				0.033 *** (0.012)		0.042 *** (0.015)
L. FIN			0.022 * (0.013)	0.022 (0.023)				
L. DFI			0.236 *** (0.084)	0.177 ** (0.077)				
L. $FIN \times DFI$				0.045 *** (0.013)				
其他控制变量	是	是	是	是	是	是	是	是
城市固定效应	是	是	是	是	是	是	是	是
时间固定效应	是	是	是	是	是	是	是	是
R^2	0.975	0.976	0.980	0.981	0.973	0.973	0.973	0.974
观测值	2 821	2 821	2 389	2 389	2 821	2 821	2 641	2 641

由(1)列可知,传统金融指数的系数估计值为正但不显著,说明传统金融发展对农村居民收入的促进作用非常微弱;数字普惠金融的回归系数为正且在 1% 的水平上显著,其增收效果十分显著。由第(2)列可知,交互项系数为正且在 1% 的水平上显著,验证了传统金融和数字普惠金融为互补关系的观点。

①替换新变量后,传统金融与数字普惠金融的相关系数降为 0,二者在统计方法和指标度量上均存在明显差异。若能得出逻辑一致的结果,则证明本文变量选取的稳健性和结论的内部有效性。

2. 采用滞后变量

将核心解释变量滞后一期处理不仅可以分析变量间的滞后效应,也能够检验因果倒置问题,同时减轻内生性问题对结论的干扰,结果见表5的第(3)(4)列。从第(3)列可看出,传统金融指数滞后一期的回归系数为正且显著,说明传统金融发展对农村居民收入的影响具有一定的滞后性;数字普惠金融滞后一期的回归系数显著为正,说明数字普惠金融对农村居民收入的影响具有持续性和稳定性,其增收效应并未随着时间推移而急剧衰减。第(4)列显示,交互项滞后一期在1%的水平上显著为正,表明传统金融发展在长期内也能对数字普惠金融的增收效应产生正向调节作用。综上所述,从农村居民增收长效性的角度看,数字普惠金融显著优于传统金融,但传统金融也能发挥良好的辅助作用,与数字普惠金融形成互补关系,这与基准回归所得结论一致。

3. 变量缩尾处理

为了减少样本异常值对回归结果的影响,对所有变量进行双侧2.5%缩尾处理,结果见表5的第(5)(6)列。从中显示,传统金融的回归系数为正但不显著,数字普惠金融的回归系数及交互项系数均在1%的水平上显著为正,与前文结论保持一致。

4. 排除特殊样本

考虑到中国的重点城市因政策偏向性影响而存在经济特殊性,这些城市的农村居民收入可能受到其他混淆因素的影响,从而造成其与普通样本不可比的问题,故将中国4个直辖市以及15个副部级城市样本剔除后重新回归^①。结果见表5的第(7)(8)列,从中可知,在排除特殊城市样本后,前文的核心结论稳健可靠。

5. 固定效应模型、随机效应模型与混合 OLS 的比较检验

对于使用面板数据的实证研究,固定效应与随机效应的比较分析是一个不可忽视的问题。首先,对于固定效应模型而言,个体效应的联合F检验在1%的水平上显著,即城市个体效应在整体上显著,表明固定效应模型优于混合 OLS 模型。然后,对于随机效应模型而言,LM 检验得到的P值为0.000,表明随机效应非常显著,因此随机效应模型也优于混合 OLS 模型。最后,Hausman 检验的 χ^2 统计量为368.11,对应的P值为0.000,强烈拒绝“城市固定效应与解释变量不相关”的原假设,为了得到一致估计量,应该采用固定效应模型。此外,本文还采用了Wooldridge(2010)^[48]辅助回归下的稳健Hausman 检验,结果显示 χ^2 统计量为229.673,对应的P值为0.000,再次验证了固定效应模型的适用性和有效性。因此,本文基于双向固定效应模型所得到的结论是稳健可靠的。

(三)内生性检验

由于影响农村居民收入的因素较多,本文所涉及的控制变量难以避免遗漏变量问题。另外,传统金融与数字普惠金融的发展可能促进农村居民收入增长,但农村居民收入增长也可能增加对不同金融服务的需求,且居民收入水平低可能抑制金融市场的有效需求,所以传统金融、数字普惠金融与农村居民收入之间存在一定的反向因果关系。

因此,为了保证实证研究的严谨性与稳健性,本文需要解决传统金融与数字普惠金融的潜在内生性问题。一方面,考虑到数字普惠金融具有地理依赖性和显著的正向空间集聚效应(郭峰等,2017)^[49],参考赵亚雄和王修华(2022)^[50]的研究,构建“地级市到北京、深圳、杭州的平均球面距离与省域内地级市数字金融发展水平的平均值(除自身地级市以外)的交互项”作为数字普惠金融的工具变量。另一方面,因金融机构通常不愿意为偏远地区和贫困群体服务,金融机构网点分布空间上呈非

①4个直辖市分别为北京市、上海市、天津市、重庆市;15个副部级城市分别为沈阳市、大连市、长春市、哈尔滨市、济南市、青岛市、西安市、武汉市、成都市、南京市、宁波市、杭州市、厦门市、广州市、深圳市。

均衡性,欠发达地区金融分支机构较少,金融发展水平较低(Armendáriz 和 Morduch,2010)^[51]。故本文选择“每万人金融机构网点数量”作为传统金融的工具变量。此外,针对传统金融与数字普惠金融的交互项,采用上述 2 个工具变量的交互项进行两阶段最小二乘估计。

基于上述分析,本文采用面板 IV-2SLS 模型进行检验,结果如表 6 所示。第(1)(2)(3)列分别对传统金融、数字普惠金融及其交互项进行估计,第(4)列将 3 个变量纳入同一个模型进行估计。从中可知,不可识别 LM 检验均在 1% 的水平上显著,高度拒绝工具变量识别不足的原假设,表明工具变量满足相关性要求;弱工具变量检验的 F 统计量均大于 15,说明不存在弱工具变量问题。因此,说明本文选取的工具变量有效。在处理内生性问题后,传统金融指数的回归系数为正但不显著;数字普惠金融的农村居民收入效应在 5% 的水平上显著为正;交互项系数在 1% 的水平上显著为正。可见,在排除了内生性问题干扰后,前文的结论依旧成立。

表 6 面板 IV-2SLS 模型回归结果

变量	(1)	(2)	(3)	(4)
<i>FIN</i>	0.317(0.248)			0.658** (0.298)
<i>DFI</i>		0.602** (0.258)		0.935*** (0.363)
<i>FIN × DFI</i>			0.169*** (0.038)	0.106** (0.044)
其他控制变量	是	是	是	是
城市固定效应	是	是	是	是
时间固定效应	是	是	是	是
R^2	0.892	0.894	0.902	0.535
不可识别 LM 检验	15.203***	115.302***	55.610***	11.823***
弱工具变量 F 检验	15.461	105.389	45.936	—
观测值	2 821	2 767	2 767	2 767

(四)异质性分析

基于传统金融指数的两个子维度(金融规模(*Size*)、金融效率(*Effi*))和数字普惠金融指数的三个子维度(覆盖广度(*Width*)、使用深度(*Depth*)、数字化程度(*Digital*))进行异质性分析,揭示两种金融模式的不同方面如何作用于农村居民收入,从而探讨促进农村居民增收的最佳发力点。结果见表 7,其中第(1)列为金融规模、金融效率的回归结果,第(2)列为覆盖广度、使用深度、数字化程度的回归结果,第(3)列为所有指标纳入同一方程进行对比的回归结果。

表 7 异质性分析:多个细分维度的回归结果

变量	(1)	(2)	(3)
<i>Size</i>	0.015(0.012)		0.019(0.013)
<i>Effi</i>	-0.003(0.008)		-0.004(0.007)
<i>Width</i>		-0.067(0.075)	-0.057(0.076)
<i>Depth</i>		0.185*** (0.049)	0.190*** (0.049)
<i>Digital</i>		0.074*** (0.025)	0.075*** (0.025)
其他控制变量	是	是	是
城市固定效应	是	是	是
时间固定效应	是	是	是
R^2	0.975	0.976	0.976
观测值	2 821	2 821	2 821

第(1)列显示,金融规模和金融效率对农村居民收入的影响均不显著。长期以来,我国城乡二元经济结构导致城镇地区的资本收益率始终高于农村地区(高帆和李童,2016)^[52],驱动农村金融资本持续向城镇流动,金融规模的扩大和金融效率的提高主要依靠金融资源向城镇地区的转移和集聚而得以实现。因得不到充足的信贷支持,农村地区经济发展缓慢、产业升级滞后、就业机会减少,因此传统金融对农村地区没有发挥减贫增收的显著作用。

由第(2)列可知,数字普惠金融的覆盖广度对农村居民收入的影响不显著,其使用深度和数字化程度均显著促进了农村居民收入增长。这可能是由于农村地区居民的数字素养有限,“数字鸿沟”在短期内难以消除,仅依靠增加电子账户数不能直接帮助农户改善收入状况,只有切实扩大农村居民的数字金融参与及其受益程度,才能对农村居民收入产生积极影响。这一结果表明数字普惠金融的增收效应关键在于其利用金融科技降低交易成本、提升金融服务便捷性、促进金融产品创新,从而使农村居民有效扩大金融参与并获得更多的金融资源支持,最终对农村居民收入产生积极影响。

五、拓展性分析——面板门槛模型

本部分通过建立面板门槛模型来验证研究假说2和假说4,并进一步揭示传统金融和数字普惠金融收入效应差异性的来源。

(一)传统金融和数字普惠金融影响农村居民收入的经济发展门槛特征

经济发展是居民收入的前提和基础。根据Greenwood和Jovanovic(1990)^[21]的研究,随着经济发展水平的提高,金融发展与收入不平等之间存在倒U型关系。因此,金融发展对农村居民收入的影响可能也受到经济发展水平的制约;在不同的经济发展水平下,传统金融和数字普惠金融对农村居民收入的影响可能存在结构性差异。本部分以城市人均GDP作为门槛变量,揭示两种金融模式对农村居民收入影响的经济门槛特征。

表8报告了以人均GDP作为门槛变量的检验结果。结果显示:单门槛检验和双门槛检验均在1%的水平上显著,三门槛检验不显著,表明传统金融和数字普惠金融对农村居民收入的影响存在以人均GDP为门槛变量的双门槛效应。第一个门槛对应的人均GDP为59 163元,第二个门槛对应的人均GDP为93 173元,在样本城市中,跨越第一个门槛的城市占比为31.7%,仅有12.4%的城市越过第二个门槛。

表8 门槛效应检验:经济发展门槛

分类	F统计量	10%临界值	5%临界值	1%临界值	门槛估计值	95%置信区间
单一门槛	288.230 ***	47.656	57.334	71.530	59 163	[58 922, 59 608]
双重门槛	93.250 ***	40.849	47.883	68.874	93 173	[92 148, 94 782]
三重门槛	30.550	76.197	90.147	114.557		

注: * $p < 0.1$ 、** $p < 0.05$ 、*** $p < 0.01$, p 值为基于Bootstrap方法重复抽样1 000次得到的概率值。表10同。

与表8相对应,根据门槛模型原理,门槛估计值即为LR统计量趋近于0时得到显著的“结构突变点”。图1为人均GDP两个门槛估计值在95%置信区间下的似然比函数图,其中,LR统计量最低点为对应的有效门槛值,虚线表示的临界值为7.35,由于两个门槛值明显处于临界值以下,因此可认为这两个门槛值是真实有效的。

表9报告了以人均GDP为门槛变量的面板门槛回归结果。当经济发展水平较低时(人均GDP在第一个门槛值以下),传统金融和数字普惠金融均未对农村居民收入产生显著影响。随着经济发展水平提高,两种金融模式的增收效应显著且呈阶梯式上升趋势。当人均GDP处于(59 163, 93 173]区间

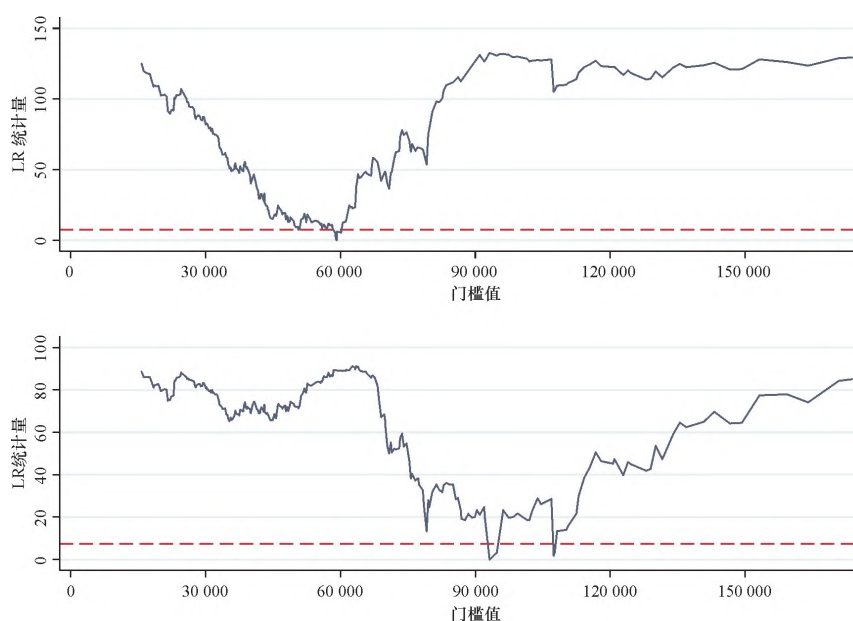


图1 金融影响农村居民收入的经济门槛估计结果

注:上下图依次为人均GDP门槛值59 163和93 173对应的估计结果。

时,两种金融模式的增收效应出现第一次跃升,此时数字普惠金融的边际增收效应相比传统金融高出34%;当人均GDP大于93 173元时,两种金融模式的增收效应出现第二次跃升,传统金融和数字普惠金融的边际增收效应分别增长了92%和50%,但数字普惠金融的边际增收效应相比传统金融仍高出5%。综上可知,金融惠农效应的有效发挥需要一定的物质条件和经济基础作为支撑。相比传统金融,数字普惠金融能够更好地缓解金融排斥现象,有助于实现金融资源的更均衡分配,缩小金融服务的差距,让更多弱势群体享受到金融服务,其先进性、普惠性和包容性使农村居民在更大程度上受益。

(二)传统金融和数字普惠金融影响农村居民收入的城镇化门槛特征

城镇化进程塑造着当地的经济基础和产业结构,从而影响当地的金融供给和金融需求。在高度城镇化地区,金融业通常更发达、金融市场更成熟(熊毅和栗勤,2022)^[53]。由于城镇化进程具有差异性,不同城市的金融发展水平会呈现空间上的非一致性和地域上的非均衡性,对农村居民收入的贡献也存在空间分异。本部分以城镇化率作为门槛变量,探究传统金融与数字普惠金融对农村居民收入影响的城镇化门槛特征。

表10报告了以城镇化率为门槛变量的检验结果,图2为门槛估计过程的似然比函数图。从中可看出,单门槛检验在1%的水平上显著,强烈拒绝线性关系的原假设;双门槛检验不显著,从而表明传统金融和数字普惠金融对农村居民收入的影响存在以城镇化率为门槛变量的单门槛效应。城镇化率

表9 面板门槛回归(门槛变量:人均GDP)

变量	因变量:农村居民收入
$FIN(P_{GDP} \leq 59\ 163)$	0.021(0.013)
$FIN(59\ 163 < P_{GDP} \leq 93\ 173)$	0.142*** (0.024)
$FIN(P_{GDP} > 93\ 173)$	0.272*** (0.031)
$DFI(P_{GDP} \leq 59\ 163)$	0.060(0.078)
$DFI(59\ 163 < P_{GDP} \leq 93\ 173)$	0.190** (0.078)
$DFI(P_{GDP} > 93\ 173)$	0.286*** (0.078)
其他控制变量	是
城市固定效应	是
时间固定效应	是
R^2	0.585
观测值	1 199

注: *、**和***分别表示10%、5%和1%的显著性水平;括号中是系数标准误。表11同。

的门槛估计值为 59%, 样本中仅有 33.7% 的城市已达到这一水平。据国家统计局最新数据显示, 2022 年中国城镇化率为 65.22%, 全国仍有近半数城市低于门槛值水平。

表 10 门槛效应检验: 城镇化进程门槛

分类	F 统计量	10% 临界值	5% 临界值	1% 临界值	门槛估计值	95% 置信区间
单一门槛	209.230 ***	49.390	65.191	88.603	0.590	[0.588, 0.591]
双重门槛	46.230	48.438	61.374	88.859		

表 11 报告了以城镇化率为门槛变量的面板门槛回归结果。可以发现, 传统金融和数字普惠金融的边际收入效应均随着城镇化水平的提高而改善。在城镇化率低于 59% 的门槛值以下, 传统金融发展维持“收入中性”, 其对农村居民收入没有显著影响。在城镇化率高于 59% 的门槛值以上, 传统金融和数字普惠金融均能显著促进农村居民收入增长, 且数字普惠金融的增收效应相比传统金融高出 238%。无论是否越过门槛值, 数字普惠金融对农村居民收入均有显著的提升效果, 当城镇化率超过 59% 时, 将触发数字普惠金融对农村居民收入的“加成效应”和“倍增效应”, 边际收入效应进一步提升了 113%。因此, 从城镇化进程的门槛视角来看, 数字普惠金融充分展现出普惠性和包容性的优势, 打破了传统金融的地理空间限制。在三四线城市和其他城镇化进程滞后的地区, 传统金融机构覆盖不足, 无法满足当地的金融服务需求; 数字普惠金融借助强大的地理穿透性和区域渗透性, 扩大了金融服务的覆盖范围, 提升了欠发达地区群体的金融可得性, 为金融减贫增收作用的发挥提供了强大的技术支持。此外, 即使在高度城镇化地区, 传统金融也存在成本约束、逐利偏好和离农倾向, 而数字普惠金融凭借“低成本、低门槛、高效率”的特性有效克服了传统金融的难点和痛点, 因而在农村居民增收效应上占据绝对优势。

表 11 面板门槛回归(门槛变量: 城镇化率)

变量	因变量: 农村居民收入
$FIN(UR \leq 59\%)$	0.019(0.014)
$FIN(UR > 59\%)$	0.096 *** (0.027)
$DFI(UR \leq 59\%)$	0.152 * (0.084)
$DFI(UR > 59\%)$	0.324 *** (0.082)
其他控制变量	是
城市固定效应	是
时间固定效应	是
R ²	0.546
观测值	1 199

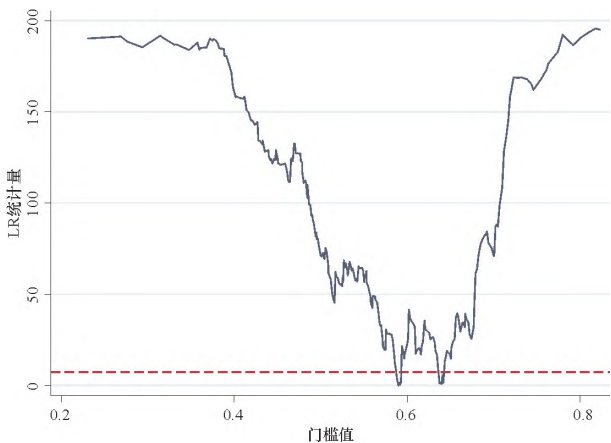


图 2 金融影响农村居民收入的城镇化门槛估计结果

六、结论与政策启示

本研究基于 2011—2021 年中国 290 个地级市的面板数据, 采用熵值法构建传统金融指数, 并与北京大学数字普惠金融指数相匹配, 运用双向固定效应模型实证检验传统金融与数字普惠金融对农村居民收入的影响, 重点分析两种金融模式的收入效应差异及其“互补—替代”关系。在此基础上, 运用面板门槛模型进一步检验了经济发展水平和城镇化水平如何影响两种金融模式的收入效应, 从而为传统金融与数字普惠金融的收入效应差异性提供解释。

主要结论如下: 第一, 传统金融没有发挥出应有的服务效能, 其增收作用比较有限且十分微弱。

第二,数字普惠金融能够显著促进农村居民收入增长,其使用深度和数字化程度具有显著的增收效应,其覆盖广度的影响不显著。第三,传统金融与数字普惠金融优势互补,两者在改善农村居民收入方面表现为互补关系,主要体现在传统金融发展为数字普惠金融的减贫增收产生了正向调节效应;第四,传统金融与数字普惠金融对农村居民收入的影响受到经济发展水平和城镇化水平的制约而表现出非线性关系和阶段性特征。具体而言,传统金融与数字普惠金融的边际收入效应均随着经济发展水平和城镇化水平的提高而呈阶梯式上升趋势。以人均GDP为门槛变量时,当人均GDP低于59 163元时,两种金融模式的增收效应均不显著;当人均GDP处于(59 163,93 173]区间时,两种金融模式的增收效应出现第一次跃升,且数字普惠金融的边际增收效应相比传统金融高出34%;当人均GDP大于93 173元时,两种金融模式的增收效应出现第二次跃升,且数字普惠金融的边际增收效应相比传统金融仍高出5%。以城镇化率为门槛变量时,在城镇化率低于59%的门槛值以下,传统金融没有对农村居民收入产生显著影响;在城镇化率高于59%的门槛值以上,传统金融和数字普惠金融均能显著促进农村居民收入增长,且数字普惠金融的增收效应相比传统金融高出238%。数字普惠金融无论在门槛值之下或之上均能显著促进农村居民收入增长,且超过门槛值后其增收效应提高了113%,产生倍增效应。

基于以上结论,提出如下政策建议:第一,利用金融科技和数字技术增强传统金融的增收效应。深入推动传统金融数字化转型,加快补齐数字基础设施短板,缩小农村地区的“数字鸿沟”,打通数字金融服务的“最后一公里”。通过集合性应用软件,将部分基础性金融业务转移至线上平台,降低物理拓展成本、减少申请审核流程、提高专业服务能力,增强农村居民对金融服务的可获得性。第二,推动金融服务下沉,注重开发长尾市场。深入乡村调研,掌握农村居民的信贷偏好,结合农村地区的发展特点,推出与农民实际需求相适应的金融产品,满足不同农户的个性化需求,使更多金融资源助推“三农”小微经营主体发展。第三,进一步提高经济发展水平和城镇化水平,发挥经济增长和城镇化对金融减贫增收的溢出效应。第四,传统金融与数字普惠金融的互补关系表明,仅依靠推广数字普惠金融非最佳策略,在农村地区增设线下营业网点并配备更多悉心为农民服务的金融从业人员仍是必要的,应注重传统金融服务和数字普惠金融服务的有机结合,促进两种金融模式协调发展和常态化互动,更好助力农村居民收入增长和共同富裕的顺利实现。

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The Income-generating Effects of Traditional Finance and Digital Inclusive Finance on Poverty Reduction: Differences and Complementarities

JIANG Mei-shan, LIANG Tai-yuan

(College of Economics and Management, South China Agricultural University, Guangzhou 510642, China)

Abstract: The deep empowerment of traditional finance by financial technology has important research value and broad prospects, and injects new momentum for rural residents to reduce poverty and increase their income. Using panel data of 290 cities in China from 2011 to 2021, this study empirically tests the impact of traditional finance and digital financial inclusion on the income of rural residents. The results show: firstly, traditional finance has not played its role as an effective service provider, and its impact on rural residents' income is limited and weak; secondly, digital inclusive finance significantly contributes to the growth of rural residents' income, and its income-increasing effect is significant compared with traditional finance, with the depth of use and the degree of digitization having significant income-increasing effects, but the effect of the breadth of coverage being not significant; thirdly, there is a synergistic and complementary relationship between traditional finance and digital inclusive finance in promoting income growth of rural residents, mainly reflected in the positive moderating effect of traditional finance development on poverty reduction and income growth of digital inclusive finance; fourthly, the income effects of traditional finance and digital inclusive finance on rural residents are non-linear and stage-specific, and show a stepwise increase with the upgrade of economic development and urbanization level. Digital inclusive finance significantly weakens the threshold effect constraint and have an absolute advantage in the income-raising effect. Therefore, it is recommended to promote the digital transformation of traditional finance and the coordinated interaction of the two financial models to help rural residents' income growth and the smooth realization of common prosperity.

Keywords: traditional finance; digital financial inclusion; income of rural residents; poverty alleviation and income generation; collaborative complementarity

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DO MICROCREDIT LOANS DO WHAT THEY ARE INTENDED TO DO? A CASE STUDY OF THE CREDIT VILLAGE MICROCREDIT PROGRAMME IN CHINA

MEISHAN JIANG¹ , KRISHNA P. PAUDEL^{2*}  and FAN ZOU¹

¹*College of Economics and Management, South China Agriculture University, Guangzhou, China*

²*Department of Agricultural Economics and Agribusiness, Louisiana State University and LSU AgCenter, Baton Rouge, LA, USA*

Abstract: The purpose of this study is to assess if the credit village is an effective way to develop a microcredit programme in China from the perspective of poverty reduction policy and risk monitoring. Cross-sectional household survey data from three credit villages in the Yunan County of China are analysed using 3SLS and IV probit models. The major finding is that the credit village loosens credit restrictions to some extent. However, it has no impact on educational expenditures, medical expenditures, long-term assets, short-term assets and women's rights. It is our observation that the microcredit programme in China needs more innovation to become effective. © 2020 John Wiley & Sons, Ltd.

Keywords: Credit Village; microcredit innovation; welfare impact

JEL Classification: O22; Q14

1 INTRODUCTION

Microcredit is a financial intervention that provides loans without collateral to underserved groups that are excluded by traditional financial institutions (Yunus, 2004; Holvoet, 2005; Aggarwal, Goodell, & Selleck, 2015). Microcredit uses special mechanisms, such as group lending, progressive lending, regular repayment installments, making repayment public, targeting women, financial collaterals and dynamic incentives (Armendáriz & Morduch, 2010). It provides non-financial services to farmers, such as health education,

*Correspondence to: Krishna P. Paudel, Gilbert Durbin Endowed Professor, Department of Agricultural Economics and Agribusiness, Louisiana State University and LSU AgCenter, Baton Rouge, LA, USA.
 E-mail: kpaudel@agcenter.lsu.edu

cultural education, marketing education and training in agriculture production practices. Implementation and operation mechanisms of microcredit have been developed in different countries (Armendáriz & Morduch, 2010; Awunyo-Vitor, Abankwah, & Kwansah, 2012; Garikipati, 2008; Goetz & Gupta, 1996; Hermes *et al.*, 2005; Holvoet, 2005; Rahman, 1999), so microcredit systems vary in their operational details, but the fundamental objective of providing loans to the poor without collateral stays the same.

The microcredit programme in China was started in 1994 by the Rural Development Institute of the Chinese Academy of Social Sciences and the Yi county government of Hebei province for the purpose of poverty alleviation. The microcredit programme is currently operated by three different entities: the government, non-government organizations and financial institutions. The government agencies that operate the microcredit programme are departments operating under the poverty alleviation mandate, such as the Poverty Relief Office and the Labor and Social Security Department. The non-governmental organizations, supported by government, international donors and others, include the Chinese Academy of Social Sciences and the Women's Federation, among others. Financial institutions providing microcredit include rural credit cooperatives, village banks and other microcredit companies. Microcredit from rural credit cooperatives is the primary credit source in rural areas in China. These rural credit cooperatives get capital through deposits, refinancing and rediscount from the People's Bank of China; however, information asymmetry restricts the development of microcredit for individual lending.

Credit village is an innovation of the microcredit mechanism for clearing the obstacles that exist between the rural credit cooperatives and farmers. It enables the direct flow of capital from rural credit cooperatives to farmers. Another objective of the credit village is to prevent an excessive flow of capital from rural to urban areas. The credit village reduces credit risk through three mechanisms: by rating farmers; by sharing information with other governmental departments such as the Public Security Bureau and the Administration for Industry and Commerce; and by creating a donation foundation pool that can be expanded five times by rural credit cooperatives to lend to the poor for income-generating activities. It extends the Grameen Bank model by penalizing those who fail to repay with social and economic exclusions, not only to the credit group but also to the entire village.

We analyse the credit village mechanism based on microcredit theory and evaluate its effectiveness using 3SLS and IV Probit models to data available from Guangdong province, China. We organize the remaining parts of the paper as follows. First, we provide literature reviews related to the role of microcredit on asset build-up, education expenditures, health expenditures and women's empowerment. Second, we provide the working structure of the credit village programme used in the paper. Third, we describe the models used in the paper. Finally, we provide results and conclude the paper by highlighting the implications of this study to China's rural credit market and the applicability of the study to rural development in other developing countries.

2 LITERATURE REVIEW

2.1 The Impact of Microcredit on the Income and Household Assets of Farmers

The growth of income and household assets are the most important financial outcomes of microcredit because these are effective indicators for gauging poverty alleviation. Effects

of microcredit on these financial outcomes have been found to be both positive and negative (Nader, 2008; Li, Gan, & Hu, 2011; Swain & Varghese, 2009; Montgomery & Weiss, 2011; Awunyo-Vitor *et al.*, 2012; Van Rooyen, Stewart, & De Wet, 2012; Weber & Ahmad, 2014; Loubere & Shen, 2018; Loubere, 2018). Microcredit correlates with the income and household assets of farmers positively, but the effect is very small (Nader, 2008). One explanation given was that many microcredit programmes focus on survival issues rather than income generation (Nader, 2008; Awunyo-Vitor *et al.*, 2012). Positive effects of microcredit on income and wealth build-up are observed only when participants go through multiple loan cycles (Montgomery & Weiss, 2011; Weber & Ahmad, 2014).

Swain and Varghese (2009) affirm the positive impacts of microcredit on farmers' long-term assets only if the MFI requires members to save money and accumulate poultry and livestock before approving the loan. Hossain (2012) and Imai, Arun, and Annim (2010) find significant poverty reducing effects of microcredit in rural areas in India and Bangladesh. In China, participation in microcredit has improved income level when the loan is used in income-generating activities, and the programme has been effective when borrowers are more involved in the programme (Li *et al.*, 2011; Shuai, Li, & Sun, 2011; Hsu, 2017).

Several other studies have indicated that microcredit has negative effects on asset build-up, especially among participants in Zimbabwe, Pakistan and Sub-Saharan African countries (Barnes, Keogh, & Nemarundwe, 2001; Goldberg, 2005; Van Rooyen *et al.*, 2012). A systematic review has been undertaken by Van Rooyen *et al.* (2012) in Sub-Saharan Africa. The authors conclude that microcredit increases poverty in some cases, but poverty can be overcome by better addressing farmers' needs. Microcredit by commercial financial institutions had no effect on farmers' income and assets, irrespective of whether they invested the money in agriculture or other microenterprise (Montgomery & Weiss, 2011). Combining the loan along with other non-financial services like training, marketing and education can help farmers to generate more income and build-up short-term and long-term assets.

2.2 The Impact of Microcredit on Education in Farm Households

The schooling rate of children is one of the proxy variables of education. In analysing the impact of microcredit on the schooling rate, researchers assume a positive education demand elasticity of income. Microcredit may improve the schooling rate by increasing income, smoothing shock, lending to women and changing the awareness of parents (Maldonado & González-Vega, 2008; Nader, 2008; Montgomery & Weiss, 2011).

Based on data from Egypt, Nader (2008) concludes that microcredit increases the schooling rates of recipient's children. Montgomery and Weiss (2011) also confirm this finding using data from Pakistan. They indicate that the families receiving microcredit are able to send children to school, thereby reducing the total educational inequalities within the community. Maldonado and González-Vega (2008) indicate that microcredit can also reduce the school enrolment rate for children as there is also a demand for child labour in agriculture and other microenterprises. This view is consistent with the findings of Shimamura and Lastarria-Cornhiel (2010), who indicate that girls' school attendance rates declined because agricultural credit induced income-generating activities in tobacco production increased in rural Malawi. Hazarika and Sarangi (2008) conclude that

microcredit-induced enterprise may not reduce the schooling rate, but the children attending the school from the household with a microcredit enterprise are tired because of farm work and put less effort into their studies.

2.3 The Impact of Microcredit on Women's Empowerment

The relationship of microcredit and women's empowerment lies in two aspects. First, microcredit gives women an increased chance to take part in income-generating activities, even if they may not always succeed in generating a high return from the investment. It gives them self-confidence and bargaining power in the family (Osmani, 2007). Second, microcredit with group lending organizes women from different walks of life together that can uplift their spirits and help them to face challenges along with other group members (Osmani, 2007; Revindo & Gan, 2017). Microcredit from the Women's Federation (WF) is one path to success. The WF gives women borrowers yellow bean seeds and provides new production technology along with needed microcredit. The WF is a national non-government organization (NGO) that has a strong influence among women borrowers in China. From the transaction cost perspective, providing microcredit along with non-financial service increases the cost of microfinance institutions. So the best strategy may be 'borrower+organization+MFI', with organizations giving non-financial services to borrowers. This is a financial linkage system for decreasing transaction costs.

The indicators for women's empowerment include financial and social aspects, such as decision making, resource controlling, better treatment in the village, a sense of self-confidence, family harmony, equitable status, participating in a social network actively and access to loans (Rahman, 1986; Goetz & Gupta, 1996; Khandker, Khalily, & Khan, 1995; Nader, 2008; Weber & Ahmad, 2014; Revindo & Gan, 2017). Because there are many indicators available, the results in previous studies do not seem to show across the board positive effects.

Nader (2008) claims that if women do not put themselves in a decision-making position, participation in microcredit may not be able to empower them. The impact of microcredit on family harmony can be positive because it increases income, but at the same time, it may have a negative impact because there is less time available for leisure activities (Nader, 2008). Additionally, women generally do not have full control of the loan borrowed from the microfinance institutions. What is unfortunate in many cases is that if a husband has a loan that he is unwilling to pay, his wife has to settle the debt by selling whatever meagre assets they may have accumulated. This problem can be overcome by making loans to women and empowering them with market access (Goetz & Gupta, 1996). Several authors (Rahman, 1986; Khandker *et al.*, 1995; Montgomery & Weiss, 2011) have expressed the view that irrespective of who has the managing power, microcredit receiving households are much better off than non-recipient households when evaluated using criteria such as income, consumption and the right to make decisions by females in a household.

Decision-making abilities are more important for women's empowerment than other rights. However, microcredit cannot be translated into household decision-making automatically. Microcredit has a significant impact on decision making when it is given through women's groups, especially if the women have been members of the group for a long time (Holvoet, 2005). This is because group pressure and group financial support improve a woman's position within the household. Therefore, delivery models and lending

technology are assumed to be more important than the credit itself in empowering women through microcredit (Holvoet, 2005; Garikipati, 2008; Jia, Cull, Guo, & Ma, 2016). Ganle, Afriyie, and Segbefia (2015) explain that women's empowerment depends on the capacity to control the loan and having a microenterprise before receiving the loan. At the same time, they emphasize the importance of adequate loan size, appropriate timing, effective monitoring and better screening methods in lending to ensure women's empowerment.

Weber and Ahmad (2014) explain that microcredit has an impact on financial empowerment (e.g. asset buying, household expenses and income spending) but not on social empowerment (e.g. decision making, schooling and marriage). They add that social empowerment is not obtained through increasing income and asset accumulation, but through external forces, such as the cooperation of the husband, autonomous productive activities, family members and peers outside of the household (Ngo & Wahhaj, 2012; Weber & Ahmad, 2014).

2.4 The Impact of Microcredit on Health Expenditures

Microcredit and the household's health are connected through four pathways: social, economic, psychological and political. Better health care is possible because microcredit provides social support, increases income, provides a stronger voice in the community and household and boosts self-confidence (Ahmed, Chowdhury, & Bhuiya, 2001; Mohindra & Haddad, 2005; Pronyk *et al.*, 2006; Montgomery & Weiss, 2011). The most important pathway is that microcredit gives fund to vulnerable groups without collateral to respond to health shocks. In addition to that, the other contributions to health include health awareness, prevention and guidance. This also provides opportunities to spread health knowledge to group members. Microcredit has group power and non-financial services that make it different from other types of credit.

Households receiving microcredit loans provide better medical care for their children and have a lower rate of child mortality (Montgomery & Weiss, 2011) than nonparticipating households. Ahmed *et al.* (2001) compare mental health problems in two groups of rural women with the same social and economic status. Their study shows that microfinance participants had better mental health as measured by emotional well-being and stress levels. Where women's mental health problems are mostly because of economic problems, the intervention of microcredit can provide loans, skills training and savings, which improves the economic status of poor women in their households. Women's mental health problems originating from economic problems are therefore resolved gradually as they continue their membership in the group.

Mohindra and Haddad (2005) also find a significant positive relationship between microcredit and women's health as measured by health care expenditures and mental stress. Pronyk *et al.* (2006) find that South African women participating in the microcredit project for 2 years experienced 55 per cent less intimate partner violence compared to the nonparticipating women. However, they did not find any difference in the prevention of HIV between two groups. It is clear from these studies that microcredit can improve the health of recipient households through its unique operating mechanisms.

Different proxy variables of farmers' welfare have different results. Different cultures needs different proxy variables to analyse the impact of microcredit. As for the women's power, women in China have more rights and wealth than in other South Asian countries such as Bangladesh and India. Measures like seeing the doctor when ill or having assets

under the woman's name are not good proxy variables for measuring the results of obtaining microcredit in China.

2.5 Problems with Microcredit

Microcredit is not the panacea, as described in the previous sections 2.1–2.4. Excluding problems related to data and econometric methods, there are several shortcomings of the microcredit programme as pointed out by previous authors (Yunus, 2011; Duvendack & Palmer-Jones, 2012; Banerjee, 2013; Duvendack, Palmer-Jones, & Vaessen, 2014; Banerjee, Karlan, & Zinman, 2015b; Angelucci, Karlan, & Zinman, 2015; Loubere & Shen, 2018; Loubere, 2018).

The field work of Loubere (2018) in China indicates that microcredit has both beneficial and detrimental impacts during the process of capital, knowledge and technology transfers from the central town to marginal villages. The negative impact comes from the arbitrage of village officers and elites based on the non-standard operation mechanism as compared to the Grameen Bank operation model. Coleman (2006) also provides evidence through his study of a group-lending programme of women in Northeast Thailand that microcredit targets wealthier farmers and has a positive impact on affluent and well-connected farmers. The MFI selects the lending group member based on land holding and local information known through the village leader. This selection process leads to a wealthy group member phenomenon that makes poor farmers think only the wealthy can apply to become a group member and hence results in a relationship-based lending (mission drift occurs). It worsens marginalization of the poor in rural areas. In transforming developing countries, microcredit addresses social problem only temporarily for the workers who are getting laid off (Loubere, 2017). Loubere and Shen (2018) provide evidence based on two microcredit programmes: the Employment Microcredit Program and the Farmer Microcredit Program in China. They indicate that microcredit causes marginalization and demarginalization at the same time without a net positive impact. Microcredit benefits local elites based on relationships (Loubere & Zhang, 2015).

Banerjee, Duflo, Glennerster, and Kinnan (2015a) do not find a substantial impact of microcredit on income, consumption, health, education and women's empowerment in India. Angelucci *et al.* (2015) measured the impact of microcredit in Mexico using 37 different outcomes encompassing micro entrepreneurship, income, labour supply, expenditures, social status and subjective well-being and find no impact.

One of the reasons why microcredit fails is because the time-inconsistent borrowers increase consumption too much, and they have no ability to deposit funds for repayment (Banerjee, 2013). If borrowers use microcredit for consumption, do not have business acumen and do not have an income-generating project, microcredit cannot generate more income effects (Banerjee, 2013). Eventually, microcredit decreases farmers' borrowing ability and expenditure (Seng, 2018).

Other reasons are that investment in microenterprise needs a high return exceeding 24 per cent to cover the interest of microcredit, which is a difficult proposition for small size farmers, the poor (Banerjee *et al.*, 2015a) and especially women who face family-related and individual-related challenges, due to funds, the project itself or other difficulties (Braná, 2013). Gender discrimination leads to smaller loan size and higher interest rates for women than men (Braná, 2013). Women empowerment requires them to be able to control the loan, the income-generating business and overcome many social and cultural

constraints (Ganle *et al.*, 2015), which they may feel are too challenging and simply give up and decline to participate in the microcredit borrowing process. Microcredit's assumptions that borrowers have business acumen and income-generating projects able to generate higher profits than farming are faulty. Interest rates are inconsistent with the income-generating potential of the project in many cases (Bateman, 2014). Yunus, the founder of microcredit himself, has described many problems associated with microcredit in India where mission drift has happened as microcredit institutions got hijacked by profit making entrepreneurs charging high interest rates (Yunus, 2011). With commercialization of microcredit in some developing countries, MFI accelerates to deviate from its social task. Bateman (2017) indicates that the microfinance sector, especially for out of country investors, earns huge returns through 'accumulation by dispossession' from the poor, not through reconstruct value, and thus causes a negative social impact.

Social capital is essential for living in a village. Defaulting borrowers lose social capital, which makes it difficult for them to live in the same village after the default. Even worse is the fact that indebtedness of a group member makes the leader of the group suffer both emotionally and financially. This lack of social capital and social ostracizing after default makes microcredit borrowers worse off (De Quidt, Fetzer, & Ghatak, 2018) than before participating in the microcredit process. Women borrowers will encounter more violence for non-repayment of microcredit. Given these problems, some developing countries have halted microcredit projects. An easy and crude policy like halting microcredit projects breaks credit equilibrium for the poor and makes credit supply even worse (Breza & Kinnan, 2018).

In conclusion, giving farmers loans to solve their loan restrictions is not the best way to increase their income. The loan may get misused by someone other than the borrower or the borrower may use the loan in a nonproductive area, which leads to heterogeneity and non-linear development (Loubere, 2018). Standardizing microcredit systems and combining the loan along with other non-financial services like training, marketing and education can help microcredit to overcome its shortcoming (Jia *et al.*, 2016). External microcredit intervention needs heterogeneous implementation at local and individual levels to be effective (Loubere & Shen, 2018).

We introduce a new microcredit operating mechanism based on Yunus' theory that links social capital with lending to decrease default rates and increase default cost. We are not only proposing to give loans to vulnerable groups but also providing a series of non-financial services, including help with starting a project, assistance with technology, selling products and helping to pay the interest rate of microcredit. Additionally, we select appropriate variables that are reflective and consistent with the culture of China.

3 MICROCREDIT INNOVATION MECHANISMS IN YUNAN COUNTY, GUANGDONG, CHINA

Yunan county, located in the Guangdong province of China, is a typical mountainous and agricultural area with 500 000 inhabitants. Of these people, 81 per cent live in a rural setting (Figure 1). The majority of farmers are involved in the production or processing of orange, seedless wampee and sericulture. When the credit village programme started in 2009, the per capita annual net income of farmers was 5894 RMB, which was much lower than the 6907 RMB per capita income of Guangdong residents. The number of people below the poverty line in the agricultural sector was about 28 000, or 4497

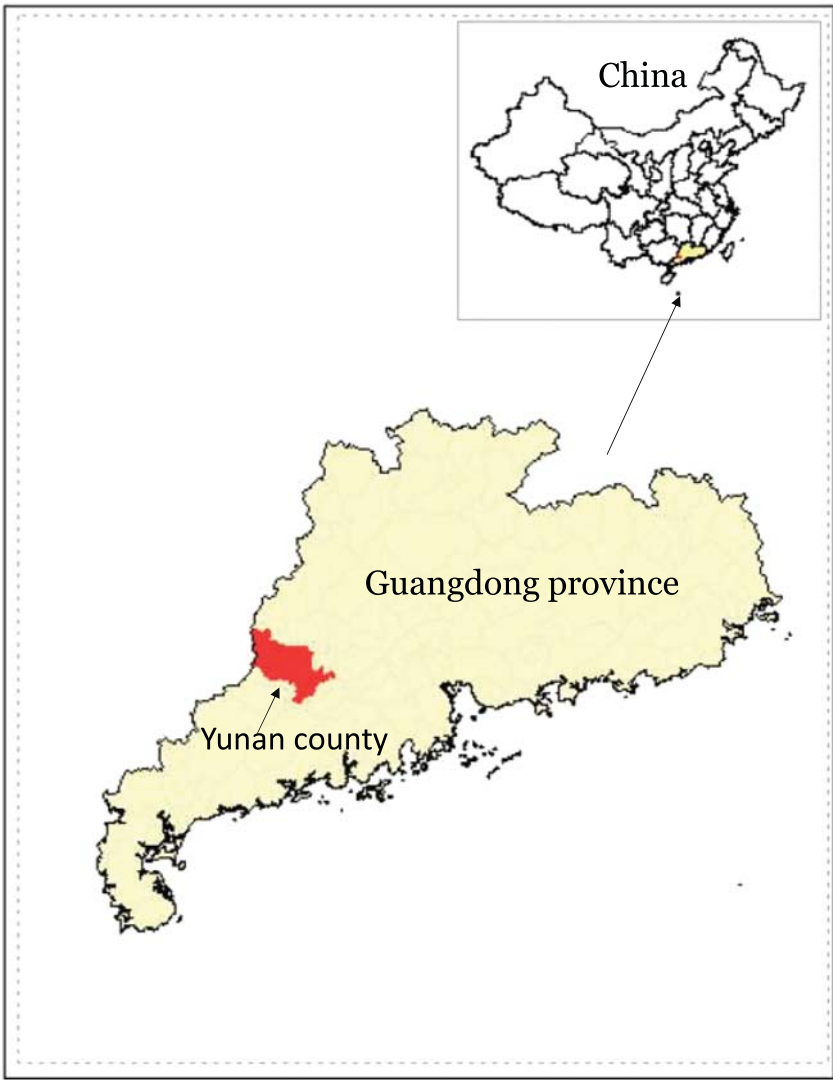


Figure 1. Study location - Yunan county, Guangdong province, China. [Colour figure can be viewed at wileyonlinelibrary.com]

households. Research conducted by the People's Bank of China in 2009 showed that 80 per cent of the farmers in Yunan county think that it is difficult for them to obtain loans from formal financial institutions. The loans owned by formal financial institutions in Yunan county increased by only 22.41 per cent from 2000 to 2008 and the loan-to-deposit ratio was 36.7 per cent in 2008. The slow growth of loan disbursement indicates that farmers are facing a bottleneck in borrowing. In our sample, 44.1 per cent of farmers think they could not borrow what they need, and 10.56 per cent of farmers believe they could borrow only a very small part of what they need before the credit village programme got started.

For resolving credit restrictions and enhancing food consumption, farm input applications and health and educational attainments, the government of Yunan county

has been cooperating with microfinance institutions (MFIs) to implement credit village since 2009. The goal of the programme is three tier credit risk management: (i) rating of farmers based on political, economic and social information; (ii) establishing an information centre for the farmers and for small and medium enterprises (SMEs) so that MFIs could obtain information to lower transaction cost; and (iii) alleviating poverty by way of microfinance so that the path of disbursing loans to farmers and the poor is redesigned.

3.1 Credit Village

Farmers cannot obtain loans from financial institutions without collateral. A credit village can give loans without collateral; this is an innovation of the Yunan county credit village (YCCV). The functioning of YCCV is based on the microcredit theory that relies on social capital as collateral. The first step consists of rating individuals by a rating body composed of 18 individuals representing government officials, cooperatives, village leaders, Chinese Communist Party members, retired cadres and other respected members of the village (Figure 2). The ratings reflect the basic conditions of the farmers, their credit and other financial conditions. An application for rating is initiated by a household. After the application is received by the rating body, the application gets evaluated, and the household's credit worthiness is classified into one of the following categories: excellent (80–100), good (70–80), average (60–70) and poor (below 60). A household with an excellent or good rating is a credit worthy household, which qualifies it to obtain a loan at a reasonable interest rate (Figure 3). This type of household is considered a low risk or model household by the county government.

Rural credit cooperatives will commit a loan of up to 30 000 RMB to a household with an excellent credit rating and 10 000 RMB to a household with good credit rating. If three or more households with a good credit rating form a group, each one of them can get a loan up to 20 000 RMB. A household with an average credit rating cannot borrow independently but may qualify to borrow if it forms a group of at least three members. In such cases, each household receives up to 10 000 RMB. This is performed to reduce the risk associated with lending to households with an average credit rating.

Of the 623 households in the Wutan village of Yunan county, 420 households qualified after participating in the rating process. Among them, 41 households received an excellent credit rating, 318 households received a good credit rating, 29 households received an average credit rating and 32 households received a poor credit rating. A total of 85.5 per cent households received an excellent or good credit rating. Wutan village was given recognition as a credit village after a year of assessment.

Credit village recognition is important for the economic well-being of a village. The conditions for becoming a credit village are (i) non-delinquent loans should account for at least 80 per cent of the total loans disbursed to households, (ii) the village must have 60 per cent of households with excellent or good credit ratings and (iii) the Village Party Branch and People's committee must actively support the work of financial institutions and assist financial institutions to organize funds and recover defaulted loans. A credit village could receive a greater loan size and 10 per cent additional discount in the interest rate from financial institutions. Unlike the microcredit setting in Grameen Bank, a household who defaults on their credit can jeopardize the whole village's credit village recognition.

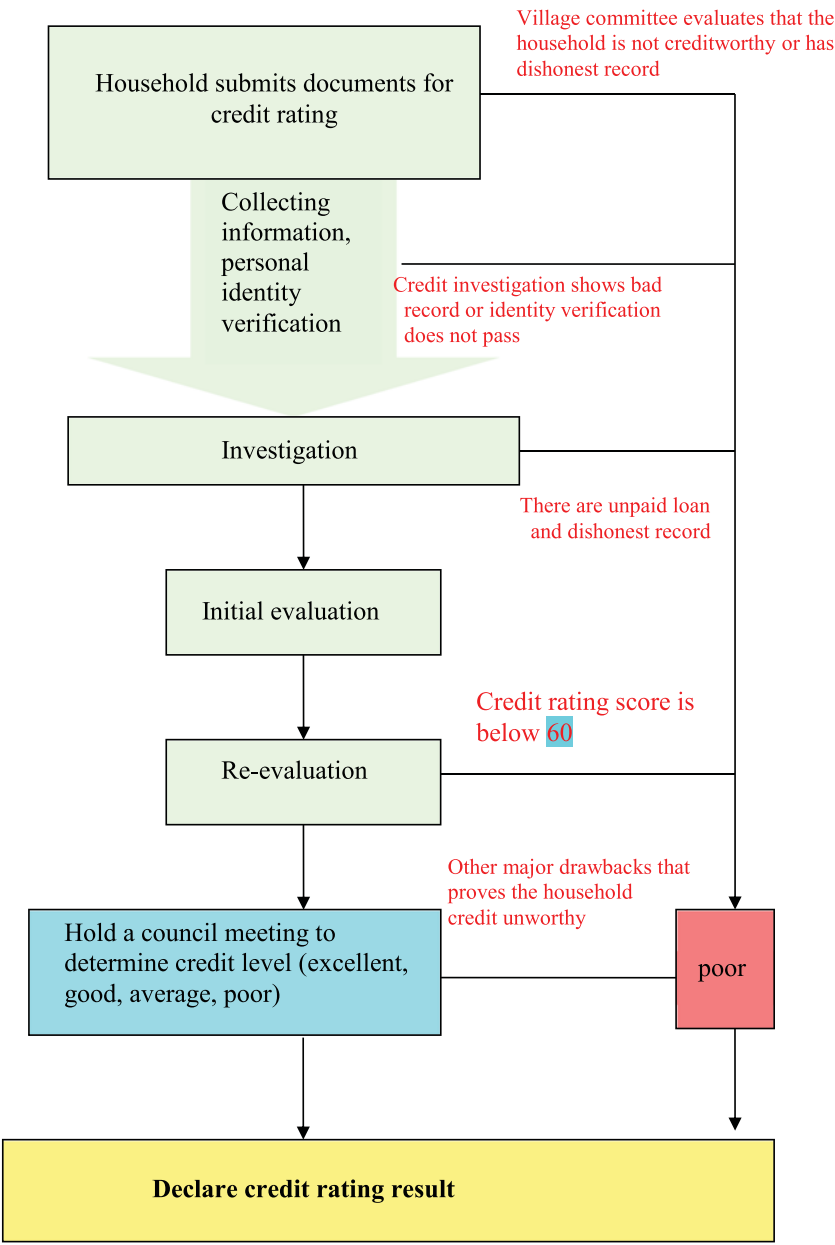


Figure 2. Procedure for rating household's credit worthiness in Yunan County, China (Source: Modified and translated from the Yunan county government document). [Colour figure can be viewed at wileyonlinelibrary.com]

The ratings grade can also be used to discover a model individual to be recognized by the county government every year (while a defaulter will be punished not only in the credit market but also in social and political settings). The rating result is dynamic, and it is applicable for only 2 years (the objective is to make loan repayment a habit).

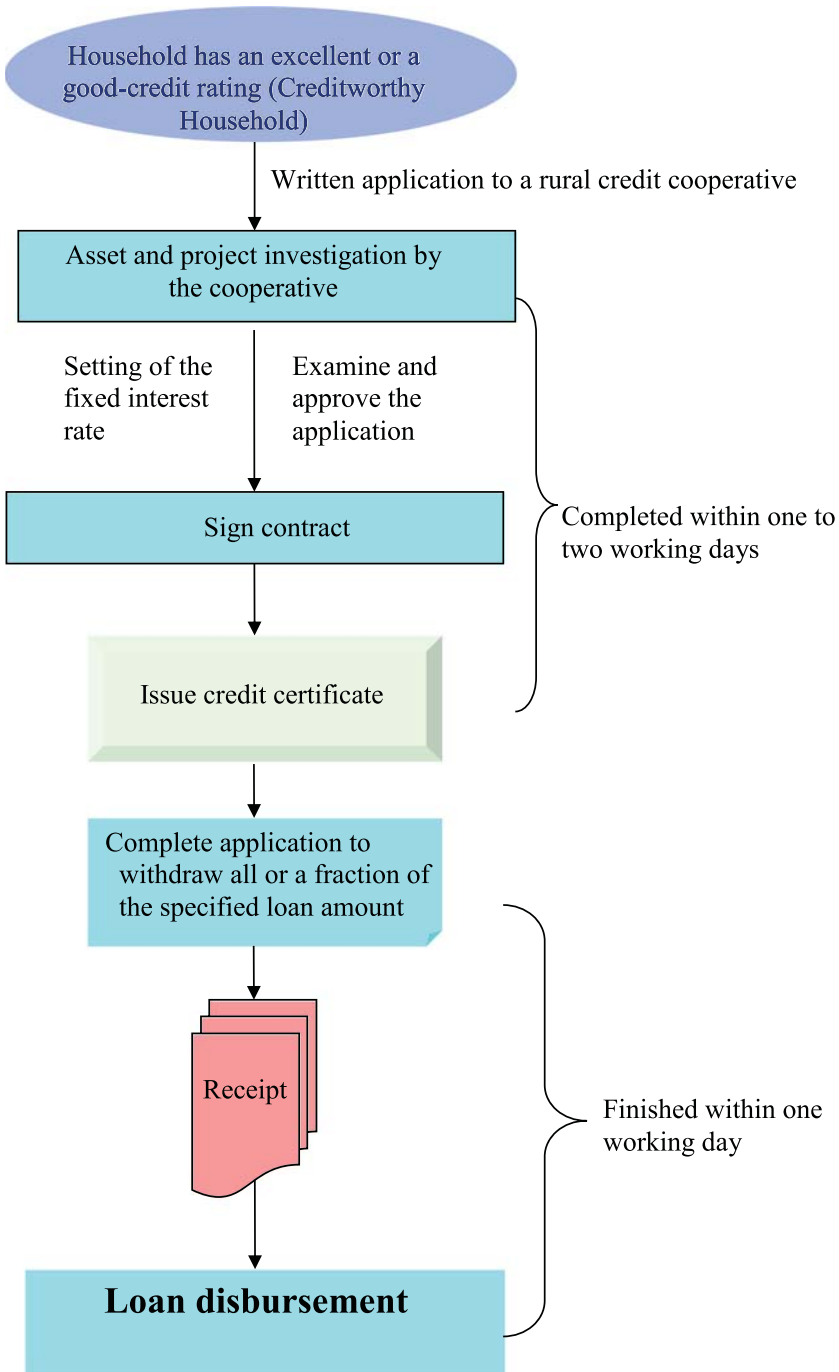


Figure 3. Procedure for loan disbursement to households with excellent and good credit ratings.
[Colour figure can be viewed at wileyonlinelibrary.com]

Within 2 years of approval, households can use the authorized credit amount. The interest rate is charged according to the actual amount of the loan, and there are no additional fees associated with it.

Through the Credit Village, the relationship between farmers and cooperatives changes into a relationship among farmers, cooperatives and government. Government plays a coordinating role between the cooperatives and farmers by making the credit rating uniform. If an individual defaults, he gets penalized socially, politically and economically. On the other hand, if an individual repays, the credit village continues to gain an advantage in loan size and loan rate (multiplier effects).

3.2 County Credit Information Centre

Although the rural credit cooperatives in China have a goal to increase the volume of loans disbursed, credit risks and high transaction costs are major obstacles to the microcredit system. The county credit information centre is a mechanism innovation that provides credit worthiness information about farmers and SMEs to MFIs. Yunan county is a pioneer in the sense that it created the first county-level credit centre that collects information regarding farmers and SMEs originally stored in the Public Security Bureau, Administration for Industry and Commerce, Electric Power Company, Ministry of Human Resources and Social Security, the bank and other departments. This information includes wage arrears information from the Bureau of Human Resources and Social Security, payment to the Telecom and Water Supply Corporation and Electric Power Company, litigation in court, the failure to pay tax from the Local Taxation Bureau, illegal environmental activities reported to the Bureau of Environmental Protection, administrative penalties and awards, and certificates of qualification in relevant departments. We provide the functioning structure of the Yunan County Information Center in Figure 4.

If MFIs previously needed information about clients, they had to expend lots of resources, and it was difficult to obtain information as they had to contact different departments of government. Yunan County Credit Information Center is unique because it provides both financial and non-financial information related to farmers and nonfarmers, which is not readily available to most financial institutions. This integration of information reduces adverse selection and moral hazards while also leading to lower transaction costs and interest rates.

The importance of the information centre can be understood even better by observing what happened in India. There, farmers borrowed money from one MFI to pay to another MFI, creating a consumptive loan rather than the productive loan it was intended to be.

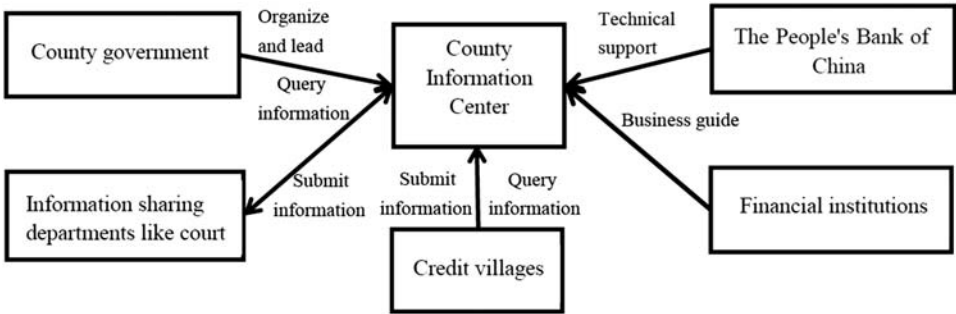


Figure 4. Functioning of the Yunan County Information Center

This has been highlighted by Armendáriz and Morduch (2010) and Dogra and Gorbachev (2016).¹ This type of incident can be avoided through the information centre innovation started by Yunan county.

3.3 Poverty Alleviation in a Financial Way

Innovation of the poverty alleviation mode is the third aspect of YCCV. The general *modus operandi* of poverty alleviation in China has been to provide food, clothing or perhaps some monetary support to the rural poor. This approach is a temporary solution to poverty. YCCV implements a financial way to reduce poverty that puts relief money in a foundation as collateral (Figure 5). The rural credit cooperatives disburses loans totalling up to five times the deposited relief money in the foundation. The loan amount provided by the rural credit cooperatives to a borrower cannot exceed 20 000 RMB, the interest amount has to be paid quarterly, and the principal has to be paid by maturity (generally within 3 years). Another condition for the loan is that 90 per cent of the interest amount has to be paid by the government officials who are responsible for helping the poor, and the remaining 10 per cent interest amount is paid by the borrower. Each of the borrower's projects gets appraised by the relevant government departments for feasibility, and the government departments offer technical support, provide agricultural inputs in credit and help borrowers sell output. By following these steps, relief money is changed into a microcredit loan with non-financial services and a low interest rate.

There are at least three advantages of this innovation developed by YCCV:

- (1) From the perspective of non-financial services, Nader (2008) recommends additional development activities (non-financial services) while providing loans to enhance the ability of borrowers. Although Bhatt and Tang (2002) warn that non-financial services should not be a necessary condition for borrowing, the non-financial services at Yunan involve feasibility analysis, technical support and health awareness services. Therefore, it should be more effective at improving the livelihood of poor farmers.
- (2) From the point of view of the interest rate charged, the international microcredit interest rate is between 20 and 50 per cent, compared to only a 6 per cent interest rate on the microcredit provided to poor farmers in Yunan county. (Even more interesting is the fact that only 0.6 per cent is paid by the poor borrowers.) Based on Dehejia, Montgomery, and Morduch (2012), poor borrowers have more loan demand interest rate elasticity than the rich; therefore, a lower interest rate will provide incentives to poor borrowers to get microcredit loans.
- (3) The involvement of NGOs or other organizations between the borrowers and the financial institutions has been found to be effective in previous studies. Swain and Varghese (2009) indicate a long-term positive impact such as more asset creation if NGOs act as intermediaries between banks and borrowers to provide non-financial services. When the loan is transferred through women's organizations, the impact of microcredit on empowerment of women is obvious, especially when women are in the organization for a long time and they participate in more training and group meetings (Holvoet, 2005).

¹<http://thewire.in/18937/why-microfinance-is-becoming-a-bad-word-all-over-again/>

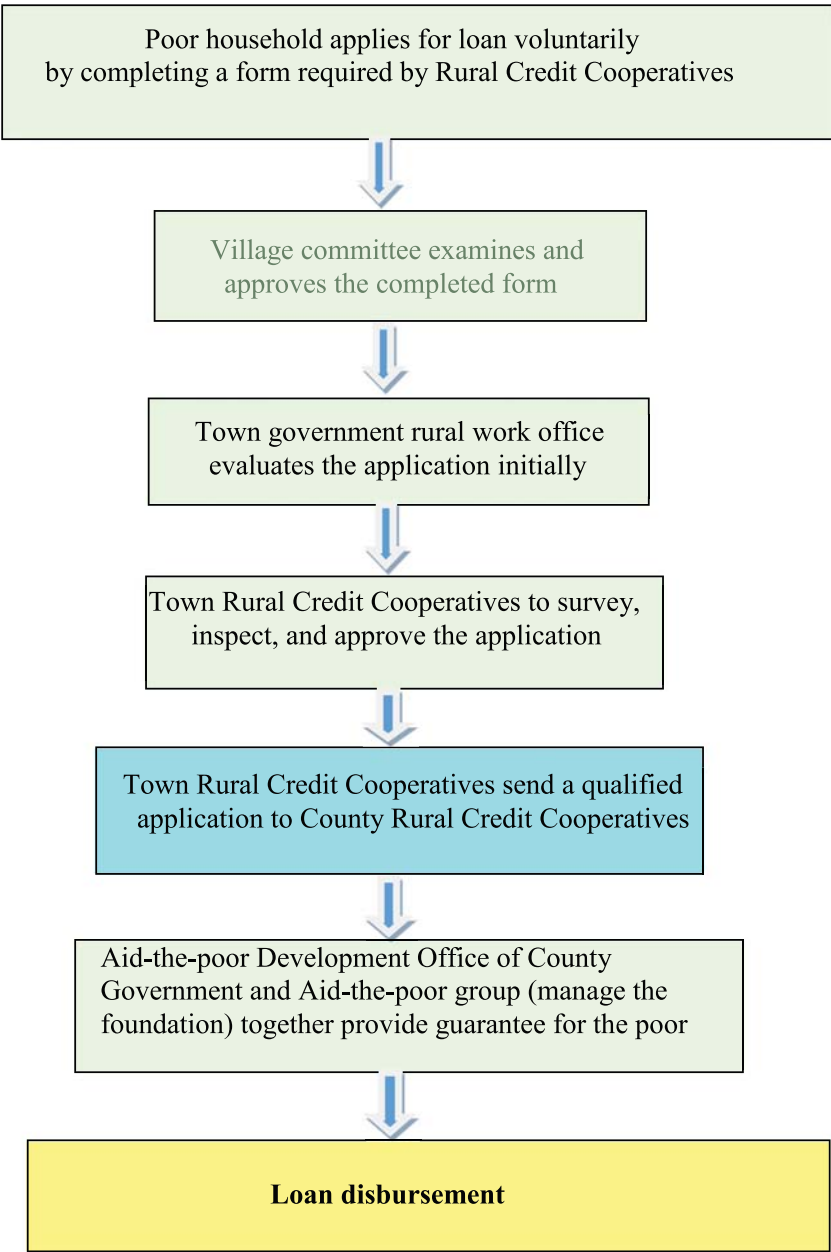


Figure 5. Procedure for loan disbursement to resource poor households. [Colour figure can be viewed at wileyonlinelibrary.com]

4 METHOD

We can use a simultaneous equation method to test if the credit village loosens credit restrictions and improves farmers' living conditions through a change in asset build-up, health and education expenditures. The impact on women's rights can be assessed using

a probit model with the dependent variable related to women's decision-making power (yes/no) in the household.

Long-term assets, short-term assets, medical expenditures and education expenditures are interrelated to each other. Long-term assets and short-term assets have an impact on medical and education expenditures because selling these assets provides the cash needed for medical and educational expenditures. In the rural financial market, credit restrictions make owned capital more important than other factors of production. Short-term assets are more liquid than long-term assets. Medical expenditures can reduce the funds available for educational expenditures. If there were a choice between educational attainment and medical treatments, villagers were likely to select the medical treatment first. Long-term assets can also be impacted by short-term assets because short-term assets are an important capital resource for purchasing long-term assets. These variables are endogenous to the system; therefore, corresponding simultaneous equations can be expressed as follows:

$$\begin{aligned}M_i &= \gamma_M + \alpha_M D_i + \beta_M S_i + \theta_M F_i + \delta_M LA_i + \varphi_M SA_i + \epsilon_i^M \\E_i &= \gamma_E + \alpha_E D_i + \beta_E S_i + \theta_E F_i + \delta_E LA_i + \varphi_E SA_i + \rho_E M_i + \epsilon_i^E \\LA_i &= \gamma_{LA} + \alpha_{LA} D_i + \beta_{LA} S_i + \theta_{LA} F_i + \mu_{LA} G_i + \varphi_{LA} SA_i + \rho_{LA} M_i + \sigma_{LA} E_i + \epsilon_i^{LA} \\SA_i &= \gamma_{SA} + \alpha_{SA} D_i + \beta_{SA} S_i + \theta_{SA} F_i + \tau_{SA} H_i + \rho_{SA} M_i + \sigma_{SA} E_i + \epsilon_i^{SA}\end{aligned}$$

Here, M is medical expenditures, E is education expenditures, LA is a long-term asset and SA is a short-term asset. The coefficient of F_i measures the impact of a participant's credit rating, loan from MFI and informal ways on household welfare. D_i is a matrix representing the farmers' demographics, including gender, job, education, household head, land and labour ratio. S_i is the proxy variable of the farmers' social situation. G_i is the proxy variable of factors that impact long-term assets but do not impact short-term assets (household income in 2010). H_i is the proxy variable of factors that impact short-term assets but do not impact long-term assets (household members who are involved in farming); ϵ_i^j is error with $E(\epsilon_i^j|X) = 0$ and $corr(\epsilon_i^j, \epsilon_i^k|X) \neq 0$, where X is all exogenous independent variables.

Given that we have some dependent variables enter into another equation as explanatory variables and error terms are correlated across equations, we estimate the above model using a three stage least square (3SLS) method. The 3SLS can use the variance–covariance matrix of cross-equation error terms to correctly estimate the standard error of all equation parameters (Zellner & Theil, 1962; Faggian & McCann, 2009). The Hausman specification test results show that a better specified order of models is iterative 3SLS, 3SLS, 2SLS and OLS, so we choose to interpret parameter estimates from the iterative 3SLS in Section 6.

The identification issue needs to be resolved when estimating a 3SLS model. Test statistics presented in Tables 1 and 2 indicate that there are no issues related to under identification in the model.

Self-selection issues are often encountered in loan disbursement, as rural credit cooperatives sometimes give loans only to well-to-do clients. Those who receive loans may differ from the very beginning from those who do not receive loans, and they continue to differ in resource endowment over time. MFIs choose poor areas where it is easier to implement microcredit. Therefore, unmeasured area factors and household attributes could be obstacles to calculating the real impact of microcredit.

Under the credit village system, MFIs give loans to farmers without collateral except in cases of households with poor ratings. Households with poor ratings only account for 7.7

Table 1. Instrumental variable identification

Variables	Weak identification test		Over identification	Under identification test	
	KleibergenPaap stat	Wald <i>F</i> - stat	Hansen <i>J</i> -stat	KleibergenPaap stat	<i>LM</i> - stat
Medical expenditure	2.721		8.818 (0.18)	12.091 (0.09)	
Education expenditure	2.424		5.549 (0.47)	13.412 (0.06)	

Note: *P*-value of chi-square in parentheses. Weak identification test depends that 2.721 is less than 20 per cent maximal IV size value 10.41 and 20 per cent maximal IV relative bias value 6.20.

**p* < 0.1.
***p* < 0.05.
****p* < 0.01.

Table 2. *F*-statistic of the first stage

	(1) Medical expenditure	(2) Education expenditure	(3) Long-term asset	(4) Short-term asset
<i>F</i> value	4.12 (0.000)	2.94 (0.000)	1.93 (0.022)	1.66 (0.060)

Note: Pro > *F* in parentheses.

per cent in our sample. Some of these farmers can obtain loans under the system of financial poverty alleviation. We select three villages in the sample with similar political, economic and social conditions. Furthermore, by setting the credit rating level and village as independent variables, we can avoid the selection bias issue.

To determine the variables affecting women’s rights, we use the following specification:

$$W_i = \gamma_W + \alpha_W D_i + \beta_W S_i + \theta_W F_i + \sigma_W R_i + \epsilon_i^W$$

Except R_i , all the variables used in this equation are defined previously. R_i is a matrix that includes farmers’ social relationship variables, such as the number of siblings and the surviving parents of both spouses. This equation is estimated using an IV probit model. Variable *Household income in 2011* is endogenous and we use the village as an instrument variable. Different villages have different geographic orientations and soil fertility levels that can be important factors affecting income generation, but that is only a cause, not a result, and therefore has no relationship to the error term or the women’s rights variable. These geographical and soil-related variables impact women’s rights only through income.

5 DATA AND VARIABLES

We interviewed randomly selected households from three villages (Dadi, Gumian and Wutan) in Yunan county, Guangdong province in 2012. These three villages have similar political, economic and social conditions. The credit village has been implemented in Yunan county since 2009. We interviewed a total of 214 households: 48 households from

Dadi village, 31 households from Gumian village and 135 households from Wutan village. Most of the farmers are from Wutan village because the credit village programme was first implemented there.

We use demographic, social, economic and financial variables in regression models. Dependent variables include education expenditures, medical expenditures, long-term assets, short-term assets and women's rights (Table 3). Education and medical expenditures reflect the amount of household spending on education and health in 2011. Compulsory education and some form of minimal medical insurance have been implemented in the study area for many years prior to the credit village programme. However, education and medical expenditures are still a significant component of spending

Table 3. Variable definitions

Variable	Definition	Average	Std. dev.
<i>Dependent variables</i>			
Education expenditure	Amount of household education expenditure in 2011	5240.67	10 501.54
Medical expenditure	Amount of household medical expenditure in 2011	5890.19	12 158.63
Long-term asset	The sum value of family house and farm machinery, electrical appliances and furniture in 2011	122 645.10	201 591.20
Short-term asset	The value of household livestock in 2011	3898.99	17 285.76
Women right	Women can decide how to spend money of household	0.74	0.44
<i>Explanatory variables</i>			
Gender	Gender = 1 if the household head is male, else is 0	0.832	0.375
Sickness	Family members had no major disease in 2011	0.583	0.494
Students	Number of students in the household	1	1.180
Credit rating	Family participates in credit rating	0.300	0.460
Land	Mus of household woodland and farmland	8.721	12.020
Loan from MFI	Household obtained loan from MFI only in 2009–2011	0.218	0.415
Loan from relatives and friends	Household obtained loan from relatives and friends only in 2009–2011	0.647	0.480
Labour ratio	Number of working members/family members	0.612	0.238
Wutan village	The household lives in Wutan village	0.630	0.484
Dadi village	The household lives in Dadi village	0.224	0.418
Ages 31–40	The age of household head is 31–40	0.145	0.353
Above 50	The age of household head is above 50	0.458	0.500
High school	The education level of household head is high school,	0.1830	0.388
University	The education level of household head is university	0.047	0.212
Farmer	The job of household head is farmer	0.822	0.383
Village cadre	The job of household head is village cadre	0.047	0.212
Farming	The amount of farming member in your family	2	1.513
Income 2011	Household income in 2011	38 075.74	58 992.54
Income 2010	Household income in 2010	40 370.34	64 729.17
Alive siblings of head	Living siblings of household head	3.588	2.129
Alive siblings of spouse	Living siblings of spouse	3.875	1.975
Alive parents of head	Living parents of household head	0.842	0.840
Alive parents of spouse	Living parents of spouse	0.962	0.850

by farmers. Family members in households go to university or pursue other educational training. There is also the likelihood that some family members will incur health problems that will increase loan demand because rural income is seasonal, but medical and educational expenditures occur throughout the year. Our hypothesis is that the credit village provides liquidity and loosens cash restrictions, thereby allowing farmers an opportunity to spend on education and medical expenses when needed.

We sum the value of family house and farm machinery, electrical appliances and furniture in 2011 to derive the total long-term assets. The value of household livestock in 2011 represents the short-term assets. Short-term asset investment and parts of long-term asset investment (except for farm machinery) are termed productive investment in accordance with the loan rules of MFI. Therefore, our hypothesis is that credit village has a positive impact on short-term and long-term asset build-up.

The value of the women's rights variable is equal to one when women can decide how to spend money in households. Compared with other variables like decision making, resource controlling, better treatment in district, a sense of self-confidence, family harmony and access to loans, this variable can express women's rights more accurately. In China, rural women have less right than urban women because urban women can earn income from outside work. If the credit village can give loans to rural women, they can earn more and gain more rights. So we hypothesize that the credit village has a positive impact on women's rights.

Independent variables include demographics, social relationships and the economic and financial characteristics of a household. Demographic variables include gender, age, education, job, labour ratio, village, the number of family members involved in farming, student number in the household and land size. A farmer's financial situation is indicated by participating in the credit rating programme, borrowing from a microfinance institution (MFI) and borrowing from friends and relatives. The number of parents, siblings and the spouse represent the social relationships of households. Independent economic variables are income in 2011 and in 2010, along with the health situation of household members.

Definitions of variables used and their descriptive statistics are shown in Table 3. As shown in the table, 83.18 per cent of household heads are male and 16.82 per cent are female, 45.79 per cent of household heads are above 50 years of age, the education level of household heads is concentrated at the junior high school level (with 39.91 per cent of the sample belonging to this category) and there are 27.71 per cent household heads with only a primary school education, and 4.72 per cent household heads with a university level education. The main occupation of household heads is farming, accounting for 82.24 per cent of all surveyed households, and small business and migrant work are stated as occupations by 4.12 per cent of the household heads. The three villages selected in the study are primarily dominated by farming operations, so the lion share of income for the households in these villages comes from farming. The education level and the jobs chosen by households are related, as low education precludes many household heads from getting high-paying jobs, so they are engaged in a low income-generating job like farming. Similarly, old age may restrict one to migrant work or owning a small business.

In our sample, 74.15 per cent of women can decide how to use money, whereas 63.90 per cent of women can decide on all family-related issues. The social status and freedom experienced by Chinese women are better than those of women in other developing countries.

Table 4. The impact of credit village on education expenditure, medical expenditure, long-term asset and short-term asset in Yunan county, Guangdong province, China as obtained using an iterative 3SLS model.

Variable	Education expenditure	Medical expenditure	Long-term asset	Short-term asset
Short-term asset	−0.379 (0.322)	−0.031 (0.083)	0.141 (0.125)	
Education expenditure			−0.00434 (0.163)	−0.286 (0.379)
Medical expenditure	−2.601*** (0.646)		0.746 (0.964)	−1.019 (2.331)
Gender	1.348 (1.857)	0.314 (0.484)	−0.725 (0.675)	1.376 (1.583)
Age31–40			−1.495** (0.603)	1.706 (1.357)
Above 50			0.0797 (0.475)	0.279 (1.042)
High school			0.383 (1.550)	2.988 (3.753)
University			−2.104 (1.475)	2.254 (3.249)
Farmer			−1.944 (1.373)	0.788 (3.153)
Village cadre			−2.596 (1.887)	3.395 (4.158)
Income 2010			0.116 (0.0776)	
Credit rating	−0.289 (1.737)	−0.404 (0.452)	−0.707 (0.707)	1.970 (1.634)
Land square	−0.00485*** (0.00162)	−0.002*** (0.000)	0.00121 (0.00174)	−0.00290 (0.00411)
Land	0.226* (0.119)	0.065** (0.030)	−0.0177 (0.0799)	0.158 (0.187)
Loan from MFI	2.674 (2.370)	−0.151 (0.621)	0.153 (0.936)	1.521 (2.348)
Loan from relatives and friends	2.989 (2.381)	0.380 (0.619)	−1.460 (0.958)	2.445 (2.249)
Labour ratio	−3.474 (3.271)	−0.346 (0.872)	1.233 (1.291)	0.235 (3.147)
Farming				0.822** (0.352)
Wutan village	−0.919 (1.476)	−0.437 (0.428)		
Dadi village	−3.238* (1.938)	−0.658 (0.547)		
Sickness		−0.707*** (0.216)		
Students	0.793 (0.614)	−0.041 (0.167)		
Long-term asset	−0.0640 (0.701)	0.057 (0.192)		
Constant	27.60*** (9.522)	8.156*** (2.402)	5.898 (9.606)	4.065 (23.32)
Observations	107	107	107	107
R-square	−1.210	0.386	−0.053	0.035

Notes: Values in the parentheses are robust standard errors. *, **, and *** denote parameters are significant at 10, 5, and 1 percent levels, respectively.

Only 29.65 per cent of households in the sample participated in the credit rating programme. Because of a lower participation in the programme, there are still 39.72 per cent households who cannot borrow from MFIs. Of those who borrowed money, 24.39 per cent of households borrowed only from microcredit institutions, whereas 75.61 per cent borrowed from friends and relatives to meet their family's financial needs in 2009–2011. There are 41.71 per cent households who incurred medical expenditures.

On average each household has about six family members, of which three are labourers and two are engaged in farming. The average landholding size is 8.72 mu,² including woodlands and arable lands. The average number of family members at school equals around one person. The number of siblings of household heads and spouse is averaged to four. The number of parents belonging to the head of the household or the spouse is one. Siblings and parents represent social relationships that provide informal financial resources, but elderly parents may become a financial burden to households.

²15 mu = 1 hectare

6 RESULTS

6.1 Impact on Education

The results from the iterative 3SLS model (Table 4) show that household expenditures in education go down if medical expenditures increase. The results indicate that these two expenditure categories are substitutes. For every 1 per cent increase in medical expenditures, there is a 2.60 per cent reduction in education expenditures. Land holding has quadratic effects on education expenditures. As land holding increases, education expenditures also increase, but education expenditures decrease after the land holding size reaches to 23.3 mu (approximately 1.56 hectares). This is because land has dual characteristics. Land as capital provides returns annually that can support expenses needed for education. In a rural setting, more land also requires more labourers for the production process. This labour requirement for production forces household members to work in the field instead of going to school, thereby reducing education expenditures. Others have found similar results in the labour allocation tradeoff between education and farm work in developing countries (Maldonado & González-Vega, 2008).

Households in the Dadi village spend about 3.24 per cent less on education than the households from the other two villages. Dadi village did not receive the title of credit village by the time of this data collection. Marginal effects of some of these significant variables at 1st quartile, median and 3rd quartile values are shown in Figure 6 (land) and Figure 7 (medical expenditures). Credit rating and loan from MFIs have no impact on educational expenditure.

6.2 Impact on Medical Expenditures

Results show that land has quadratic effects on household medical expenditures (Table 4). As land holding increases, medical expenditures also increase, but medical expenditures decrease after the land holding size reaches to 16.25 mu. We do not find long-term and short-term assets impacting the amount spent on medical treatment.

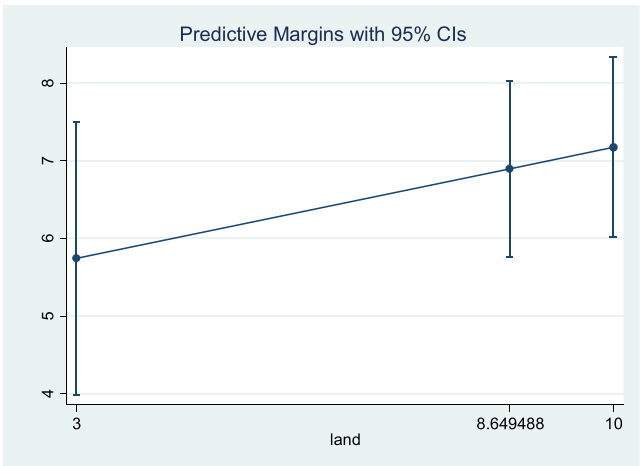


Figure 6. Marginal effects of land on education expenditures at 1st quartile, average, and 3rd quartile values. [Colour figure can be viewed at wileyonlinelibrary.com]

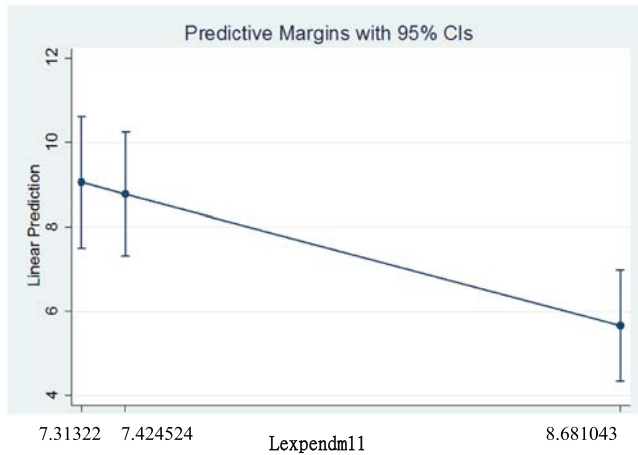


Figure 7. Marginal effects of medical expenditures on education expenditure at 1st quartile, average, and 3rd quartile values. [Colour figure can be viewed at wileyonlinelibrary.com]

In China, medical insurance was implemented when the credit village programme started, but the coverage is for basic check-ups and low priced medicine. Oftentimes, the coverage amount is low, and households have to pay in full after the maximum allowable funds from the insurance are exhausted. In such cases, farmers borrow from friends and relatives, as financial institutions cannot give loans to farmers for medical treatment unless something is used as collateral or there is a guarantor. A farmer with more land can buy commercial insurance, which means he or she does not need to spend out of pocket money for medical expenditures once the premium is paid (the premium for basic coverage for one person per year is about 150 RMB, whereas it is approximately 500 RMB per person per year for the commercial coverage³). In our sample, 82.2 per cent households are farmers; therefore, more land holdings mean they can buy commercial insurance, thereby avoiding their responsibilities for medical expenses in case of a catastrophic health event. We also find that a household with no major health problems spends less on medical expenditures.

Marginal effects show that a 1 mu increase in land holding increases 347.52 RMB in medical expenditures. Marginal effects of land holding at 1st quartile, median and 3rd quartile values are shown in Figure 8. Credit rating and loan from MFIs have no impact on medical expenditure.

6.3 Impact on Long-Term and Short-Term Assets

We use the sum of economic value of the family house, farm machinery, electrical appliances and furniture to define long-term assets. Among these, the value of the house and farm machinery contributes the most towards long-term assets. The long-term assets increase if farmers acquire these items. Yunan county farmers have mainly fruit orchards

³The Chinese government implements the basic health insurance programme for farmers, the premium of which is set at about 150 RMB per year. Commercial insurance should be purchased from commercial companies so the premium amount is different. The value shown here is averaged across several providers based on the authors' knowledge of the area and information available from insurance agents in the region.

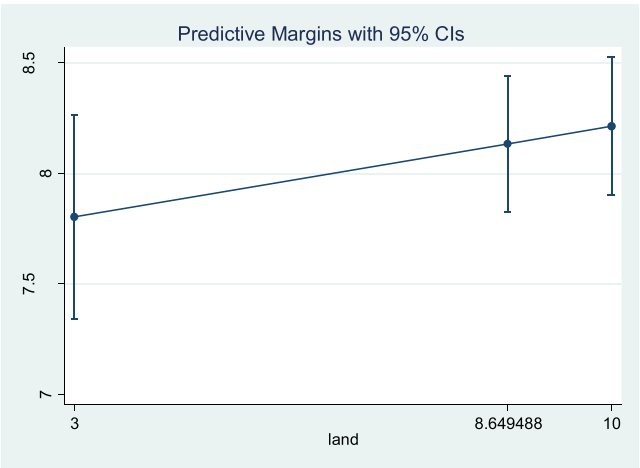


Figure 8. Marginal effects of land on medical expenditures at 1st quartile, average, and 3rd quartile values. [Colour figure can be viewed at [wileyonlinelibrary.com](#)]

and livestock, where manual labour is the norm during the production and harvesting process. Machinery use is minimum.

The results in Table 4 show that household heads of 31–40 years of age invest less in long-term assets compared to other households. We can see from Figures 9–12 that household heads of 31–40 years of age had the lowest income. The figures also show that a farming head of household invests less on long-term assets than others in both 2010 and 2011. This group of farmers does not invest in long-term assets compared to the household heads of other ages and professions. They are in the stage of life between being students and older parents. Daily expenses and a low salary make them unable to accumulate long-term assets. The mountainous landscape of Yunan county is also a reason for not investing in long-term assets as a farmer.

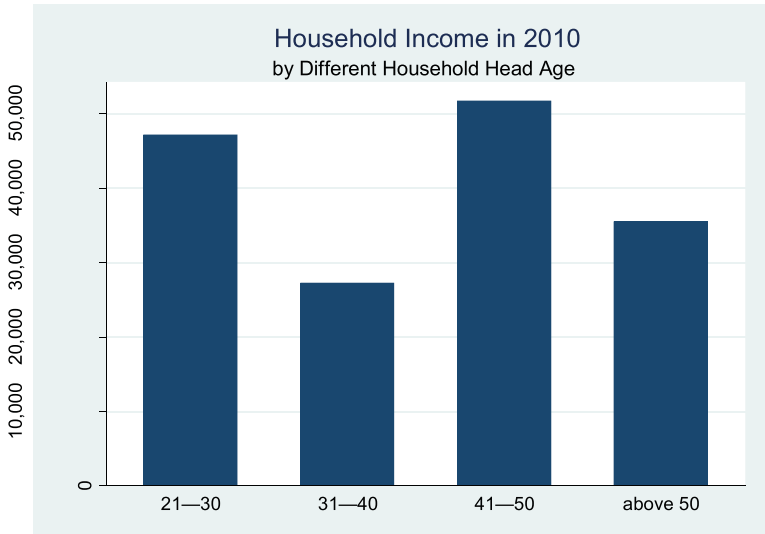


Figure 9. Household income by age categories (years) in 2010. [Colour figure can be viewed at [wileyonlinelibrary.com](#)]

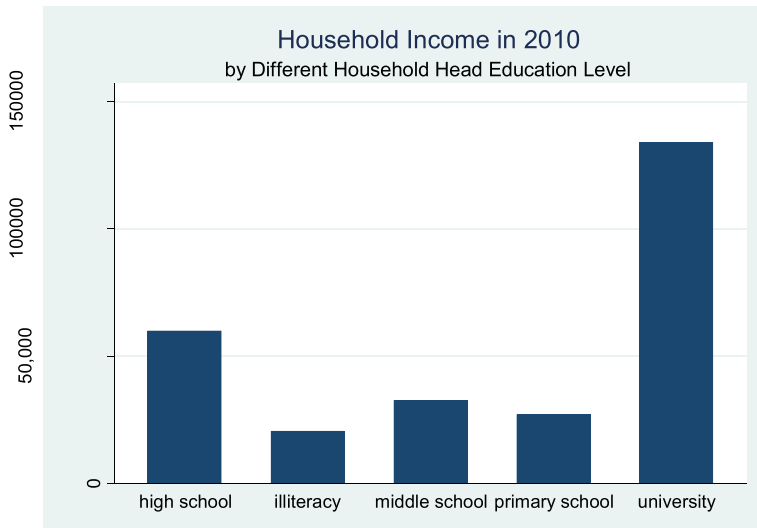


Figure 10. Household income by education levels in 2010. [Colour figure can be viewed at wileyonlinelibrary.com]

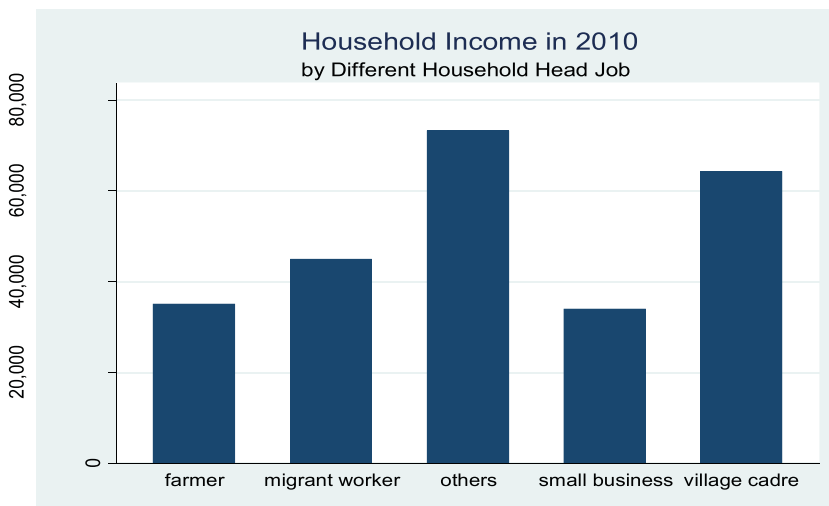


Figure 11. Household income by job category in 2010. [Colour figure can be viewed at wileyonlinelibrary.com]

The results in Table 4 show that more farming members in the household lead to more short-term asset investment. We use the value of household livestock in 2011. This result gives us information about the importance of livestock in the rural households in the sample districts.

6.4 Impact on Women's Rights

We use a female participant in the household having the ability to make decisions as a proxy to measure women's rights. The results (Table 5) show that if the household

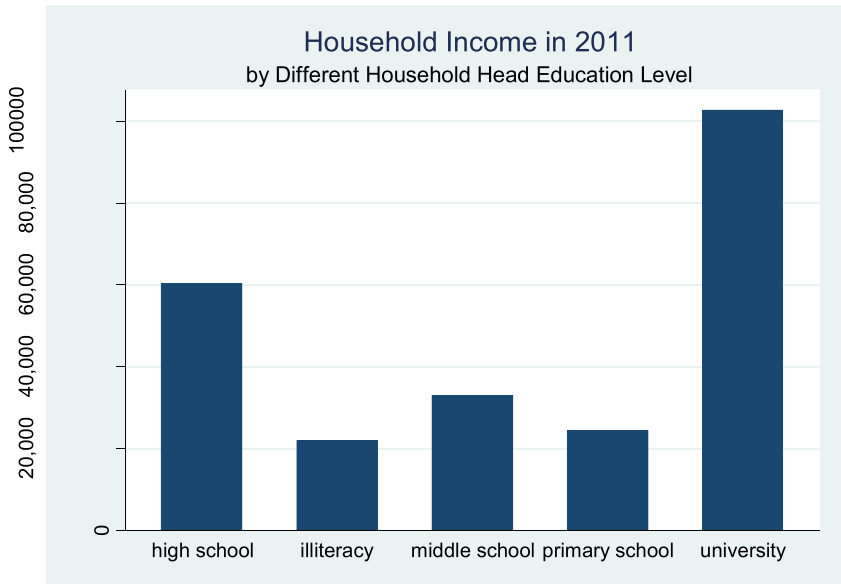


Figure 12. Household income by education levels of the household in 2011. [Colour figure can be viewed at wileyonlinelibrary.com]

Table 5. Impact of the credit village on women’s right in Yunan county, Guangdong province, China, as obtained from estimating a probit model

Variable	Coefficient (robust standard error)
Gender	−0.047 (0.448)
Ages 31–40	−0.072 (0.398)
Above 50	−1.262 *** (0.481)
Farmer	−0.182 (0.727)
Land	−0.112 ** (0.053)
Land square	0.002 (0.002)
Credit village	0.151 (0.403)
Loan from MFI	0.408 (0.514)
Loan from relatives and friends	0.628 (0.441)
Labour ratio	−0.231 (1.045)
Students	0.037 (0.196)
Alive siblings of head	0.123 (0.080)
Alive parents of head	−0.611 ** (0.300)
Alive siblings of spouse	0.158 (0.132)
Alive parents of spouse	−0.040 (0.266)
Income 2011	0.329 (0.354)
Constant	−2.072 (4.180)
N	105

Notes: Values in the parentheses are standard errors. *, **, and *** denote parameters are significant at 10, 5, and 1 percent levels, respectively.

head’s parents are both alive, it has a negative impact on women’s rights. If a household head is older than 50 years, the woman’s rights are less compared to other age groups.

Land, as a proxy variable of assets, has a negative effect on women's rights. Women in households with more land holding have less right, which is because of the unique land system in China. In China, the government implements land laws to protect the rights of

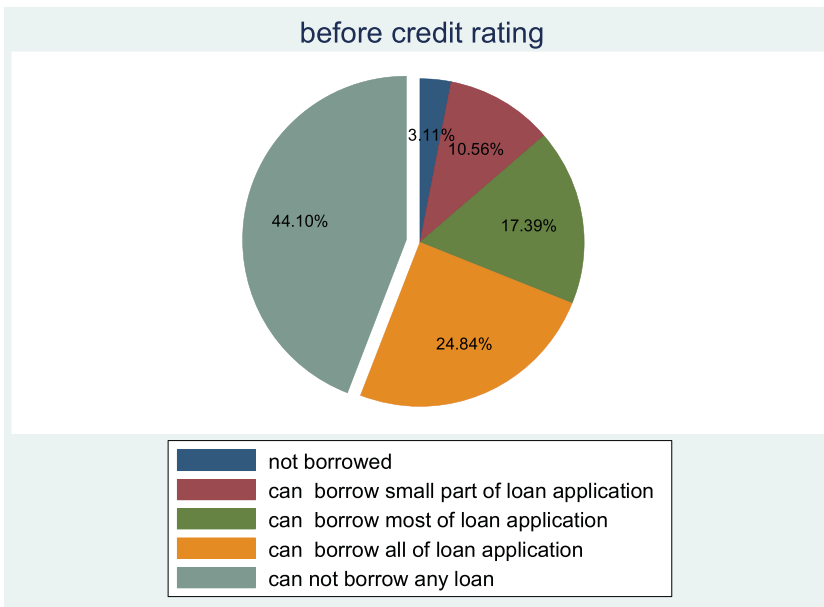


Figure 13. Credit constraint distribution before credit rating program in Yunan county. [Colour figure can be viewed at wileyonlinelibrary.com]

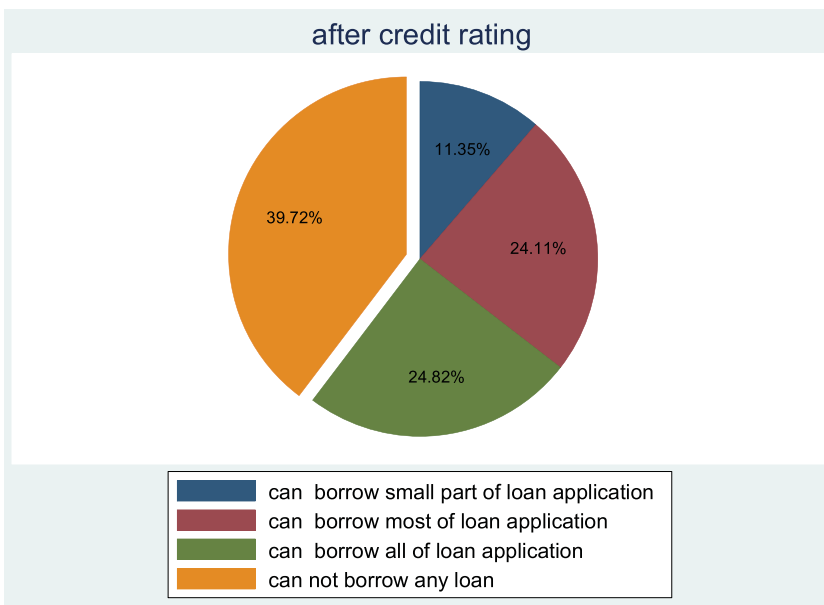


Figure 14. Credit constraint distribution after credit rating in Yunan county. [Colour figure can be viewed at wileyonlinelibrary.com]

women. Land owned by married women gets expropriated by the village collective of their former domiciles, requiring the village collective of their husbands to give them land. However, if both parents of the woman in question are still alive, the village collective does not expropriate the land, and the new residence village collective does not redistribute lands to these married women. This creates a situation in which married women can be landless. If a household owns more land, this only gives husbands more rights, not wives. In our study, 82 per cent of household heads are farmers, and farming is the way of life. Land means economic rights in the family, and those who own more land also have more economic rights.

If a household head is above 50 years of age, he is likely to be more conservative and more likely to make decisions regarding all family issues. A younger household head is likely to be more educated and consider his wife an equal partner. Women's rights are therefore related to the household head's age, and this is confirmed by our results. It is traditional in China and many other Asian countries that the parents of the household head live with their son. The wife of the household head must obey what her husband's parents say. Otherwise, she is considered unfit to be a daughter-in-law by other villagers and cannot continue to live in the village. Therefore, living parents of the household head have a negative impact on women's rights.

Financial situations such as the participation in credit rating, borrowing from financial institutions and borrowing from relatives and friends have no effect on women's rights. Credit village has no mechanism to focus on women's rights.

7 CONCLUSIONS

Results indicated that credit village has no impact on long-term assets, short-term assets, education expenditures, medical expenditures and women's rights. However, the credit village loosens credit restrictions to some extent as can be seen from Figures 6 and 7. We found that although only 30 per cent of farmers took part in the credit rating, credit disbursement has changed substantially in Yunan county. Before the implementation of the YCCV credit rating programme, 45.83 per cent were able to obtain loans, but this jumped to 65.79 per cent after the credit rating (Figures 13 and 14).

On the basis of these observations, one may wonder why the credit village programme did not improve some of the indicators we have measured in this study. We think time and involvement are the two main reasons. Our survey was conducted only 2 years after the implementation of YCCV. YCCV may not have impacted economic activities within that short time period. To make the credit village programme more effective, all agents and entities, including the farmer, MFI and government, need to work in unison.

Credit village is dominated by the county government, and its feasibility is determined by the system set-up and follow-up with different organizations and the successful implementation of the credit rating system. Only county government can make the different departments share information and provide confidence to loan applicants about the system. Dependence on the government to implement and induce market behaviour can result in a lack of long-term sustainability, full of hysteresis and variability. Potential replications of the credit village programme by other countries may be feasible by overcoming some of the drawbacks identified in this paper.

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7.1 Data Availability Statement

Data and programmes used in this paper are available from the corresponding author upon reasonable request.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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检索证明

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RESEARCH ARTICLE

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Does counter-guarantee affect microcredit mechanism's performance on repayment? Evidence from Guangzhou, China

Meishan Jiang¹  | Krishna P. Paudel²  | Seydina O. Sene²

¹College of Economics and Business, South China Agricultural University, Guangzhou, China

²Department of Agricultural Economics and Agribusiness, Louisiana State University (LSU) and LSU Agricultural Center, Baton Rouge, Louisiana

Correspondence

Krishna P. Paudel, Louisiana State University and LSU AgCenter, Baton Rouge, LA.
Email: kpaudel@agcenter.lsu.edu

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Abstract

We study the credit repayment effectiveness when microcredit is operating in combination with the counter-guarantee mechanism. We use a sample of 176 poor urban borrowers from the Guangzhou Municipal Labor and Social Security Bureau (GZMLSSB). Their loans were guaranteed by the Guangzhou Financing Guarantee Center (GZFGC), then counter-guaranteed by borrowers. The size of loans offered to urban borrowers varies from 20,000 RMB to 30,000 RMB per individual per year (60,000 RMB if part of a partnership and maximum of 50,000 RMB per individual in a given loan cycle). We estimated the model using a conditional mixed process given the binary dependent variable and a binary endogenous explanatory variable in the model. We find that the real estate mortgage as a financial counter-guarantee mechanism has no effects, but a training certificate as a non-financial counter-guarantee mechanism has a negative impact on the microcredit repayment rate. Group lending and focusing on women have no impact as well. The findings help to minimize the management cost of pre-default and default risk on microcredit loans in GZMLSSB and other similar projects by targeting university graduates. Our study is the first to assess the impact of microcredit mechanisms together with counter-guarantee on loan repayments in China.

KEYWORDS

counter-guarantee, mechanisms, microcredit, repayment rate

1 | INTRODUCTION

Despite considerable improvement in the Chinese economy and development in small and medium-sized enterprises (SME) in the past 20 years, the remaining problems of relative poverty and absolute poverty still have a negative impact on urban progress and the effectiveness of poverty alleviation. To mitigate the corroding effects of poverty on growth performance, microcredit has become an important financial tool that can be used to accelerate the growth of income of poor people

(Samujh, Twina, & Reutemann, 2012). Without qualified collateral, stable income, and a credit record, SME encounter credit constraints. Microcredit is an important component of inclusive finance, which can help vulnerable groups meet their credit needs (Armendáriz & Morduch, 2010).

Often, special mechanisms are used to improve microcredit repayments and overcome SME's credit risk. These mechanisms are group lending, public repayment, dynamic incentives, progressive lending, frequent repayment, focus on women, and non-financial services

(Armendáriz & Morduch, 2010; Banerjee, Duflo, Glennerster, & Kinnan, 2015). Empirical studies (Cho & Honorati, 2014; Cull, Demirgüç-Kunt, & Morduch, 2009) have proven that group lending, focusing on women, and non-financial services are more successful in improving livelihood as well as the repayment rate (Reichert, 2018). Developing countries have been innovative about using other incentive mechanisms to improve the social aspect (giving loans to more vulnerable groups) and sustainability (sustaining the profit of microfinance institutions) (D'espallier, Guérin, & Mersland, 2011; Fenton, Tallontire, & Paavola, 2017; Menkhoff, Neuberger, & Rungkruxsirivorn, 2012; Nader, 2008), such as flexible collateral in Indonesia (Armendáriz & Morduch, 2010) and counter-guarantee and credit villages in China (Jiang, Paudel, & Zou, 2020). We focus on the counter-guarantee mechanism, where microcredit is combined with a guarantee and a counter-guarantee mechanism. A counter-guarantee could be financial or non-financial in nature to cater to the social needs and sustainability of MFI. Financial factors restructuring belongs to policy-based guarantees implemented by the government to increase borrowing by public (Noman, 2011).

A large number of SME obtain capital through the counter-guarantee mechanism in China. Testing the validity of the counter-guarantee mechanism by analysing its operating procedures and performance from theoretical and empirical perspectives is important for extending financial innovation. Sustainability and social performance of the microfinance institutions (MFI) depend on microcredit's repayment rate. A higher repayment rate can increase the returns of MFI, reduce its cost, and ultimately reduce the interest rate on credit and improve loan availability. An improved repayment rate is a standard to measure the success of microcredit's innovative mechanism. This paper will test the hypothesis that counter-guarantee mechanisms increase the repayment of microcredit loans given to SME owned by the vulnerable people of China. Using data collected from Guangzhou, China, we find that the real estate mortgage as a traditional form of financial collateral has no impact when it faces vulnerable groups protected by specific laws. In contrast, training certification has a negative impact on the repayment of credit in China. Results indicate that non-financial services cannot be used as a qualification for credit, similar to the findings of Bhatt and Tang (2002) in the study of microcredit loan repayment in the inner cities of the United States.

We structure the remainder of this paper as follows: Section 2 introduces how the counter-guarantee mechanism operates in China. Section 3 provides a literature review covering the implementations, experiences, and effectiveness of microcredit mechanisms on the

repayment of microcredit in developing countries when they do not operate with the counter-guarantee mechanism. Section 4 describes data sources and descriptive statistics. Section 5 provides the model used to study the repayment behaviour. Section 6 provides empirical results and discussions. Section 7 concludes.

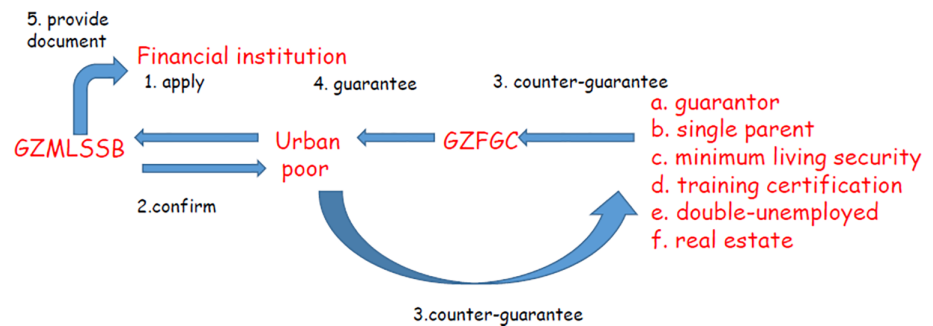
2 | OPERATION MECHANISM OF COUNTER-GUARANTEE

Similar to other developing countries, MFI organizations in China are non-government organizations (NGO), non-bank financial institutions (NBFI), cooperatives, and banks. Loan payment methods commonly used by MFI in China are group lending and guarantee. Different methods, such as counter-guarantee and guarantee, have been combined with microcredit to enhance loan repayment success (Beck, Klapper, & Mendoza, 2010).

The Guangzhou microcredit project was implemented in 2009. The loan disbursement procedure is shown in Figure 1. The eligible borrowers apply for microcredit to Guangzhou Multiple Labor and Social Security Bureau (GZMLSSB). After approval, borrowers obtain the guarantee of the Guangzhou Financing Guarantee Center (GZFGC) on the condition of providing a counter-guarantee, like guarantor, single parent (borrower is a single parent), minimum living security (borrower is accepting a minimum subsistence allowance issued by the government), training certification (borrower holds a certification that proves training is being undertaken with the GZMLSSB), double-unemployed people (borrower and his spouse are unemployed), or a real estate mortgage. Counter-guarantees in this fashion are a back-to-back security issued by GZFGC to indemnify third party MFI on the loan. Thus, this financial instrument can be cashed in the case of a default from the household, which is also called a counter indemnity. These financial instruments are new to the microcredit literature and so we offer a perspective on their implementation and effectiveness.

This project offered 20,000–30,000 RMB (maximum loan 50,000 RMB per loan cycle) microcredit, including individual and group lending.¹ It permitted two borrowers to undertake group lending, in which case the loan size was doubled (40,000–60,000 RMB). Moreover, the loan duration was limited to 2 years, with the possibility of an extension up to an additional year in some cases. The People's Bank of China had set 3% as a floating benchmark interest rate. The project aim was also to assist laid-off or unemployed workers, retired soldiers, college graduates, and members of the rural labour force to improve their skills, including those used in cooking,

FIGURE 1 Procedures and mechanisms of Guangzhou microcredit and counter-guarantee scheme [Colour figure can be viewed at wileyonlinelibrary.com]



computing, hairdressing, electrical work, and carpentering. If borrowers pay the loan amount, they can get more loans (dynamic incentives). According to the GZMLSSB statistics from April 2004 to 2008, the GZMLSSB received 290 applications with an estimated 6.72 RMB million loan requests. From this pool of applicants, only 225 applicants were accepted, with 5.86 million RMB in loans disbursed.

3 | LITERATURE REVIEW

In this section, we document the existing experiences, strategies, and implementation mechanisms of microcredit to overcome asymmetric information and limited liability and improve repayment in the credit market. All profitable projects obtain loans based on some semblance of symmetric information (Conning & Udry, 2007). But in practice, there exists information asymmetry in financial markets. Lenders depend on assets and cash flow to judge loanability and ask for physical collateral to resolve limited liability and moral hazard problems. It is difficult for vulnerable groups, primarily laid-off workers and migrant workers, to provide necessary collateral. In the absence of collateral, financial institutions will reduce the amount and duration of loans and increase interest rates to replace collateral. Stiglitz and Weiss (1981) have discussed these issues, indicating that the use of a flexible interest rate can lead to adverse selection and moral hazard issues. The traditional financial outlet cannot resolve price disequilibrium in the credit market (Ghatak, 1999; Van Tassel, 1999). Microcredit, characterized by group lending and other innovations based on it, can solve the problem of limited liability, adverse selection, and moral hazard, thereby improving the repayment rate.

Park and Ren (2001) report that many MFI' lending contracts have reported a 90% rate of repayment and some of them reported a 100% repayment rate. The MFI' client survey indicated that the impact of the loans is widespread and visible on incomes and has extended effects on gender empowerment, educational attainment,

and offset consumption volatility (Hulme & Mosley, 1996; Khandker, Khalily, & Khan, 1995; Park & Ren, 2001; Pitt & Khandker, 1998).

Group lending with peer monitoring, group pressure, and social ties as non-financial collateral has a higher efficiency on repayment than individual liability. MFI could devise different loan contracts to implement group-matching operations (De Quidt, Fetzer, & Ghatak, 2016; Kodongo & Kendi, 2013; Madajewicz, 2011).

The literature indicates that group characteristics such as group age (length of time group has been together) (Godquin, 2004) and the homogeneity of the group in income-generating activities (Sharma & Zeller, 1997) have a negative impact on repayment. The dynamic incentive could also explain the negative relationship between group age and the repayment rate. Because the loan amount is inversely related to the repayment (Godquin, 2004; Sharma & Zeller, 1997), the greater the average age of the group, the larger the loan amount, and the higher the default rate. Another reason is that the acquaintance of group members helps financial institutions to obtain information about members. Group lending also offers social sanctions in case a member fails to obey the rule of the group. The social sanctions of group lending expressed in joint liability, screening, and monitoring are not the core of group lending, they have a negative role on repayment (Griffin & Husted, 2015). The Grameen Bank also has group liability and individual liability on its microcredit. Harmonious relationships in the group can give members more financial capital, microenterprise development, and learning than sanctions. Religion, as one of the social relations, provides positive attitudes toward repayment performance in places where religion is followed; that is, religiosity improves the repayment of a group (Al-Azzam, Hill, & Sarangi, 2012). Group lending in the counter-guarantee mechanism is limited to two borrowers, and they can borrow double the loan size as compared to a single borrower. However, there is no group meeting, so there is no peer monitoring, group pressure, or social ties. Therefore, we assume that group lending in the counter-guarantee mechanism has no impact on repayment.

We review the effects of non-financial services and find that these increase the expected rate of repayment. Non-financial services include vocational, social, nutritional, or entrepreneurial education, peer-mentoring, joint decision making, and mutual insurance (Griffin & Husted, 2015). Although non-financial services have positive effects on the repayment rate, their operating costs and expected returns are important parameters (Godquin, 2004). It should be noticed that when non-financial services like training or education become one of the lending conditions, these will improve the transaction cost and reduce the repayment rate (Bhatt & Tang, 2002). In the counter-guarantee mechanism, training certification as a non-financial service can be used to obtain the loan.

The effectiveness of dynamic incentives as financial sanctions is decided by the lasting relationships between micro-lenders and borrowers, the degree of information closure, the firm's leverage, and the competition among micro-lenders (Sharma & Zeller, 1997; Vogelgesang, 2003). The more competition that exists among micro-lenders, or the higher the firm's leverage, or the more comprehensive information is available about borrowing, the easier it is to implement dynamic incentives because borrowers can earn a more reliable return in such financial surroundings. Also, in marginal environments, the dynamic incentive could perform better than group liability (Ahlin & Waters, 2016).

The focus on women borrowers is prevalent in microfinance literature because women are considered trustworthy borrowers, and there is a more extensive social impact on loans disbursed to women (Aggarwal, Goodell, & Selleck, 2015). That is because: first, there are limited substitute credit resources available to women; second, microcredit gives women more social support and resources that generate more power and income; third, compared with men, women have fewer bad habits like smoking, drinking, and gambling. They stay home more often and support children's education and family expenses when they have income. These characteristics make women more desirable for credit disbursement. Women also have a higher repayment rate for credit borrowed from not-for-profit MFIs (Aggarwal et al., 2015; D'espallier et al., 2011). The repayment rate by women is also higher in individual lending and the regulated MFIs (D'espallier et al., 2011). One of the reasons why credit repayment is higher by women is because NGOs provide services and focus on women's welfare (Shahnaz & Karim, 2008). These observations make us assume that women would have a better repayment rate than men under the counter-guarantee mechanism as well.

The characteristics of the borrowers and their business enterprises include information such as marital

status, race, education level, age, employment, family size, experience in business, and loan size impact repayment (Cassar, Crowley, & Wydick, 2007; Guttman, 2008; Hermes & Lensink, 2007; Hermes, Lensink, & Mehrteab, 2005; Sharma & Zeller, 1997). Other researchers, like Roslan and Karim (2009), include the distance of the business to the microcredit centre, as well as the ownership of financial institutions as factors that may affect the repayment rate.

Guo, Fan, and Li (2014) investigate the challenges in solving the rural financing predicament in China and find that MFI rely on credit ratings and asset evaluations, but credit guarantees and counter-guarantee schemes of intermediary organizations like GZFGC are rare. Consequently, the lack of intermediary organizations in China results in banks and MFI shouldering too much risk. Lack of an intermediary organization to shoulder risk directly affects the nature and type of collateral as well as the transaction costs in the credit market. Moreover, Guo et al. (2014) highlight the lack of coordination and unified guidelines in the operating procedures of the microcredit and microfinance industries in China. These findings reveal that collateral valuation, creditworthiness, or trusteeships via counter-guarantee mechanisms are still in the exploratory phase, and this paper contributes significantly to the literature in sharing the experience of GZFGC.

GZFGC and GZMLSSB are a hierarchy interposed between vulnerable borrowers and MFI to resolve the trouble of high transaction costs because of information asymmetry and small loan size. Williamson (1979) has proven that high transaction costs can be overcome through more hierarchy, not through more market. We study if more hierarchy has a better performance on microcredit repayment.

4 | DATA AND DESCRIPTIVE STATISTICS

The data used in this paper come from the Guangzhou microcredit project implemented by GZMLSSB and GZFGC. In our sample, there are 176 urban poor borrowers, 60.22% borrowers provided a guarantor, 10.8% provided training certification, 7.39% provided a real estate mortgage, and others provided a single parent, minimum living security, or double-unemployed people as a counter-guarantee.

From the descriptive statistics in Table 1, we can see the counter-guarantee form of repayment by delinquent borrowers. This table shows that delinquent borrowers tend to provide single parent, minimum living securities, and training certifications, but do not tend to provide real

TABLE 1 Counter guarantee tools and repayment situations in Guangzhou, China

Variables	Frequency	Percent	Repayment borrowers (%)	Delinquent borrowers (% of total)
Counter guarantee tools				
Guarantor	106	60.23	66.97	49.25
Single parent	1	0.57		1.50
Minimum living security	3	1.70		4.47
Real estate mortgage	13	7.39	11.01	1.50
Training certification	19	10.80	5.51	19.40
Double-unemployed people	34	19.32	16.51	23.88
Repayment situations				
Compensation	57	32.39		
GZFGC repayment	109	61.93		
Delinquency	2	1.14		
Extension (one year)	8	4.55		
Total			100	100

TABLE 2 Variable definition and descriptive statistics ($N = 176$)

Variable	Definition	Mean	SD
Dependent variable			
REPAYMENT	If loan repaid = 1, 0 otherwise	0.625	
Independent variables			
TRAINING	If borrower obtains credit with training certification as counter guarantee = 1, 0 otherwise	0.108	
REALESTATE	If borrower obtains credit with real estate as counter guarantee = 1, 0 otherwise	0.074	
LOANSIZE	Loan size in 10,000 RMB	2.477	0.68
TERM	Terms of the loan obtained by SME	2.057	0.28
EDUCATION	If borrower has college education = 1, 0 otherwise	0.210	
AGE	Age of the borrower	41.589	7.91
GENDER	If gender of the borrower female = 1, 0 otherwise	0.360	
FAMILYM	Number of borrower's family member	2.439	0.85
EMPLOYMENT	Number of employees in the business	2.313	1.87
meager profit	If borrower's business has meager profit = 1, 0 otherwise	0.801	
GROUPLENDING	If borrower obtains credit with group member = 1, 0 otherwise	0.051	

estate mortgages or guarantors. Therefore, we assume that real estate mortgages and guarantors are effective predictors of repayment. The repayment for the Guangzhou project under the innovation of counter-guarantee is shown in Table 2. As seen in this table, 61.93% of borrowers repaid microcredit on time, but the other borrowers could not repay microcredit on time. Of these who could not repay on time, 4.45% extended the maturity by 1 year, and 32.39% submitted a compensation

application and were compensated by GZFGC; 1.14% borrowers were delinquent. When we further analyse the difference between customers who did not repay and customers who repaid, we find that 37.17% of males did not repay the loan, and 62.83% of males repaid the loan. At the same time, 57.63% of females did not repay the loan, and 42.37% of females repaid the loan. We did not find the women's repayment rate to be higher than the men's. It is also observed that 90.38% of high school and

university educated and 9.62% of junior and primary school educated individuals repaid the loan. Meanwhile, 68.18% of high school and university educated and 31.18% of junior and primary school educated borrowers did not repay the loan. There are 63.47% of individuals who did not repay the loan, while 36.53% repaid the loan. At the same time, 66.67% of the partnership microenterprises did not repay the loan, and 33.33% repaid the loan. Partnership borrowers could borrow more than individuals, but group lending is not more effective than individual lending on repayment. Most of the default follows from business failure and microenterprises with meager profits. Among the repaying borrowers, 76.15% had a small revenue from their microenterprise, and 23.85% had a higher revenue. Among the defaulting borrowers, 86.57% had a smaller revenue, and 13.43% had a higher revenue. The percent of meagerly profitable microenterprises increased the default rate.

5 | MODEL

Our theoretical argument is based on the optimization model of consumer choice (Campbell & Dietrich, 1983). The borrowers are assumed to maximize utility over a vector of mutually exclusive financial, sociodemographic, and economic characteristic choice variables at different states. Thus, a borrower affiliated with GZFGC maximizes her utility via a probability function of a different state. In every period that a borrower is active and receives a loan counter-guaranteed by GZFGC, she can invest in a joint partnership venture or an individual small business project. Either way, two outcomes are expected from the borrower: either a project is profitable with probability P_r and repayment happens, or alternatively, the project fails with probability $1 - P_r$ and the borrower fails to repay the loan. Thus, a probit regression model is used to model the dichotomous feature of the repayment or default:

$$\text{REPAYMENT}_i^* = x_i' \beta + u_i, \quad (1)$$

$$\text{REPAYMENT}_i = \begin{cases} 1 & \text{if } \text{REPAYMENT}_i^* > 0 \\ 0 & \text{if } \text{REPAYMENT}_i^* \leq 0 \end{cases} \quad (2)$$

Here, REPAYMENT_i^* is an unobservable latent variable, which can be understood as the utility of repayment. When it is greater than 0, the borrower will choose to repay, and the observable variable REPAYMENT_i equals 1. When it is less than 0, the borrower will choose not to repay, and REPAYMENT_i equals 0; x_i' represents the explanatory variable matrix that may affect the

borrower's repayment utility and behaviour, and β is the coefficient vector of the explanatory variable. u_i is the error term subject to the zero-mean assumption, $u_i \sim N(0, 1)$. We hypothesize that beside the effects of the socioeconomic characteristics of the borrowers on the repayment rate, the principal determinants of the repayment rate are conditional on financial and non-financial counter-guarantee tools. Therefore, under these reasonable assumptions, we estimate a probit model:

$$\text{REPAYMENT}_i = x_i' \beta + \varepsilon_i, \quad (3)$$

The likelihood function can be written as:

$$\ln L = \sum_{i=1}^n [\text{REPAYMENT}_i \ln \varphi(x_i' \beta) + (1 - \text{REPAYMENT}_i) \ln [1 - \varphi(x_i' \beta)]] \quad (4)$$

In the literature, there are many hypotheses inherent to borrowers' characteristics and their effects on the ability to repay loans on time and the pre-default and default rate on preexisting loans, especially in developing countries. In the model, the variable for gender is set at 1 if the borrower is male and 0 if female. Borrowers with higher education attainment or achievement are more sensitive to default risk and the consequences of a bad reputation. Therefore, these borrowers are more organized and well trained to keep track of the books and manage their financial performance by maximizing profit and minimizing loss from adverse social events. In conclusion, borrowers with higher education have a better repayment rate. Older borrowers are more risk-averse than younger borrowers, especially among men (Eze & Ibekwe, 2007). However, there is also evidence that younger borrowers are more responsible and more knowledgeable, thus having a positive impact on the repayment rate (Bhatt & Tang, 2002). Mokhtar, Nartea, and Gan (2012) found that borrowers in the age categories between 46 and 55 have a higher probability of default. This finding does not corroborate the hypothesis that older borrowers have a higher repayment rate than younger borrowers. Our understanding is that borrowers in this stage of their lives might have a large family size, especially in developing countries, and thus a higher consumption level; they are more likely to be financially constrained. Thus, their businesses, if run informally, are subject to adverse shock and a higher default rate on their loans. So borrowers' age impacts repayment. In our paper, we assume age impacts repayment through a real estate counter-guarantee. Business size, years of experience, and employment indicate experience in running micro-enterprises, and financial risk management means

a more stable income statement and cash flow streams than a startup SEM (Bhatt & Tang, 2002; Brehanu & Fufa, 2008). As a result, borrowers with employment in the business minimize principal-agent issues and thus have a higher repayment rate, whether it is counter-guaranteed by a single parent, minimum living security, real estate mortgage, training certification, or double unemployed. Borrowers with a high potential cash flow stream have a higher repayment rate (Clark, Kays, Zandniapour, Montoya, & Doyle, 1999). These variables can be control factors in our model to analyse the counter-guarantee mechanism. Thus, the probit model is empirically specified as:

$$\begin{aligned} \text{REPAYMENT}_i = & \beta_0 + \beta_1 \text{TRAINING} + \beta_2 \text{REALESTATE} \\ & + \beta_3 \text{GROUPLENDING} + \beta_4 \text{GENDER} \\ & + \beta_5 \text{LOANSIZE} + \beta_6 \text{TERM} \\ & + \beta_7 \text{EDUCATION} + \beta_8 \text{FAMILYM} \\ & + \beta_9 \text{MEAGERPROFIT} \\ & + \beta_{10} \text{EMPLOYMENT} + \epsilon_i. \end{aligned} \quad (5)$$

Variable definitions and descriptive statistics are provided in Table 2. We have provided justifications for including these explanatory variables in this and in the literature review section.

Training certification and group lending are included to represent non-financial services. Real estate is included to represent a traditional financial counter-guarantee. Relatively well-off borrowers tend to select real estate as a counter-guarantee tool. Having real estate or not impacts payment ability but owning real estate is impacted by several factors. Therefore the use of real estate as a counter-guarantee tool is an endogenous variable in the model. Whether borrowers use real estate or not as a counter guarantee is a binary choice. Therefore, our endogenous variable is binary. To address the problem of the endogenous binary variable problem, we use a conditional mixed process (CMP) method developed by Roodman (2011). We use age as an instrumental variable for the real estate counter-guarantee. The higher the age, the greater is the likelihood that an individual owns a house because he can afford it and because he needs it to raise the family. House distribution policy in China also explains the rationality of the relationship between real estate and the age of vulnerable borrowers. Chinese house distribution policy before 2000 was such that it was cheap to own a house. Further, the government made it easier for married workers to own a house. After 2000, it became almost impossible for the poor to buy a house in Guangzhou because of the very high prices. Age is significantly related to the real estate counter-

guarantee, but it is not related to repayment or non-repayment. Results from the first stage regression model are presented in Table A1.

6 | RESULTS

The results are presented in Table 3. We find that training certificates have a negative impact, while real estate, group lending, and focusing on women have no impact on microcredit repayment that operates with the counter-guarantee mechanism.

Analysing the reasons, we can find that group lending in this project had only two vulnerable borrowers, and they borrowed together to run a joint business. By jointly borrowing, they were able to borrow double the loan size an individual borrower could. They were not able to

TABLE 3 Effects of counter-guarantee mechanisms on loan repayment as obtained from using the conditional mixed process method

Variables	Coefficient (SE)	Marginal effect (SE)
TRAINING	−0.621* (0.37)	−0.215* (0.12)
REALESTATE	−0.289 (1.60)	−0.100 (0.55)
GENDER	0.004 (0.22)	0.001 (0.07)
GROUPLENDING	−0.664 (0.59)	−0.230 (0.20)
EDUCATION	0.570** (0.27)	0.197* (0.09)
LOANSIZE	−0.340 (0.60)	−0.118 (0.21)
MEAGERPROFIT	−0.395 (0.31)	−0.136 (0.10)
EMPLOYMENT	0.097 (0.19)	0.033 (0.07)
TERM	1.136 (0.92)	0.393 (0.32)
FAMILYM	−0.221 (0.29)	−0.076 (0.10)
CONSTANT	3.408 (6.06)	

Note: * and ** indicate coefficients are significant at 10% and 5% levels, respectively. Values inside the parentheses are robust standard errors.

repay their share of the other to evade market risk and credit risk because they operated the business together, and by paying the other's share, they may bankrupt both. They also did not have essential characteristics for group lending, that is, group member's support, monitoring, and pressure in group meetings.

In this project, women do not show a better performance compared with men. Gender difference in the urban microcredit market of China is not significant. Without group meetings to support women in this project, the result is different than what has been found in other countries. These reasons can explain why focusing on women has no impact on repayment.

The use of non-qualified financial collateral can be a deterrent force. However, we find that few borrowers use financial collateral like a real estate mortgage as a counter-guarantee tool (Table 1). The reason for real estate having no impact on repayment lies in the culture and law of China. A borrower who owns only one real estate property can refuse to leave his/her apartment after defaulting. Based on Chinese regulations, 14 square meters per person (this number is different in different provinces) as collateral is forbidden to enforce, and even if the size of the apartment is larger than this number, a court can seal but cannot auction off the property. So financial institutions prefer to receive the second real estate property as collateral, but financially vulnerable groups in Guangzhou are not likely to have that. These facts result in a financial counter-guarantee having no impact on the repayment, unlike what has been found in the previous literature (Kereta, 2007; Mersland & Strøm, 2009).

Training certification is not only a form of non-financial collateral but also a kind of non-financial service, which proves that the borrowers have taken the training implemented by GZMLSSB, including vocational guidance and vocational skills training. The vocational guidance covers financing skills, planning and development of enterprises, human resources, and financial management. Vocational skills training covers the computer, cooking, beauty, hairdressing, electrical, and other training that provides unique skills. After borrowers have been certified as completing the requirements of the training program, they can obtain credit without financial collateral. Even though education and training could improve repayment rates in group lending (Garikipati, 2008), we find that re-employment training in China decreases the repayment rate. It may be because re-employment training does not address the needs of borrowers. Instead, borrowers take the training to meet the borrowing conditions. The government can encourage borrowers to take the right type of technology training and mix it with business skill advancement training

to increase the repayment rate. Our finding contrasts with Bhatt and Tang (2002), who indicate that training as a lending condition improves the transaction cost between borrowers and the MFI.

The other significant variable is education. Looking at the effect of education on the repayment rate, we found that a university-level education has a positive impact on the repayment rate. We argue that borrowers with an advanced degree are more able to circumvent the risk of default and careful to avoid its associated disadvantages in the future. Therefore, borrowers with a low level of education are less equipped to understand the fungibility of money, especially in developing countries. University educated borrowers who honoured their contracts represent 20.59%, while university-educated borrowers who violated their contracts represent 12.12%. In the same vein, defaulting borrowers with a high school degree represent 56.06% of total respondents compared to 27.27% for junior high school and 4.55% primary school. It is evident that the repayment rate does not have a linear relationship to the socio-economic characteristics of the borrowers, like education. However, we argue that borrowers with a university education have more opportunities than their counterparts because, when a business fails, they will have more opportunities for creating alternative income or obtaining an even higher wage job, enabling them to repay the loans. These educated borrowers repay the loan once they find alternative jobs because these borrowers do not want to suffer the negative impacts of not paying the government-backed loans.

The counter-guarantee mechanism purportedly assures MFI no return loss, which makes MFI increase the microcredit supply. However, microcredit mechanisms, including non-financial services, group-lending, and focusing on women, do not increase the default cost of borrowers. These counter-guarantee tools do not have the same performance in China as the literature review suggested. Microcredit loss concentrate on GZFGC as it is sanctioned by the government. This violates the original intention of microcredit, which is poverty reduction by way of the market, not by the government.

7 | SUMMARY AND CONCLUSIONS

We analysed the effectiveness of the microcredit mechanism in counter-guarantee mode on the credit repayment rate using experiences of the microcredit project in Guangzhou, China. We used data from MFI via GZMLSSB, whose loans have been counter-guaranteed by GZFGC since 2009. We used a sample of poor urban borrowers in China, where the size of each loan offered

varied from 20,000 RMB to 50,000 RMB per individual. Moreover, given the Guangzhou project has unique operating mechanisms, we analysed the role of group lending, focusing on women and non-financial services in counter-guarantee mode. To avoid the shortcoming of using unidimensional variables (Hermes & Lensink, 2007), we adopted a model based on an optimization model of consumer choice. We hypothesized that besides the effects of the sociodemographic characteristics of the borrowers on the repayment rate, the determinants of the repayment rate were conditional on the counter-guarantee.

Our results indicated that the real estate mortgage as traditional financial collateral had no impact based on Chinese regulations and the location of the project. We also found that training certificates as non-financial services had a negative impact on credit repayment. Focusing on women and group-lending did not affect repayment.

We suggest the following alternatives to minimize the management cost of pre-default and default risk on microcredit loans in GZMLSSB and other similar projects:

1. University graduates have a higher financial potential, respect contracts, and have better managerial ability to operate small businesses than individuals with a lower level of education. GZMLSSB should provide loans to university graduates and make an imperative in their contracts that they hire vulnerable groups when they become successful.
2. Drop the counter-guarantee form of training certification and implement mechanism innovation to increase default cost.
3. Real estate is a unique financial counter-guarantee type. It has a different impact path on repayment. We suggest that it be dropped in the same project because it is not an effective deterrent in China.
4. Focus on group lending, women need group meetings, and other social capital relationships to increase default cost. We recommend more frequent and relevant psychological and financial reinforcement through group meetings. We do not underestimate the function of non-financial services, but our view is that the non-financial services must be operated independently (not by GZMLSSB but by non-governmental organizations such as women's associations). If GZMLSSB were to continue to provide training, it needs to revise the content and pattern of training to suit the needs of small enterprises. It is also our opinion that non-financial collateral should be combined with social capital to reduce transaction costs and increase loan repayments. The microcredit project in

Guangzhou should continue to focus on poverty, but it should restructure to be successful. Making credit available is the only financial means of alleviating poverty, but there should be a way to increase repayment. Increasing default cost to borrowers by linking non-financial collateral with social capital and by linking financial collateral with real estate or deposits are incentive-compatible methods. There should be reasonable contract tailoring and not only intervening financial intermediaries.

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DATA AVAILABILITY STATEMENT

Data will be available upon request from the corresponding author.

ORCID

Meishan Jiang  <https://orcid.org/0000-0001-8234-658X>
 Krishna P. Paudel  <https://orcid.org/0000-0002-9780-5520>

ENDNOTE

¹ US \$1 = 7.06 RMB (as of July 2, 2020).

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APPENDIX A

TABLE A1 First stage regression model of factors affecting real estate as collateral use by borrowers as obtained from using the conditional mixed process method

Variable	Coefficient (SE)
GENDER	0.056 (0.35)
LOANSIZE	−1.705 (1.10)
MEAGERPROFIT	−0.061 (0.45)
EMPLOYMENT	−0.258 (0.31)
TERM	−1.919 (2.01)
FAMILYM	−0.027 (0.50)
AGE	3.038** (1.40)
CONSTANT	5.917 (12.49)

Note: Real estate is an endogenous variable in the model with age as an instrument. The first stage regression showed age meets both exclusion and relevance criteria. * and ** indicate coefficients are significant at 10% and 5% level, respectively. Values inside the parentheses are robust standard errors.

检索证明

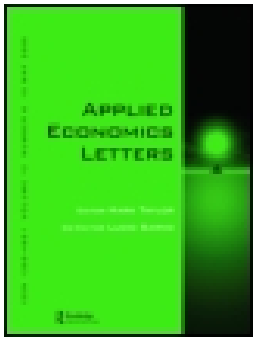
根据委托人提供的论文材料，委托人华南农业大学经济管理学院 姜美善 1 篇论文收录情况如下表。

序号	论文名称	发表刊物及发表的年月卷期/页码等	作者排名	论文等级	作者文中单位	收录情况	影响因子	中科院大类分区
1	Does counter-guarantee affect microcredit mechanism's performance on repayment? Evidence from Guangzhou, China	INTERNATIONAL JOURNAL OF FINANCE & ECONOMICS 出版年: 2022 出版日期: APR 卷期: 27 2 页码: 1807-1817 文献类型: Article	第一	B 类	SCAU	SSCI	IF2-year=2.9 IF5-year=2.9 (2022)	经济学 4 区 Top 期刊: 否 OA 期刊: 否 (2022)

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ARTICLE



Factors affecting agricultural land transfer-in in China: a semiparametric analysis

Meishan Jiang^a, Krishna P. Paudel ^b and Yunsheng Mi^c

^aSouth China Agricultural University, Guangzhou, China; ^bDepartment of Agricultural Economics and Agribusiness, Louisiana State University (LSU) and LSU Agricultural Center, Baton Rouge, LA, USA; ^cSouth China Agricultural University, Guangzhou, China

ABSTRACT

We use interview survey data collected randomly from 2677 farm households in nine provinces of China to understand the role of demographic, economic, land, and village characteristics on agricultural land transfer-in by farmers. Results show that variables such as borrowing from informal sources, household labour availability, percentage of total income from agricultural sources, and the household with village cadre have significant positive effects on land transfer-in. Low economic development and low transportation network availability in a county reduces land transfer-in. We also find that two variables (land holding and land idling) should be entered into the model nonparametrically. Land holding and land idling have U- and L-shaped impacts on land transfer-in, respectively. Land transfer-in has endowment equilibrium and provides Chinese households more opportunities to earn agricultural income, thereby reducing rural poverty.

KEYWORDS

Semiparametric model; land transfer-in; parametric determinants; nonparametric determinants

JEL CLASSIFICATION

Q15; C14

I. Introduction

Land transfer has endowment equilibrium, poverty reduction, economic transformation, structural change, and income effects on farmers (Ali et al. 2015; Deininger, Ali, and Alemu 2013). Land transfer is important in China because it can potentially help farm households to realize economy of scale, increase production efficiency, address rural labour migration issues and problems associated with the rapidly increasing ageing population, improve farmer's income, and reduce land idling (Wan and Cheng 2001; Deininger et al. 2014; Keswell and Carter 2014).

Land transfer-in is a process in which a farmer contracts in land to increase his farm size. Land fragmentation and small land holding prevents Chinese farmers from intensive mechanization and the realization of economy of scale. The Chinese government amended the Constitution to allow land management transfer in 1988. The land transfer process has accelerated since 2008 because of the massive rural to urban migration and farmers' desire to increase income from agricultural sources. By June 2016, about one-third of the total agricultural land (30.6 million hectares) had already been transferred. Still, there is substantial room to gain from land transfer in China.

Participation in land transfer-in is determined by age, asset, gender of the household head, number of household labourers, and agricultural capacity (Ali et al. 2015; Deininger, Zegarra, and Lavadenz 2003). As agriculture is a labour-intensive industry in a developing country, variables like having a younger operator, less household assets, a male household head, the availability of more labourers, and agricultural experience encourages land transfer-in.

Our study assesses the role of economic variables in addition to sociodemographic variables on the land transfer-in process. Adding land title, economic circumstance, and social circumstance will help to provide more accurate information related to the land transfer-in process.

We organize rest of this article as follows. In Section II, we provide information related to data and show the simple structure of the model and describe the explanatory variables used in the article. In Section III, we detail results from the study. We conclude the article in Section IV.)

II. Data and method

Our data come from an interview survey of 2677 farmers collected from 578 villages in nine provinces

(Sichuan, Shanxi, Liaoning, Ningxia, Jiangsu, Henan, Guizhou, Jiangxi, and Guangdong) of China in 2014. These provinces have different economic and social circumstances and provide the best survey data to study this topic.

We use probit and semiparametric probit models (generalized additive model) to determine the effects of different variables on the land transfer-in decision. A semiparametric model combined with parametric and nonparametric terms gives an estimation advantage as variables are not entered in the model in an ad hoc basis. We specify the land transfer-in decision using the following model:

$$y_i = X_i' \beta + \sum_{j=1}^n f_j(z_{ji}) + \varepsilon_i.$$

Here, y_i is a binary variable that indicates whether a household transfers-in land or not, X_i' are variables matrix of a parametric form, β is parametric vector, z_{ji} is matrix of exogenous variables that are identified to enter into the model nonparametrically, f_j is an unknown smooth function of the exogenous explanatory variable, and n is a total number of nonparametric variables.

We chose explanatory variables based on the existing literature in land transfer. These variables give information about farmer demographics, economic, land, and village characteristics. Descriptive statistics associated with these variables are provided in Table 1.

We provide log likelihood ratio test results in Table 2 that help us to determine which continuous variable should enter into the model nonparametrically. Result shows that land holding size (size) and idling size (idling) are nonparametric variables as

deviances are significant at a 5% level. We use Hong and White's (1995) test to conduct the specification test that favoured the use of a semiparametric model in the analysis (Hong and White's test statistic value is -2.306 , p -value = 0.02).

III. Results

We interpret the results from a semiparametric probit model given that the specification test indicates a parametric model should be rejected in favour of a semiparametric model. Results are shown in Table 3. We interpret values obtained from marginal effects. Farmers transfer in more land (4.8%) when they can borrow from relatives and friends. Informal finance is a major way to obtain capital to land transfer-in. In our sample, of those who funded land transfer-in from external sources, 30.06% households obtained a loan from formal financial institutions whereas 69.94% obtained loans from informal sources such as friends and relatives.

More labourers in the household lead to more (5%) land transfer-in. In developing countries, agriculture is a labour-intensive industry. Having more labourers to provide enough workforce thereby motivates farmers to transfer in land. Although Chinese farmers belong to a village collective, land allocation and land distribution are based on the number of members in a household relative to the village collective. Hiring an outside labourer is not common in Chinese farms.

When a household has more income coming from the agricultural source, they transfer in

Table 1. Definition of Variables.

Variable	Definition	Mean	SD
Transfer-in	Have transferred-in land (yes = 1, otherwise 0).	0.1	0.3
Loan	Household borrowed from informal sources (yes = 1, otherwise 0).	0.4	0.5
Middle	Number of family members with junior school or lower education level.	2.3	1.3
High	Number of family members with high school or above education level.	0.8	1.0
Labour	The ratio of labourers divided by total family members.	0.7	0.2
Size(mu)	Land holding by household	6.8	20.0
Parcel	Number of land parcels	5.0	4.7
Ag.income	The ratio of income from agriculture divided by total household income	36.5	33.2
Titled	Family's lands have been titled (yes = 1, otherwise 0)	0.5	0.5
Idling	Land area that is idle	0.6	3.3
Collective	Collective lands in your village have been transferred (yes = 1, otherwise 0)	0.3	0.5
Village cadre	Family members have been village cadre (yes = 1, otherwise 0)	0.1	0.3
Name	Responder feel that there are many same last name people as his in village (yes = 1, otherwise 0)	0.5	0.5
Econ	Responder feel that county's economic developing level is low in local province (yes = 1, otherwise 0)	0.1	0.2
Transport	Responder feel that transportation of village is poor (yes = 1, otherwise 0)	0.04	0.2

Table 2. Identifying the variables to enter parametrically or nonparametrically in the probit model.

Variable	DF	Deviance	Pr(> Chi)
Size	−0.00088342	−0.00089014	0.003149 **
Labour	3.302	4.0383	0.2996
Ag.income	−0.7855	−1.2591	0.2009
Idling	0.002178	0.0020305	0.006856 **

Notes: DF is noninteger because penalties shrink degrees of freedom in the spline based regression model. ** indicates that the corresponding variables to those p -values are significant at a 5% level.

more land. A 1% increase in share of income from agricultural sources increases land transfer by 0.1%. In our sample, an average household obtains 36.5% of its income from agricultural sources. Land transfer-in is a major way to raise the living standard of a farm household (Keswell and Carter 2014).

If there is a village cadre in the household, farmers transfer in more (3.7%) land. Village cadres are officials elected by the villagers who serve in village collectives; each term lasts for 3 years. They have influence on much business conducted by the village cooperatives. Village cadres also have a power and information advantage.

Therefore, households with a village cadre can take advantage of access and information, thereby increasing the chance of land transfer-in.

We find that land transfer-in occurs more in a county with low economic development or where the transportation network is poor. In these places, agriculture represents the major source of income. Farmers in counties with a lower economic development status have agriculture contributing as much as 35% towards income, whereas the share drops to only 14.07% if a household is in a more developed area.

Results from a semiparametric partial regression plot (Figure 1) show that where idling land increases, the probability of land transfer-in decreases sharply, but the predicted probability flattens after the idling land holding size gets to 30 mu. Therefore, we observe an L-shape in the relationship between land transfer-in and land idling.

Land holding size is another variable that entered into the model nonparametrically. There is a quadratic relationship to the probability of land transfer-in (Figure 2). The turning point

Table 3. Results from semiparametric and parametric probit models for land transfer-in in China.

Variables	Semiparametric model		Parametric model	
	Coefficients	Marginal effect	Coefficients	Marginal effect
Loan	0.247*** (0.065)	0.048*** (3.869)	0.247*** (0.065)	0.048*** (3.867)
Middle	0.025 (0.027)	0.005 (0.963)	0.025 (0.027)	0.005 (0.963)
High	0.027 (0.035)	0.005 (0.784)	0.027 (0.035)	0.005 (0.784)
Labour	0.259* (0.150)	0.050* (1.760)	0.259* (0.150)	0.050* (1.760)
Size			0.003** (0.001)	0.001** (2.231)
Parcel	0.009 (0.007)	0.002 (1.368)	0.009 (0.007)	0.002 (1.372)
Ag.income	0.004*** (0.001)	0.001*** (4.204)	0.004*** (0.001)	0.001** (4.208)
Titled	−0.028 (0.065)	−0.005 (−0.436)	−0.028 (0.065)	−0.005 (−0.436)
Idling			−0.065** (0.026)	−0.013** (−2.609)
Collective	0.083 (0.067)	0.016 (1.265)	0.083 (0.067)	0.016 (1.264)
Leader	0.193** (0.091)	0.037 ** (2.156)	0.193** (0.091)	0.037** (2.156)
Name	0.039 (0.065)	0.008 (0.620)	0.039 (0.065)	0.008 (0.620)
Econ	0.207* (0.125)	0.040 * (1.691)	0.207* (0.125)	0.040* (1.692)
Transport	0.371** (0.150)	0.072** (2.516)	0.371** (0.150)	0.072** (2.515)
Constant	−1.846*** (0.142)	−0.358*** (−13.961)	−1.829*** (0.142)	−0.355*** (−13.692)
Observations	2677		2677	
Log-likelihood	−966.90		−966.90	

Note: *, **, *** indicate significant at the 10%, 5%, and 1% level, respectively.

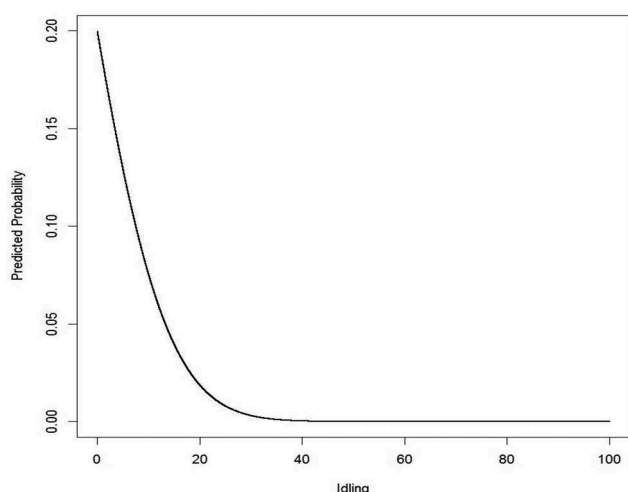


Figure 1. Predicted probability of land idling on land transfer-in by farmers in China.

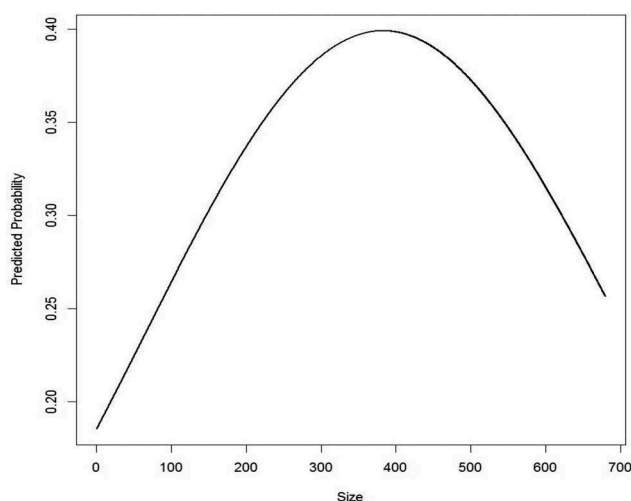


Figure 2. Predicted probability of land holding size on land transfer-in by farmers in China.

seems to be around 400 mu. The availability of farm labour and technology may be the reason why the predicted probability of land transfer decreases at that point. This has policy implications for the Chinese government: unless sufficient mechanization occurs, labour shortages may prevent farms from increasing in size.

IV. Conclusions

A semiparametric probit model was identified to be a better specified model to understand the land transfer-in process in China. We found that farmers transfer in more land if they are

able to borrow from relatives and friends, have more labourers in the household, a greater share of their income comes from agricultural sources, if the household has a village cadre, or if the economic development of the county is low and the transportation network is poor. Two variables entering nonparametrically into the model had an L-shape (land idling) and an inverted U-shape (land holding).

We observed that the majority of the land transfer fund is still coming from informal sources. Rural credit constraints will be a major impediment to an effective land transfer-in process in China. Unless technology can substitute for the availability of farm labour, rural land transfer may not happen as fast as the government wishes.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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ORCID

Krishna P. Paudel  <http://orcid.org/0000-0002-9780-5520>

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检索证明

根据委托人提供的论文材料，委托人华南农业大学经济管理学院 姜美善 1 篇论文收录情况如下表。

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1	Factors affecting agricultural land transfer-out in China: a semiparametric instrumental variable model	APPLIED ECONOMICS LETTERS 出版年: 2019 出版日期: NOV 28 卷期: 26 20 页码: 1729-1733 文献类型: Article	第一	B 类	SCAU	SSCI	IF2-year=0.752 IF5-year=0.818 (2019)	经济学 4 区 Top 期刊: 否 OA 期刊: 否 (2019)

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