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Analysis of CSAF member agricultural SME lending data

Evidence Review for Agricultural SME Finance

International Growth Centre

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Foreword

Market interventions and policy reforms to mobilise agricultural finance can be most effective when based upon evidence, including data, practitioner insights, and third-party evaluation. Such evidence is limited when it comes to the agricultural SME finance sector. Through the **Evidence Review for Agricultural SME Finance**, IGC and CSAF are working together to expand the knowledge base of what does and does not work for mobilising additional capital into the agricultural finance sector and how to steer that capital for greatest impact.

The **International Growth Centre (IGC)** is a global research centre that works with policymakers in developing countries to promote inclusive and sustainable growth through pathbreaking research. IGC is based at the London School of Economics (LSE) and majority funded by FCDO.

The **Council on Smallholder Agricultural Finance (CSAF)** is a leading network of 20 social impact investors that come together to share learning, promote an inclusive finance market, and develop best practices for lending to agricultural SMEs in developing economies.

This initial **Evidence Review for Agricultural SME Finance report** (view executive summary) was commissioned by CSAF with co-funding from the **Smallholder and Agri-SME Finance and Investment Network (SAFIN).** As part of this evidence review, IGC conducted an **analysis of CSAF members' lending data**, which is presented in the following pages. While IGC can highlight certain relationships between variables of interest, this report does not consider itself an exhaustive analysis of the participating lenders or of impact investors in the agri-SME financing space but, rather, should be considered a foundation upon which future research can build.

Data analysis: Executive summary

- The IGC was provided with a comprehensive loan level dataset from CSAF, containing information on loans to **various borrowers, across different countries and crops, disbursed up to the year 2020.**
- The **diversity of this dataset across multiple dimensions** makes it an interesting and valuable resource for analysis.
- Using this dataset, we are able to gain a deeper understanding of the **interactions between lenders and SMEs**, specifically focusing on **relational lending and lender experience.**
- While this analysis is a first step towards a better understanding of the agri-SME financing space, there is the **potential for large amounts of research** across the entire impact chain.

Roadmap

How do **firms grow** throughout their relationship with lenders?

- Descriptive statistics
- Econometric model
- Results

How do **the terms of a loan change** throughout a borrower's relationship with lenders?

- Results

How does **lender experience** relate to loan terms & loan outcomes?

- Econometric model
- Results

In which dimensions do **lenders compete** with one another?

- Econometric model
- Results

Are there **crops** or **countries** which are **riskier** than others?

- Econometric model
- Results

Appendix

Preliminary

Main findings

How do **firms grow** throughout their relationship with lenders?

- Firms that borrow longer are larger.
- However, firms that borrow longer are also larger from the start.
- After controlling for this, we do not find growth effects as a result of longer relationships between a borrower and lenders.

How do **the terms of a loan change** throughout a borrower's relationship with lenders?

- Firms that borrow longer pay slightly lower interest and receive larger loan amounts.

How does **lender experience** relate to loan terms & loan outcomes?

- Lenders lend more in markets in which they have prior experience.
- Interest rates decrease slightly with increased market and country experience.
- Default rates decrease with crop and market experience.
- As lenders explore new crops in countries where they already operate, they tend to lend out lower aggregate amounts in these new value chains.

In which dimensions do **lenders compete** with one another?

- Borrowers pay slightly lower interest rates in markets with multiple lenders.
- Borrowers receive larger loans in markets with multiple lenders.
- We find an inverted U-shaped relationship between number of lenders in a market and default.

Are there **crops** or **countries** which are **riskier** than others?

- We find significant differences in average default rates across countries and across crops.

Appendix

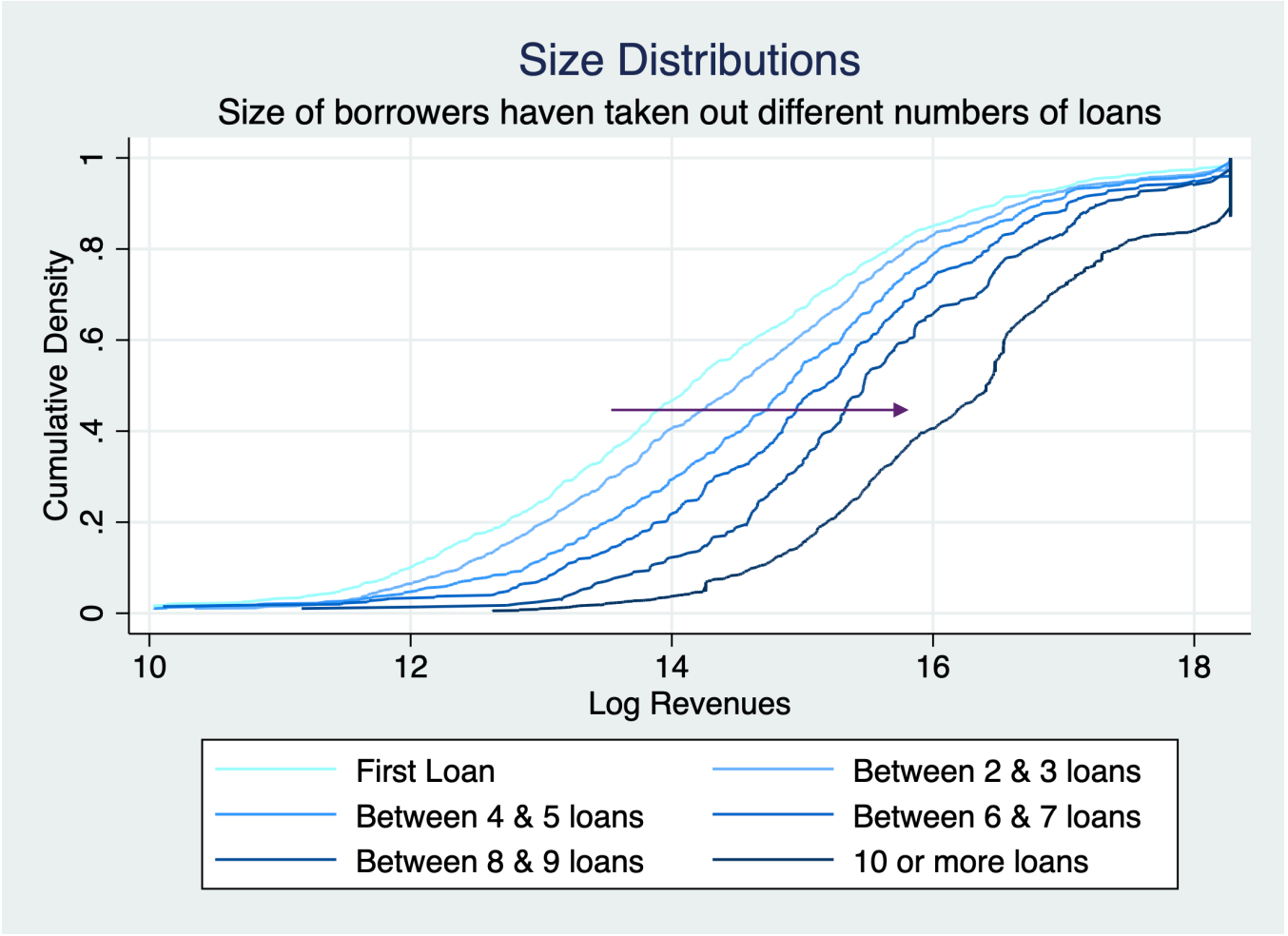
- We find moderate evidence for heterogenous effects in firm growth and changes in the terms of loans across different countries.

Firm growth

Firm growth: Descriptive statistics (1)

Firms who borrow more often are larger in terms of revenues

- The graph to the right plots the revenue distribution of different borrowers, sub-divided by how many loans they have had with lenders up to that point.
- The right shift of the distributions indicates that borrowers receiving more loans tend to be larger in size (measured by revenues).

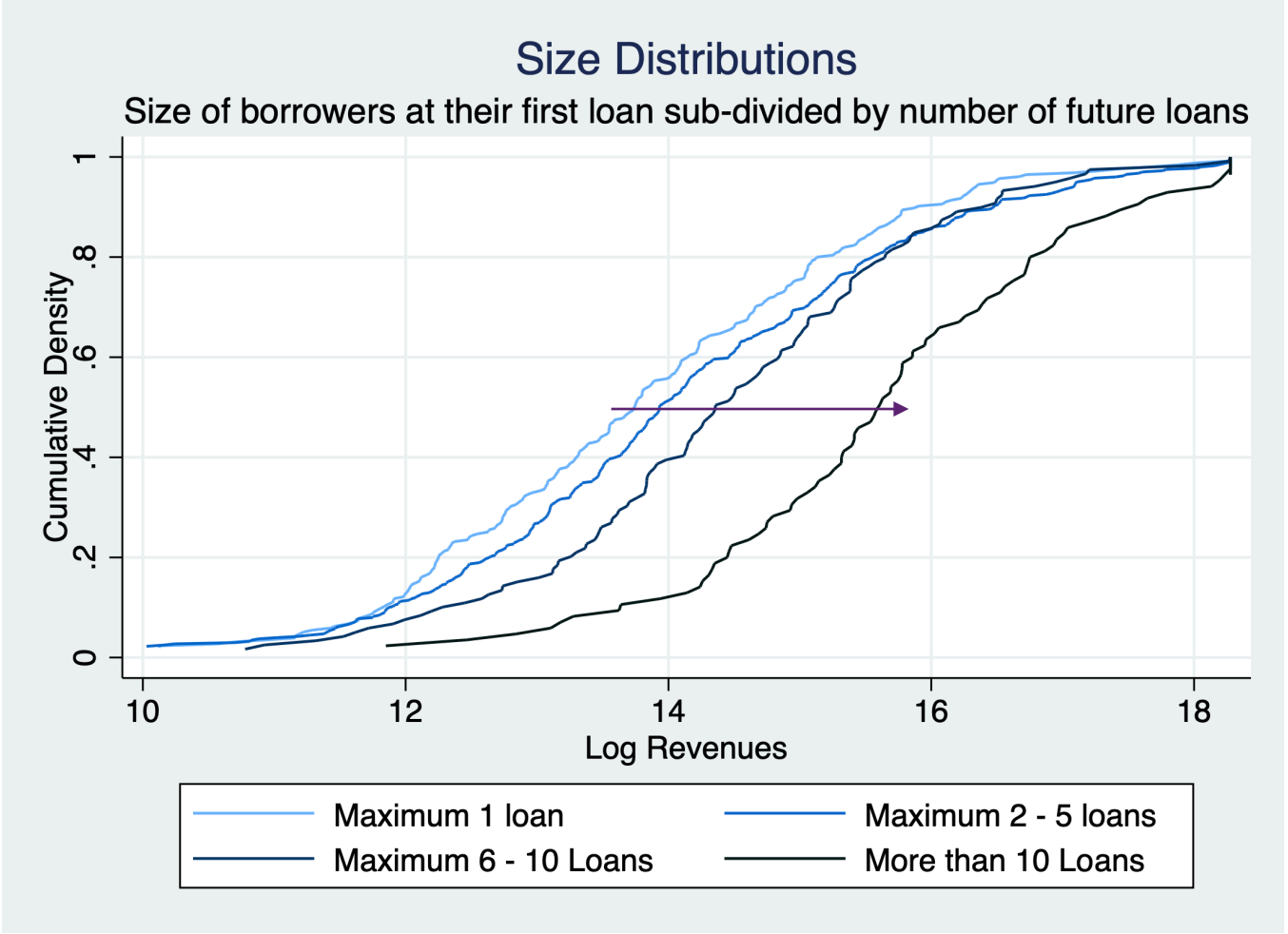


(Figure 1) Revenue distribution of borrowers, sub-divided by how many loans they had with a lender up until that point.

Firm growth: Descriptive statistics (2)

Firms who borrow more often are larger from the start

- The graph to the right plots the size distribution of different borrowers at the time of their first loan with a lender, sub-divided by how many loans these borrowers will take out in total.
- It illustrates that borrowers that will take out many loans in the future are already larger at the time of their first loan.
- This selection into loans could be a potential driver of the relationship between firm size and number of loans received by borrowers.

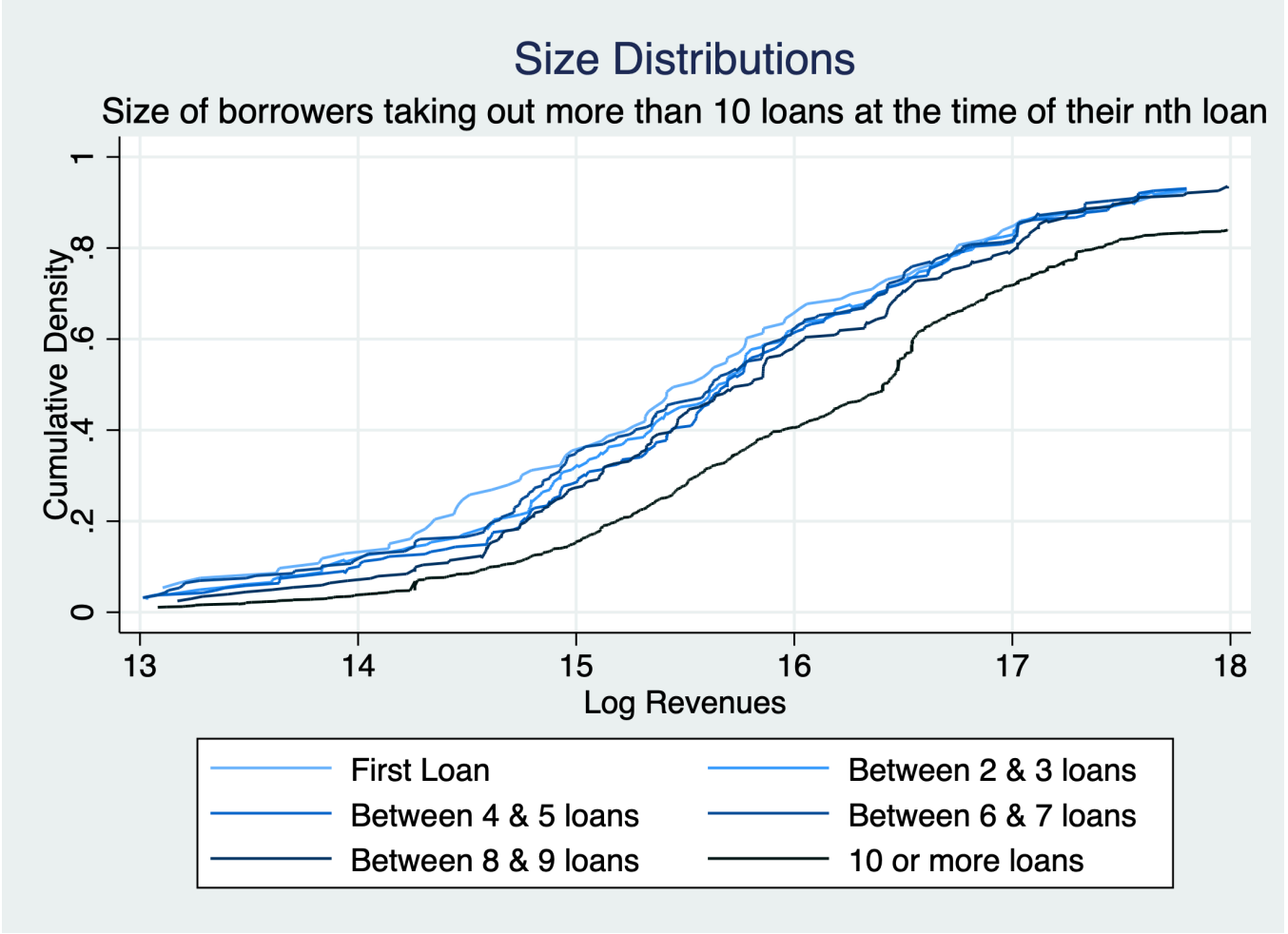


(Figure 2) Revenue distribution of borrowers at the time of their first loan, sub-divided by how many loans they will take out in total.

Firm growth: Descriptive statistics (3)

After controlling for selection, it is unclear to what extent firms grow through lending

- The graph to the right restricts the sample to those borrowers that will take out at least 10 loans and plots the size distribution of these borrowers after having taken out a certain number of loans.
- When only looking at borrowers that stay for at least 10 loans, we control for bigger firms self-selecting themselves into taking out more loans.
- After controlling for this selection, the growth trajectory of firms taking out more loans seems less clear.
- This is indicative of the fact that the correlation between the length of a borrower-lender relationship and the size of a borrower is driven by long-term borrowers being larger from the start.

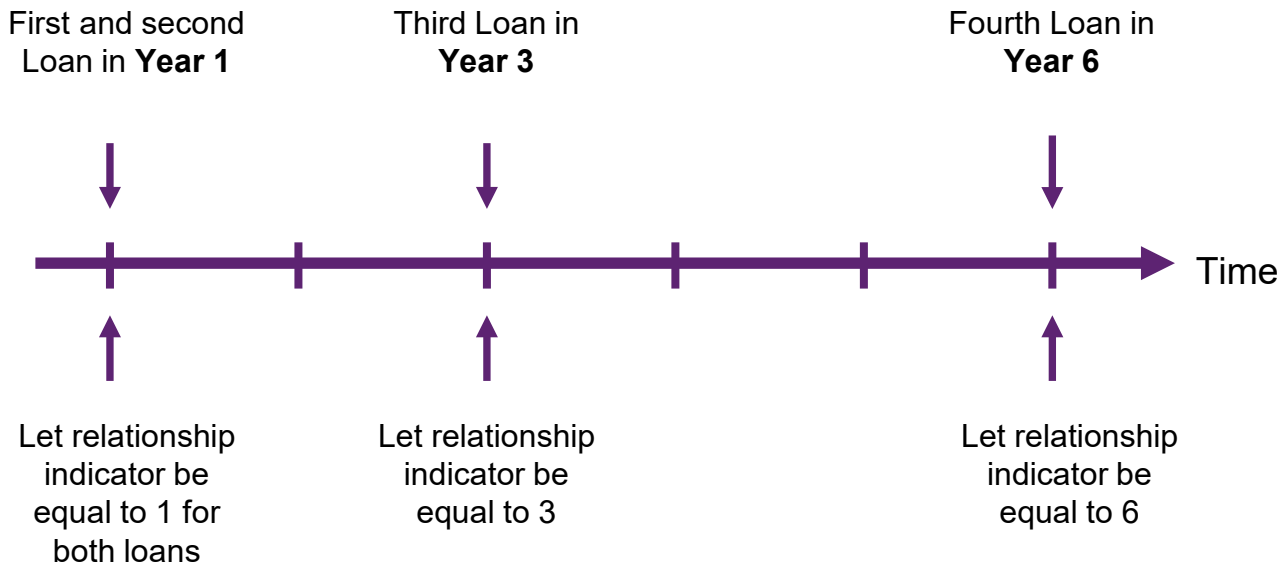


(Figure 3) Revenue distribution of borrowers at the time of their n-th loan, restricting the sample to borrowers taking out at least 10 loans.

Firm growth: Econometric model (1)

Our measure of relationship is defined as the number of years passed since a borrower's first loan

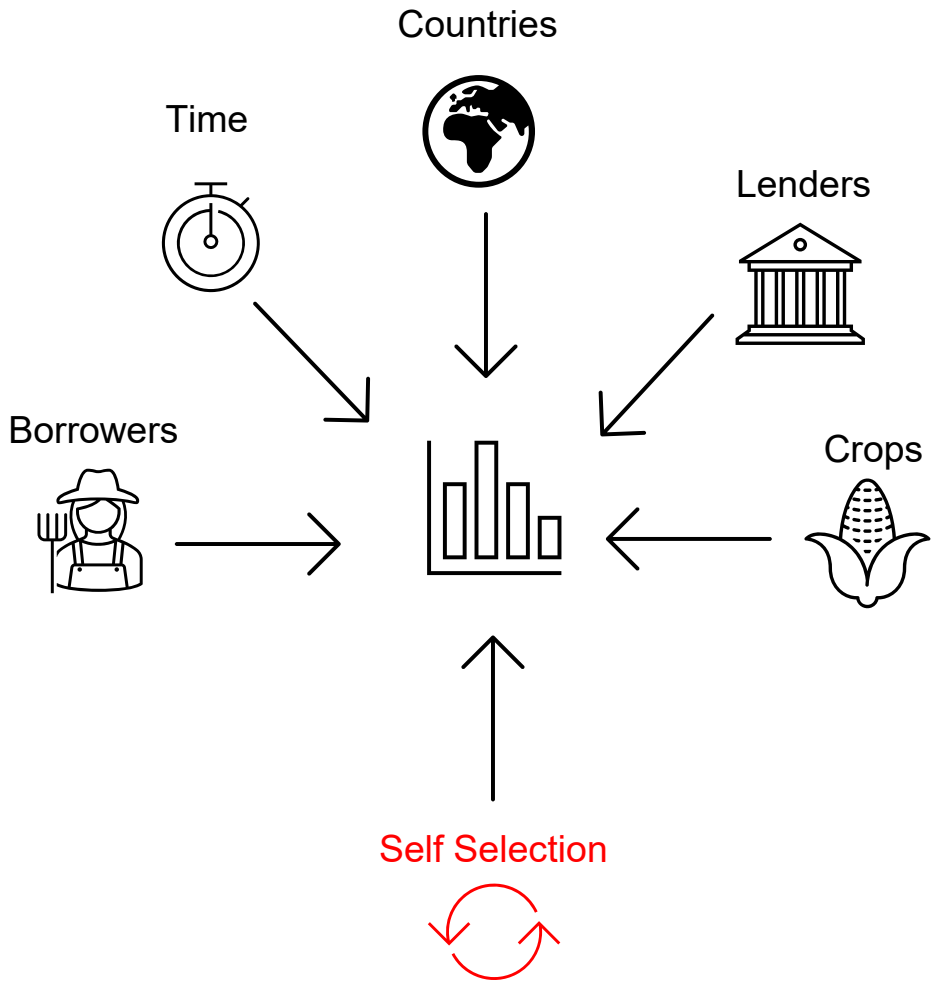
- We construct our measure of relationship as the number of years between an issued loan and the first loan that was issued to a borrower by a CSAF member.
- As we are interested in firm growth, we will use two different measures of size as dependent variables (revenues and permanent employees).



Firm growth: Econometric model (2)

There are many potential biases which can drive the estimation of coefficients

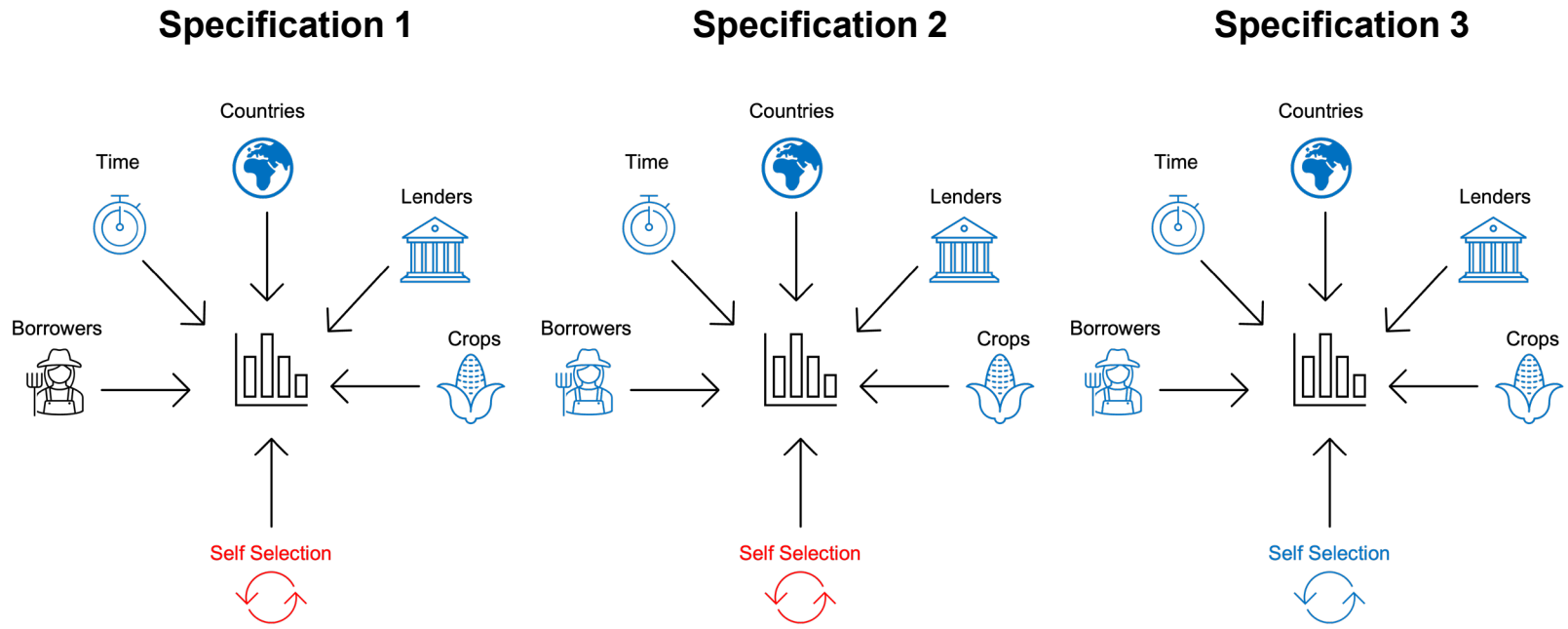
- The descriptive statistics are indicative of the fact that firms borrowing more with lenders are indeed larger, but that this relationship is also driven by selection.
- To properly investigate this relationship, we need an econometric model which lets us estimate the effect of lending on firm size, accounting for any biases induced by various sources, including self-selection.
- Biases can arise from many sources, some of which are observable (country, time, lender, borrower, crop) and some of which are not observable (self-selection).
- We can easily control for any biases which are observable, but controlling for unobservable characteristics is trickier.



Firm growth: Econometric model (3)

We will progressively control for more potential sources of bias

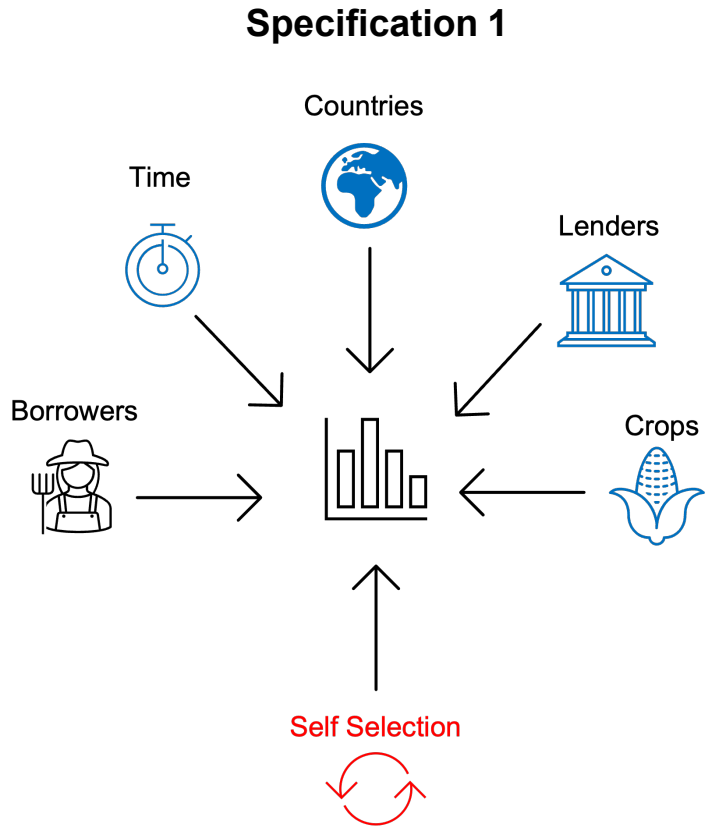
- In Specification 1, we control for any biases which arise from time, countries, lenders or crops.
- In Specification 2, we also remove any biases induced by a borrower's characteristics which are constant over time.
- In Specification 3, we do the same but restrict the sample to only borrowers that borrow over a duration greater or equal to 5 years and restrict the analysis to only their first 5 years of borrowing. We hence always compare similar firms and therefore control for any selection of bigger clients into lending.



Firm growth: Econometric model (4)

In specification 1 we control for anything constant across country, time, lender, and crop

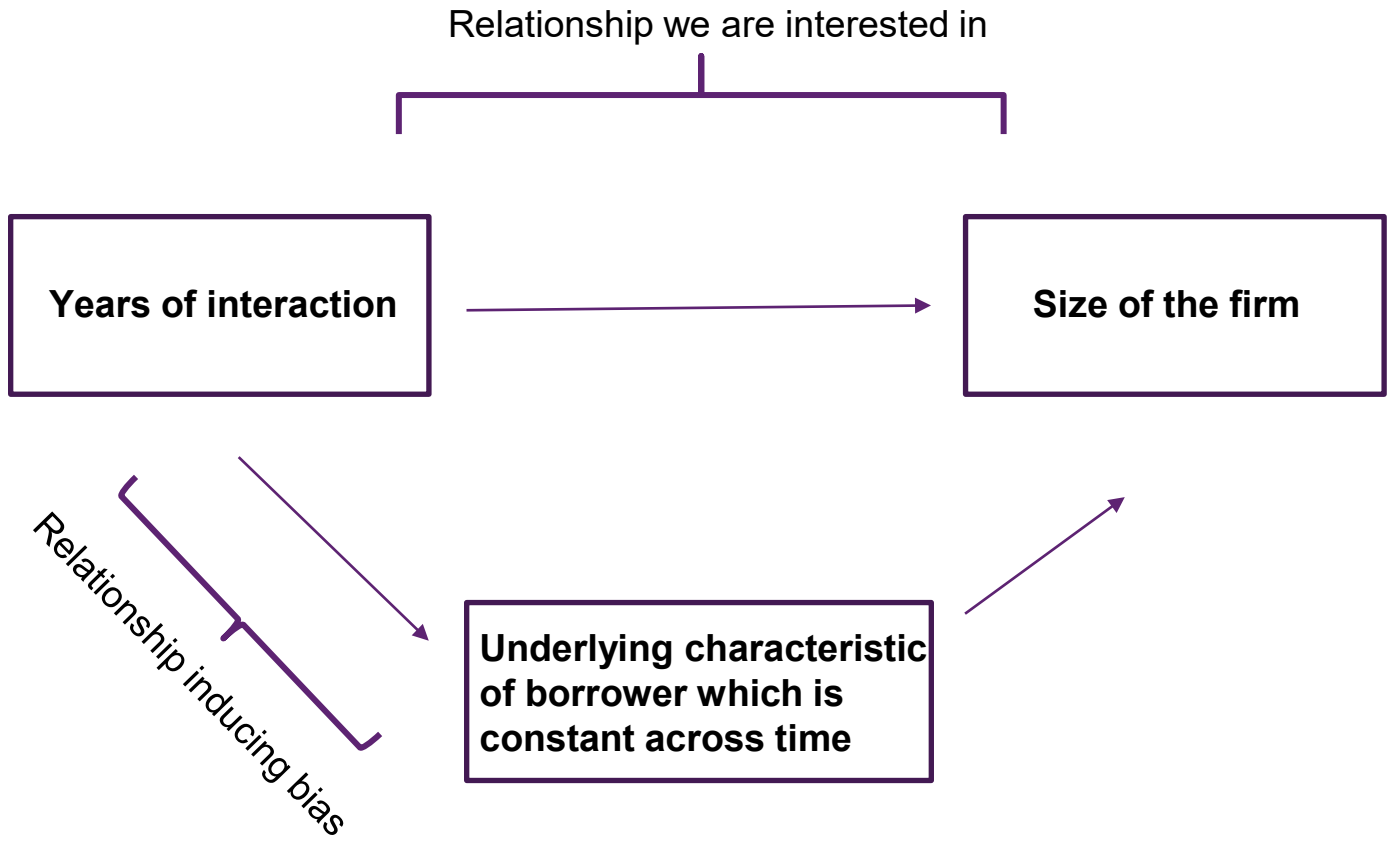
- It might be that the country in which a firm operates is both related to the size of a firm as well as its ability to repeatedly take out loans with lenders.
- The same might hold for the crop a borrower is active in, the year a loan is issued, or the lender that issues the loan.
- These relationships would induce biases in our analysis and hence we control for them in specification 1.



Firm growth: Econometric model (5)

In specification 2 we additionally control for unobservable characteristics of a borrower

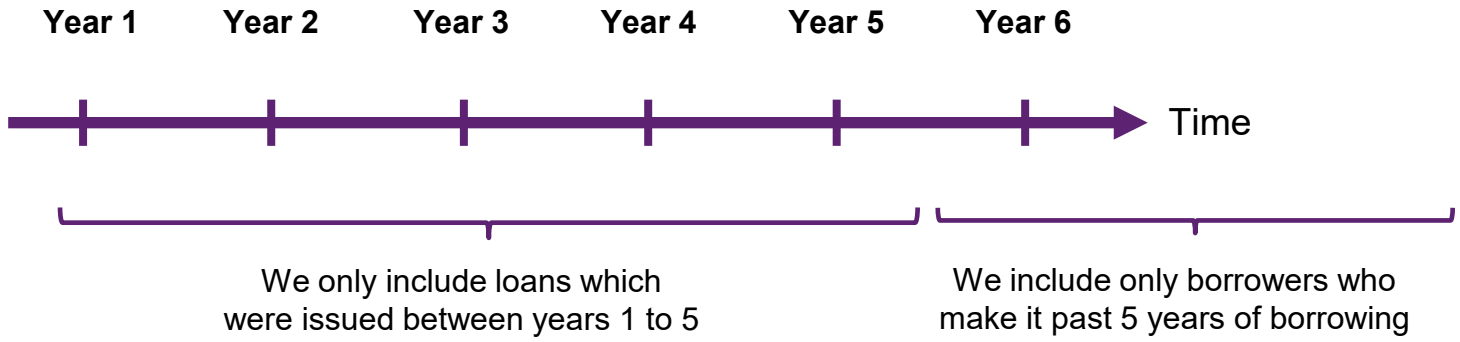
- There is the potential that unobservable characteristics of the borrower, when not controlled for, drive the estimation of our results.
- These characteristics might be correlated with both a borrower's decision/ability to take up a loan as well as the size of the firm, hence inducing a bias.
- An example might be the underlying productivity of a borrower which is correlated with both the size of the firm as well as the decision to take up a loan.
- We can control for unobservable borrower characteristics which **are constant over time** so that these characteristics don't drive the estimation of our models.
- This is called a fixed effect estimation.



Firm growth: Econometric model (6)

In specification 3 we additionally control for self-selection by restricting our sample

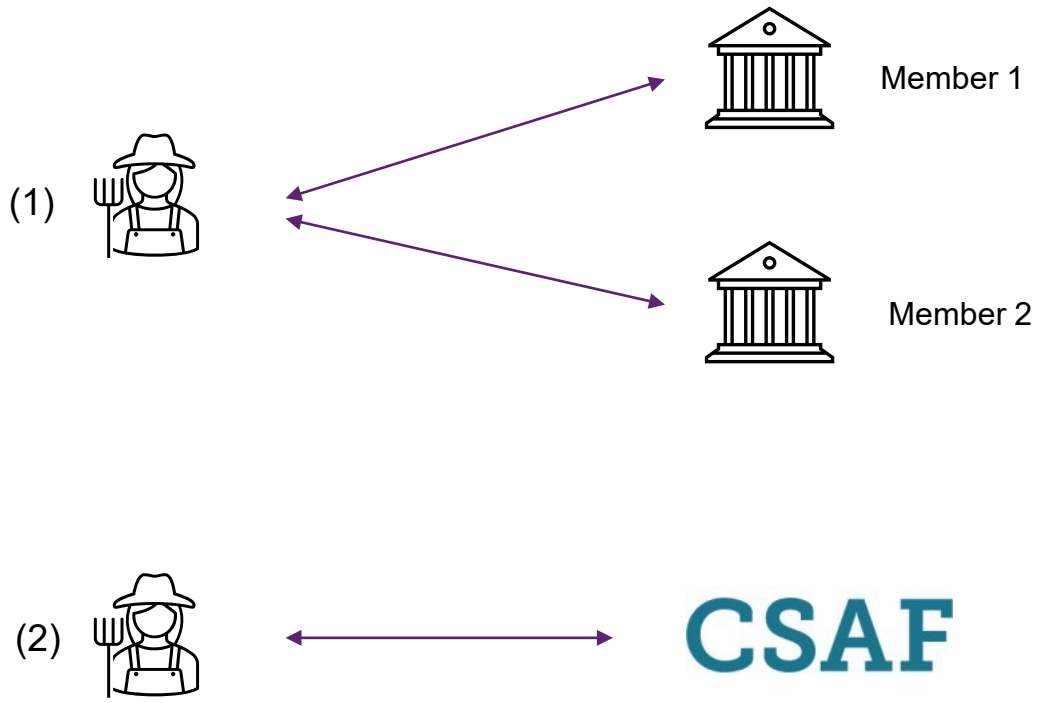
- In specification 3 we restrict the sample to borrowers who borrow for over 5 years and only include the loans of these borrowers which were issued in the first 5 years.
- By restricting the sample to look at only borrowers who borrow over a duration longer then 5 years. We therefore control for the fact that borrowers receiving loans over several years are larger from the start.



Firm growth: Econometric model (7)

Relationships can be defined between a borrower and all lenders or between a borrower and one lender

- Lastly, we must define between which parties we consider a relationship to hold.
- We can either define a relationship as that between a borrower and all CSAF lenders or between a borrower and a specific CSAF lender.
- In this analysis, we will consider a relationship as one between a borrower and **any** CSAF lender.



Summary statistics

- The table to the right provides summary statistics for some of the key variables of interest.
- The abbreviation “sd” stands for standard deviation and measures the dispersion within a sample.
- The number of observations vary for each variable as not every loan entry has complete information about each loan or firm characteristic.
- We define default as a loan having been provisioned or written off at any point in time by a lender.

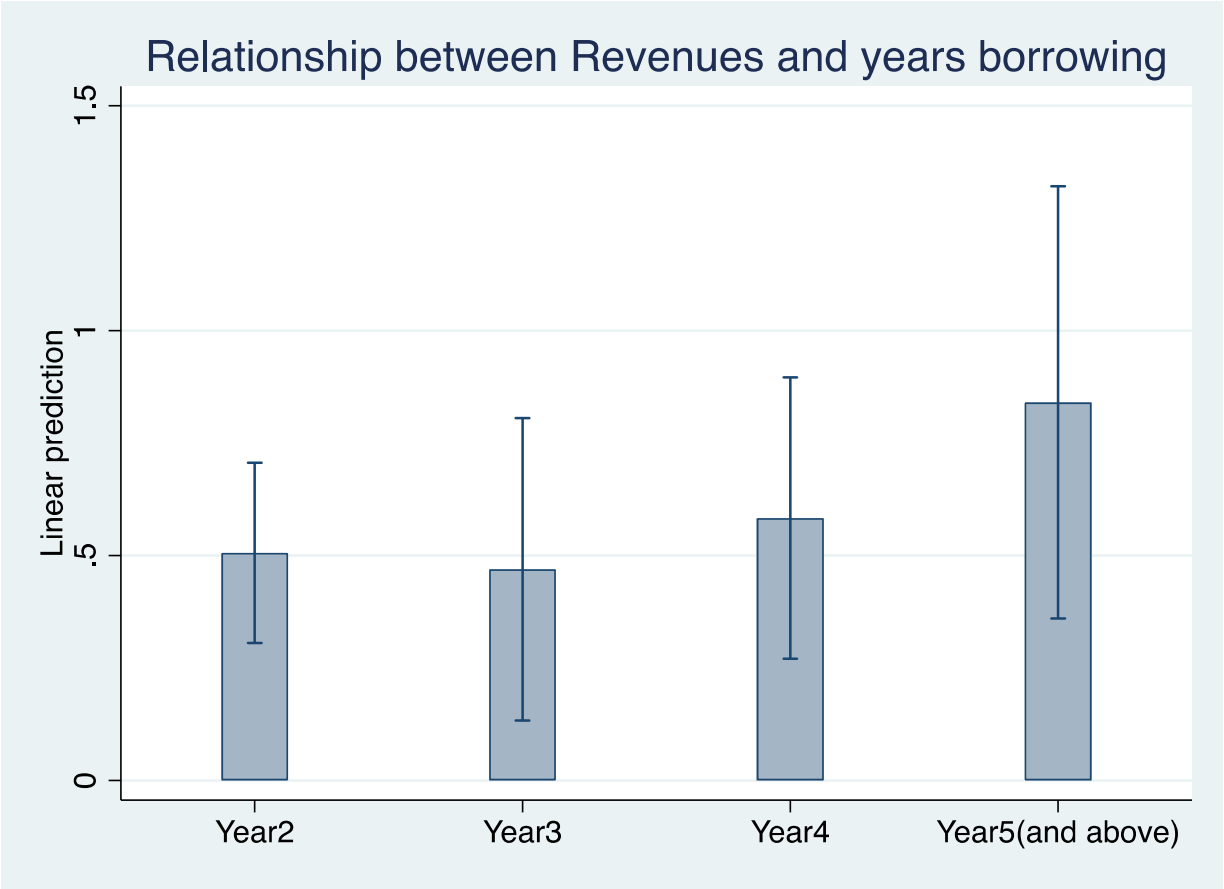
Firm Size	Observations	Mean	sd	min	max
Revenues (USD)	5,244	11.3M	2.12M	0	86.6M
Premanent Employees	5,406	80	118	0	462
Loan Characteristics	**Observations**	**Mean**	**sd**	**min**	**max**
Loan Amount (USD)	6,742	745,570	681,544	56,561	2,500,000
Default	6,742	0.079	0.270	0	1

(Figure 4) Summary statistics for some key variables of interest. Note that these observations are winsorized meaning extreme values are set to the 95th and 5th percentile. Furthermore note that sd = standard deviation.

Firm growth: Results (1)

Firms borrowing over longer durations are also bigger

- Only controlling for time, country, crop, and lender fixed effects indicates that firms grow significantly throughout their relationship with borrowers.
- Firms that borrow 5+ years are 80% larger than those who have only been borrowing for 1 year.

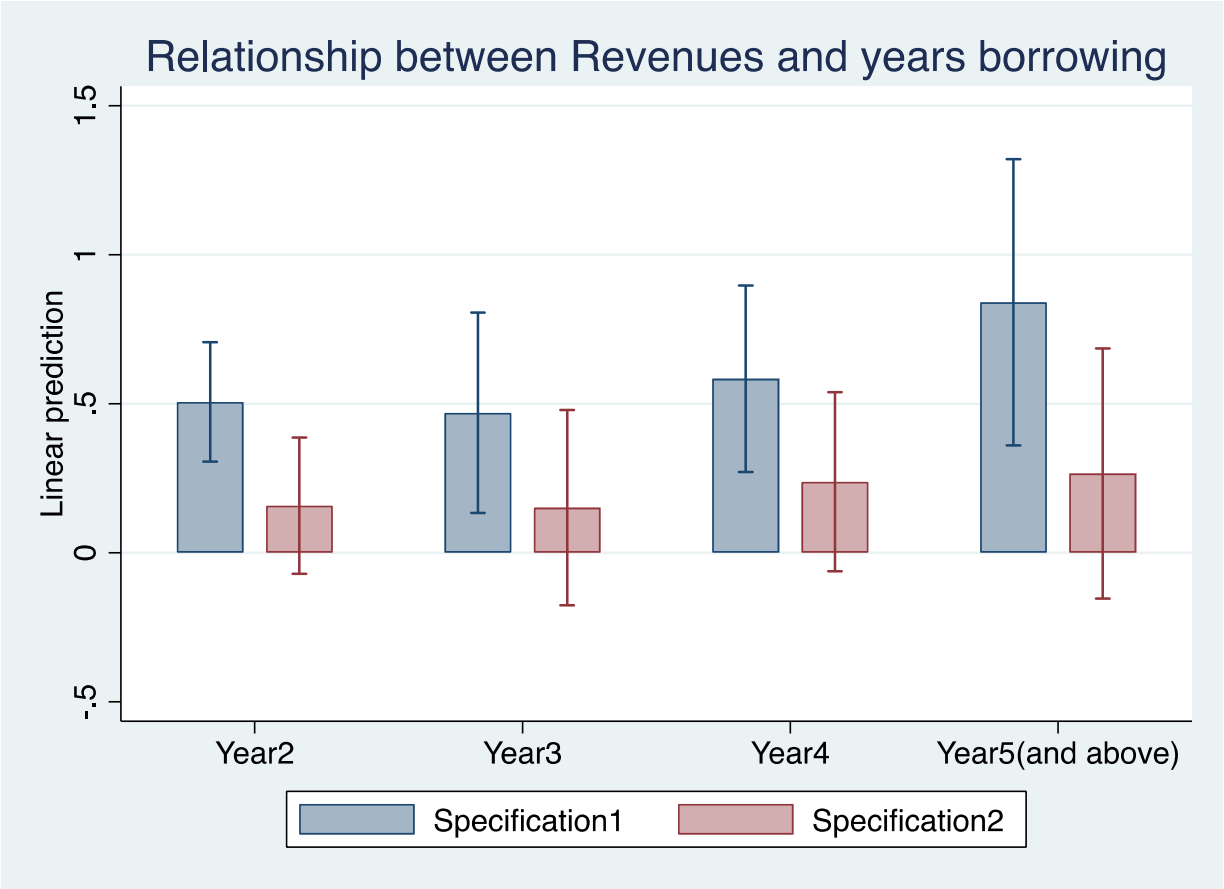


(Figure 5) Regression coefficients when regressing revenues on number of years a borrower has been borrowing from lenders – Specification 1.

Firm growth: Results (2)

Controlling for borrower characteristics lowers the estimated growth effect

- Also controlling for borrower fixed effects reduces the size of the estimated coefficients significantly.
- We estimate that firms borrowing for 5+ years are 25% larger than those borrowing for only 1 year.

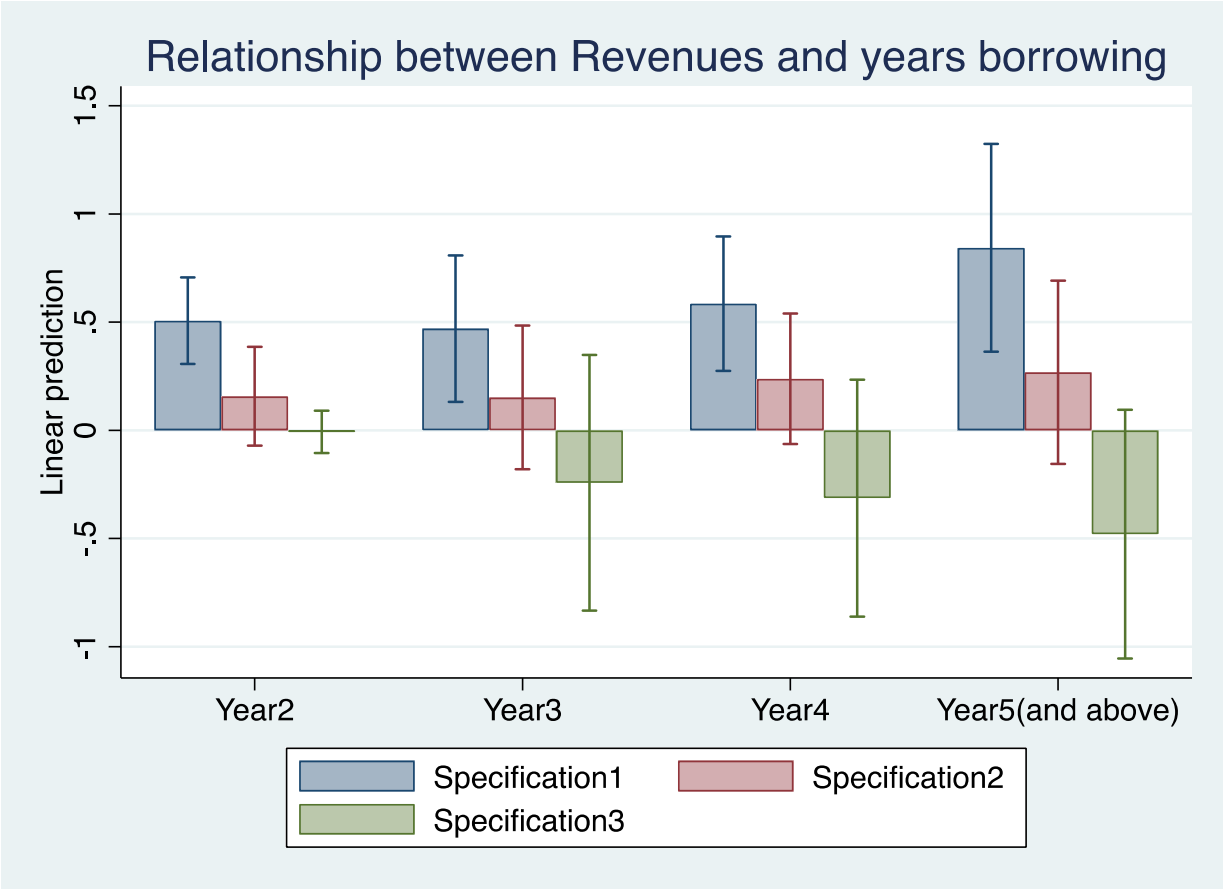


(Figure 6) Regression coefficients when regressing revenues on number of years a borrower has been borrowing from lenders – Specification 1 & 2.

Firm growth: Results (3)

When controlling for self selection we cannot find that firms who borrow longer are bigger in terms of revenue

- After controlling for the fact that big firms are larger from the start, we no longer observe growth throughout the relationship between a borrower and lenders.
- At this stage we need to underline that we do not observe firms in absence of capital made available to them – *hence we cannot draw a conclusion on whether access to finance leads to firm growth or not.*
- What we can say is that the selection of larger firms into long-term relationships is a significant determinant of the positive correlation between the length of a relationship and firm growth.

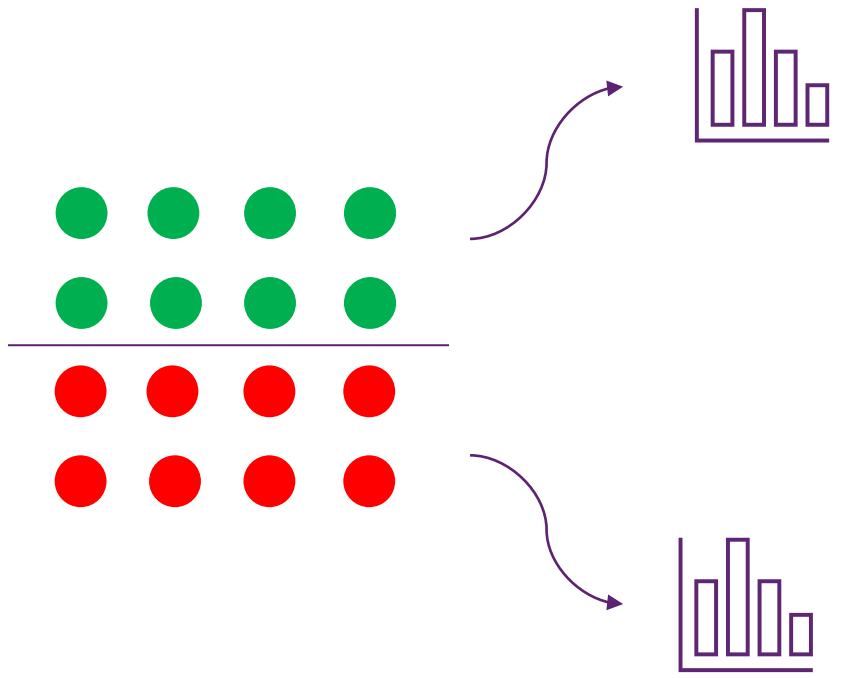


(Figure 7) Regression coefficients when regressing revenues on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3.

Firm growth: Results (4)

Growth effects vary by country

- We can look at **heterogeneities** in our estimated coefficients.
- We will use **number of bank branches per 100,000 adults** as a **measure of financial access**, a statistic provided by the IMF.
- We can perform a sample split, dividing observations into those country-year pairings above the median financial access score and those below the median within the sample.
- We find moderate evidence that **firm growth is stronger in countries with better developed financial systems.**
- The estimated coefficients can be found in the appendix.

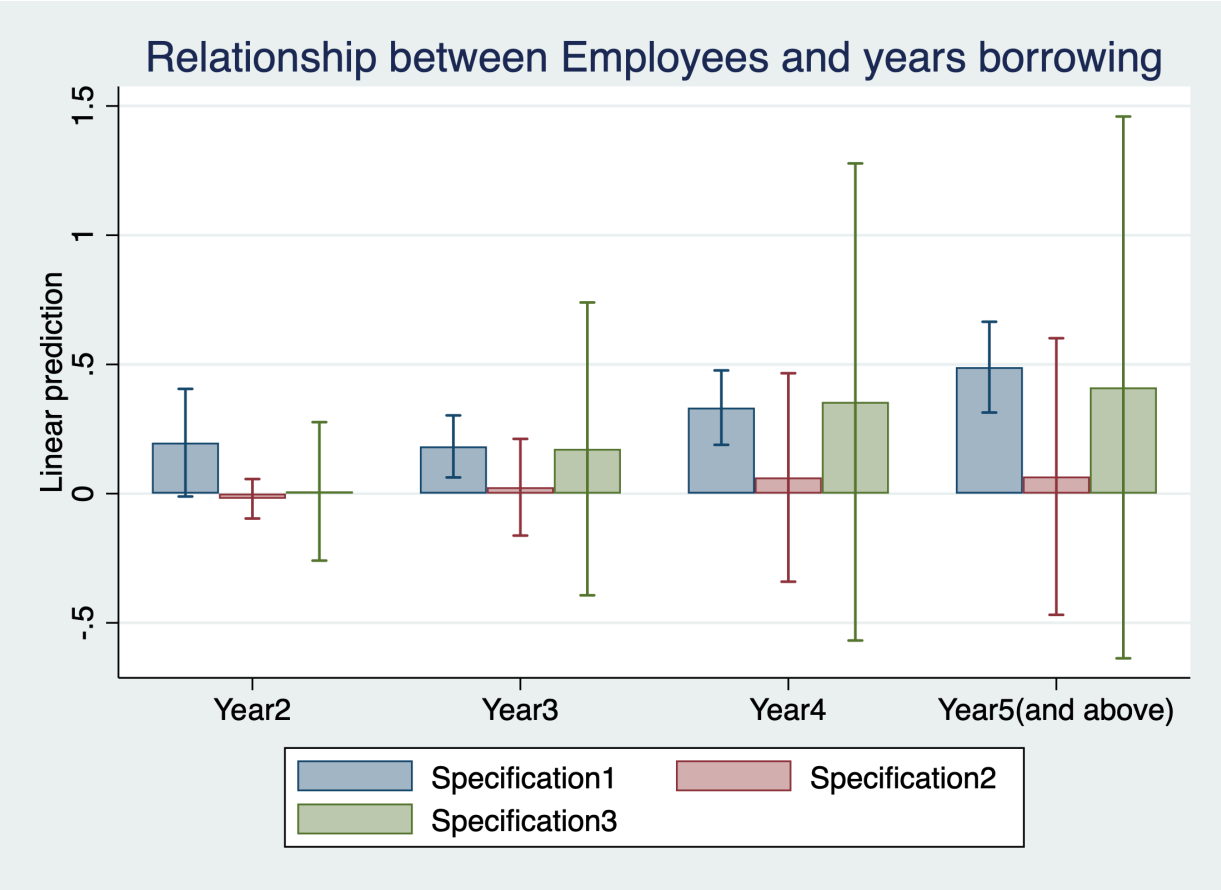


Please Note: When performing a sample split, the sample size decreases and hence estimated coefficients become less reliable.

Firm growth: Results (5)

When controlling for self-selection we find that firms who borrow longer are bigger in terms of permanent employees

- We can repeat this exercise looking at the growth in terms of permanent employees.
- While revenues do not seem to increase over time, we observe that the number of permanent employees do seem to increase throughout years of borrowing.
- We estimate that, in terms of permanent employees, a firm borrowing for 5+ years is nearly 50% larger compared to a firm that is borrowing for its first year.
- We must note that while the coefficients are large, they are also noisy. This is because we have less datapoints on permanent employees compared to revenues. Furthermore, permanent employees is also more likely to be measured with error.

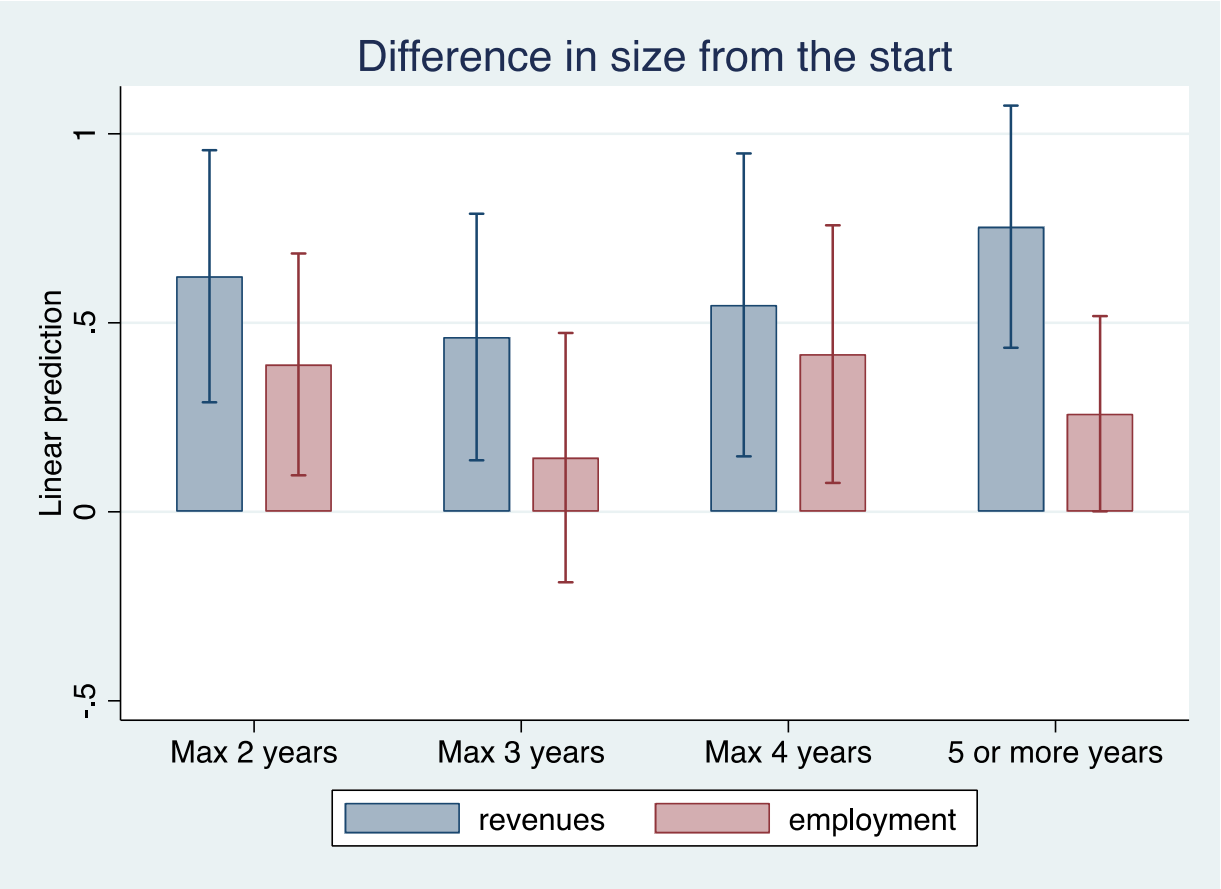


(Figure 8) Regression coefficients when regressing permanent employees on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3.

Firm growth: Results (6)

Firms who will borrow longer are bigger from the start

- The diagram depicts the differences in the size of borrowers at the time of their first loan, sub-divided by how many years they will borrow from lenders in the future.
- We can see that borrowers receiving loans for more years are already significantly larger at the time of their first loan.
- Borrowers receiving loans for 5+ years have 75% higher revenues and 25% more permanent employees at the time of their first loan compared to those borrowers only receiving a loan for one year.
- This is a major driver for the positive correlation between size and age of a relationship captured in specification 1.



(Figure 9) Regression coefficients when regressing revenues and permanent employees at the time of a borrowers first loan on how many loans a borrower will take out in total.

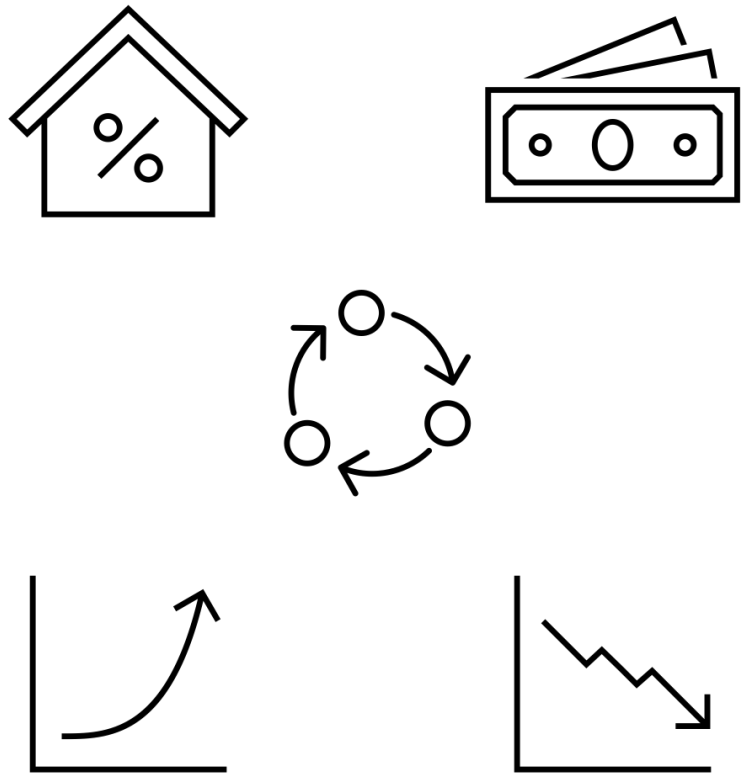
Firm growth: Summary

- There exists a positive relationship between the length of a borrower-lender relationship and the size of that borrower. However, we find that this relationship is primarily driven by larger borrowers establishing longer term relationships with lenders.
- Prior to obtaining their first loan, firms which will take out multiple loans in the future are larger in size than firms that end up borrowing only for one year. After controlling for this effect, we no longer observe firm growth effects related to the length of a borrower-lender relationship.
- In the dataset, we do not observe firms not borrowing, hence we cannot conclude that firms do or do not grow as a result of having received financing.
- It might be that firms benefitting the most from access to finance substitute away from social lenders towards institutional lenders – as such, the length of a relationship between a borrower and lenders would be an imperfect measure to capture the success of a relationship.

Terms of the loan

Terms of the loan

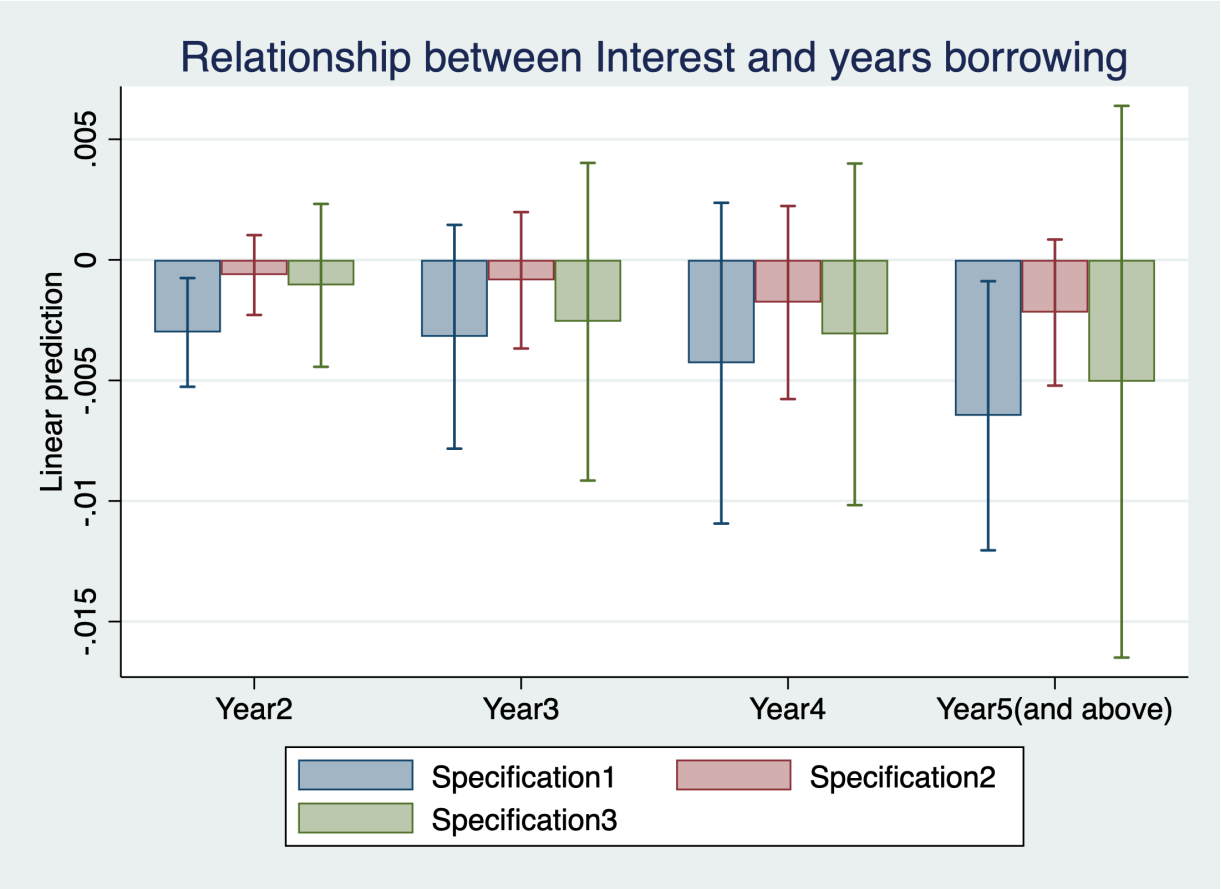
- We can repeat the same exercise but instead of the size of the firm we can look at the terms of the loan as outcome variables.
- Primarily we are interested in looking at how loan amounts, interest rates, and default probabilities change as a borrower interacts longer with lenders.
- We use the same regression framework as in the prior analysis.



Terms of the loan: Results (1)

Firms borrowing longer pay slightly lower interest

- As firms borrow with lenders over more years, their interest rates decrease.
- We estimate that firms borrowing for 5+ years pay interest rates 0.5 percentage points lower than those borrowing for only 1 year.
- As these results illustrate, the magnitude of this effect is rather small.

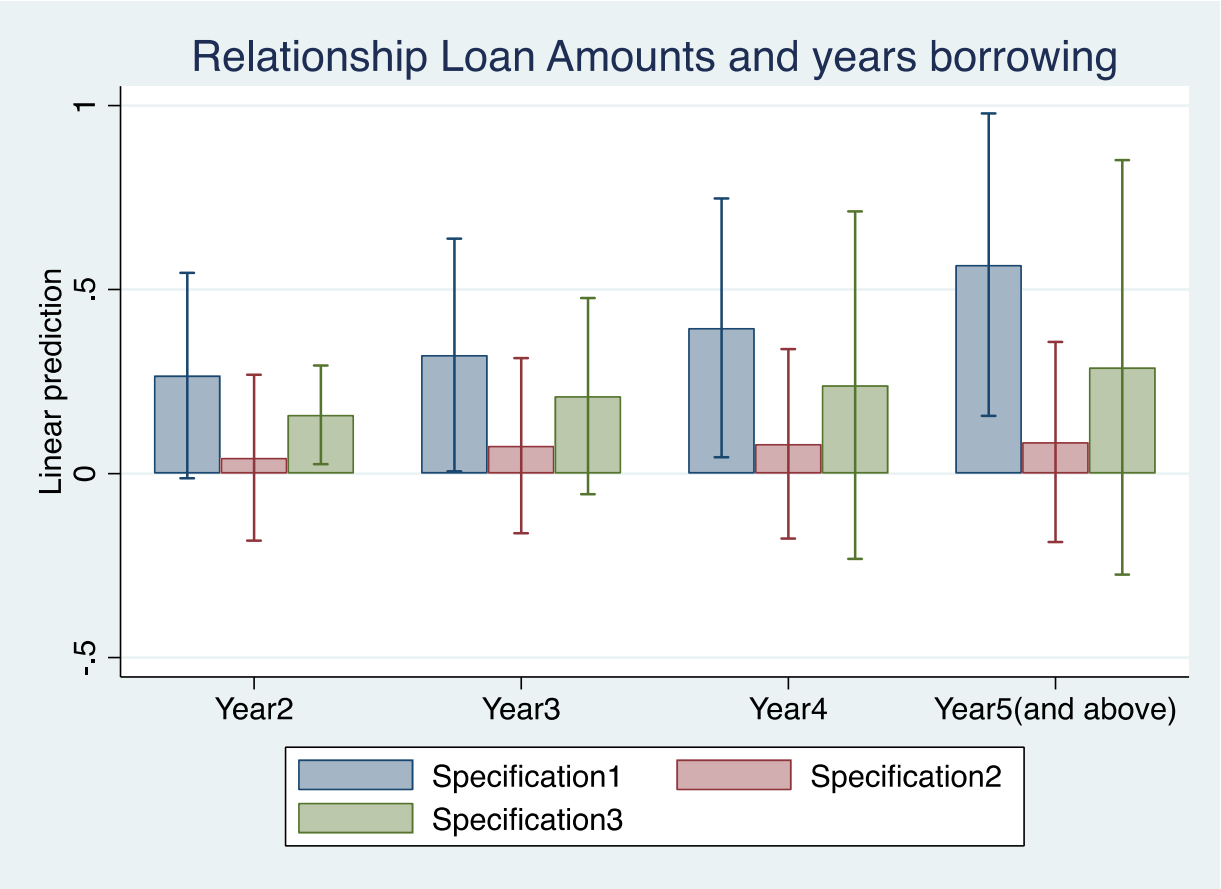


(Figure 10) Regression coefficients when regressing interest rates on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3.

Terms of the loan: Results (2)

Firms borrowing longer receive higher loan amounts

- As firms borrow with lenders over more years, their loan amounts increase.
- We estimate that firms borrowing for 5+ years receive loans 25% larger than those borrowing for only 1 year.
- Again, it should be noted that the estimated coefficients are rather noisy and that hence these results should be regarded contextually.

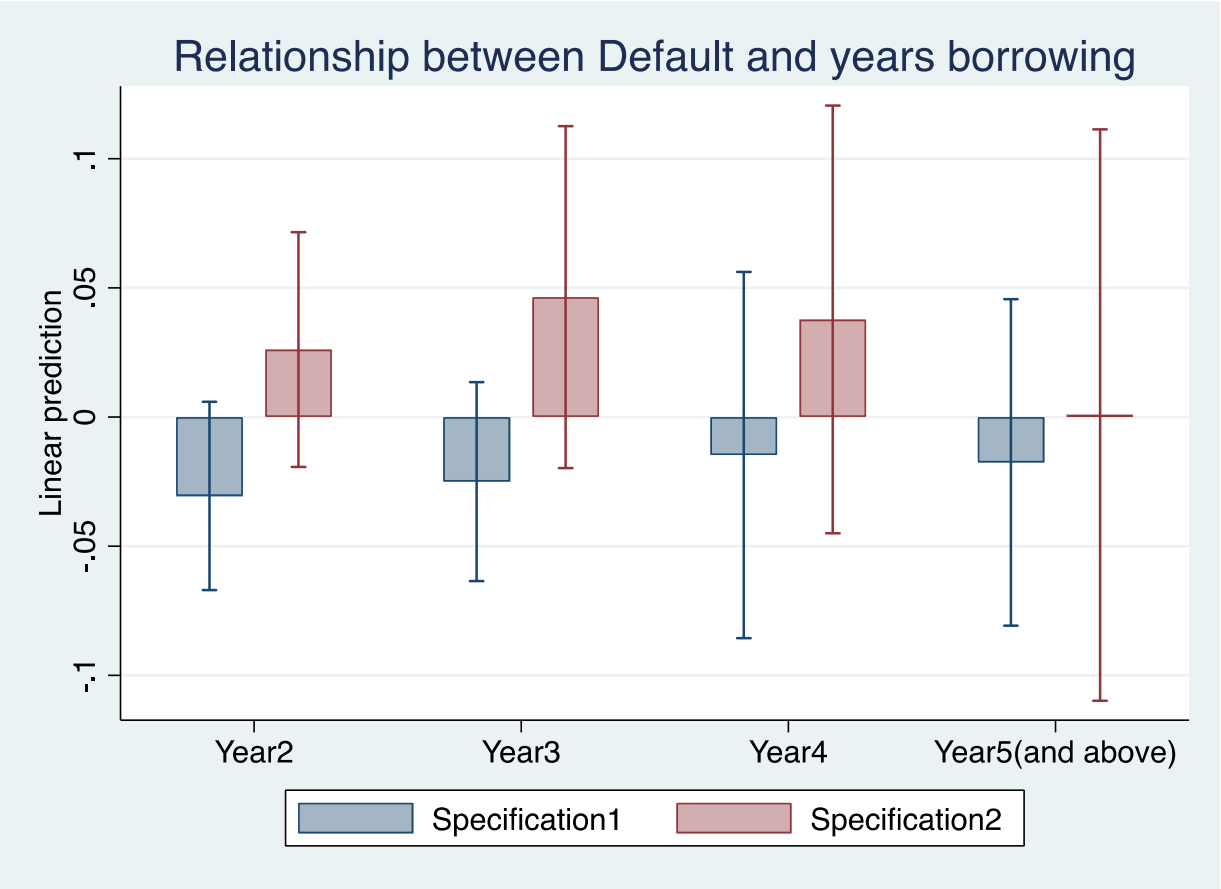


(Figure 11) Regression coefficients when regressing loan amounts on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3.

Terms of the loan: Results (3)

Borrowers are most likely to default on their loans in Years 2, 3, and 4

- We define default as a loan having been provisioned or written off at any point in time by a lender.
- As Specification 3 restricts the sample to those borrowers surviving at least 5 years, by construction default rates in Year 1-5 will be extremely low, hence we want to focus on specification 2.
- Looking at Specification 2, we estimate that borrowers are most likely to default on loans after having interacted with lenders for 2-4 years, after which default probabilities decrease.
- One can speculate about the drivers of this relationship. Maybe lenders become complacent in their diligence after having granted credit to a borrower for a couple of years, whilst selection drives bad borrowers out of the portfolio after 4 years.

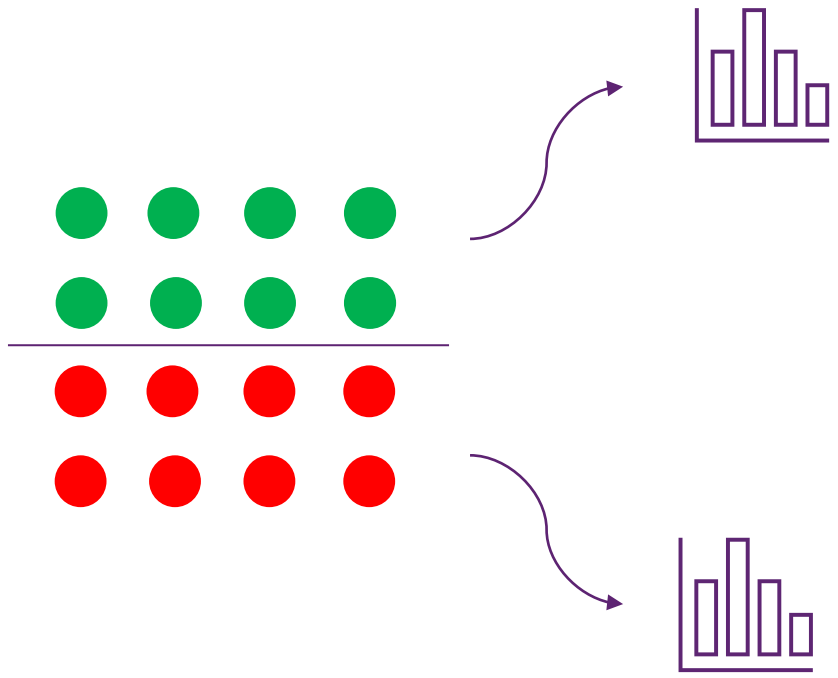


(Figure 12) Regression coefficients when regressing default on number of years a borrower has been borrowing from lenders – Specification 1 & 2.

Terms of the loan: Results (4)

Terms of the loan effects vary with countries

- We can look at **heterogeneities** in our estimated coefficients.
- After controlling for selection and borrower fixed effects, **interest rates** seem to **decrease more** in countries with **better developed financial systems.**
- We **do not find evidence** for differences in **loan volume evolvement.**
- The relevant coefficients can be found in the **appendix.**



Please Note: When performing a sample split, the sample size decreases and hence estimated coefficients become less reliable

Terms of the loan: Results (5)

Firms borrowing longer receive slightly lower interest from the start

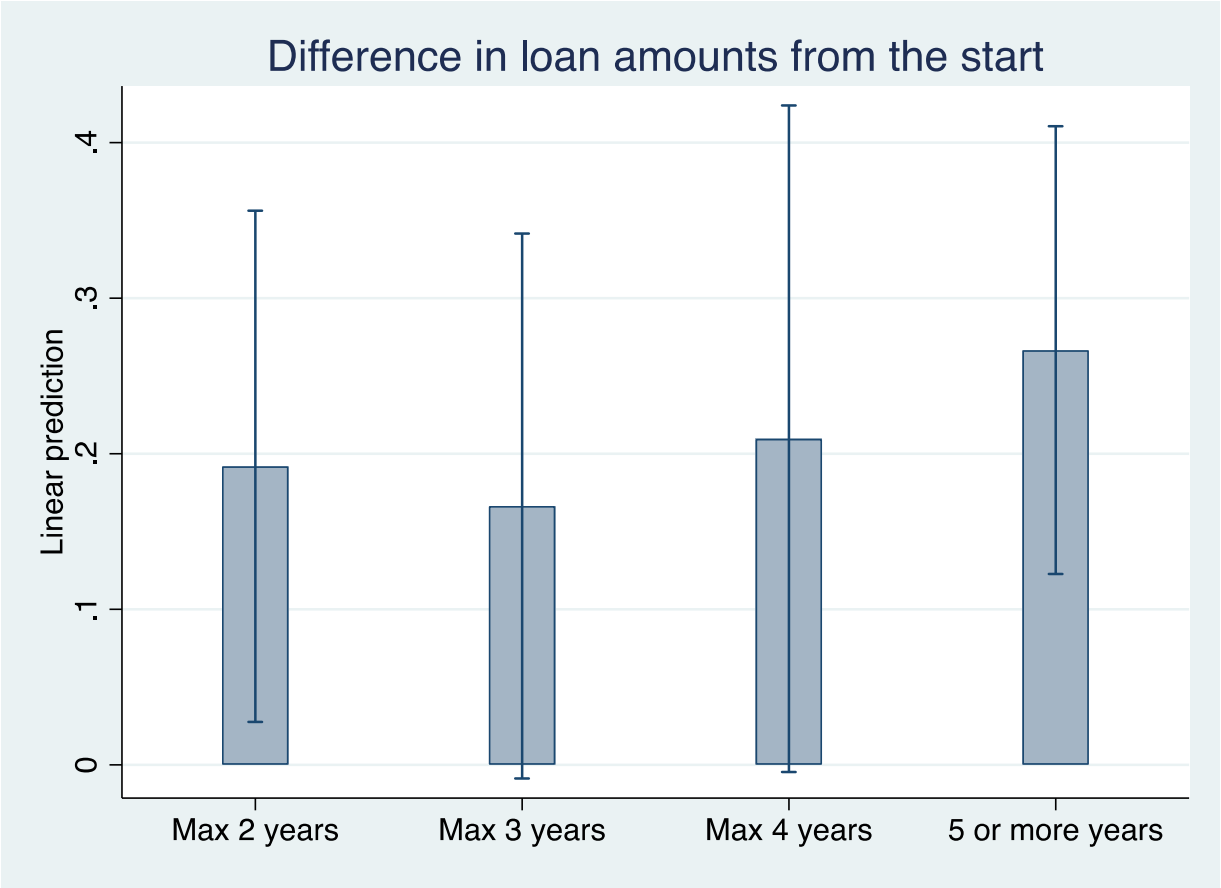
- We find moderate evidence suggesting that interest rates are lower from the first loan onwards for firms that take up more loans with lenders in the future.
- It should be noted that the estimated effect is rather small.
- We estimate that firms borrowing for 5+ years will pay interest rates 0.2 percentage points lower on their first loan compared to those only borrowing for 1 year.

(Figure 13) Regression coefficients when regressing interest rates paid at the time of a borrowers first loan on how many loans a borrower will take out in total.

Terms of the loan: Results (6)

Firms borrowing longer receive higher loan amounts from the start

- Loan amounts are higher from the first loan onwards for firms borrowing longer from lenders.
- We estimate that borrowers who will take out loans for 5+ years receive loan amounts more than 25% higher on their first loan compared to those who will only borrow for 1 year.



(Figure 14) Regression coefficients when regressing loan amounts at the time of a borrowers first loan on how many loans a borrower will take out in total.

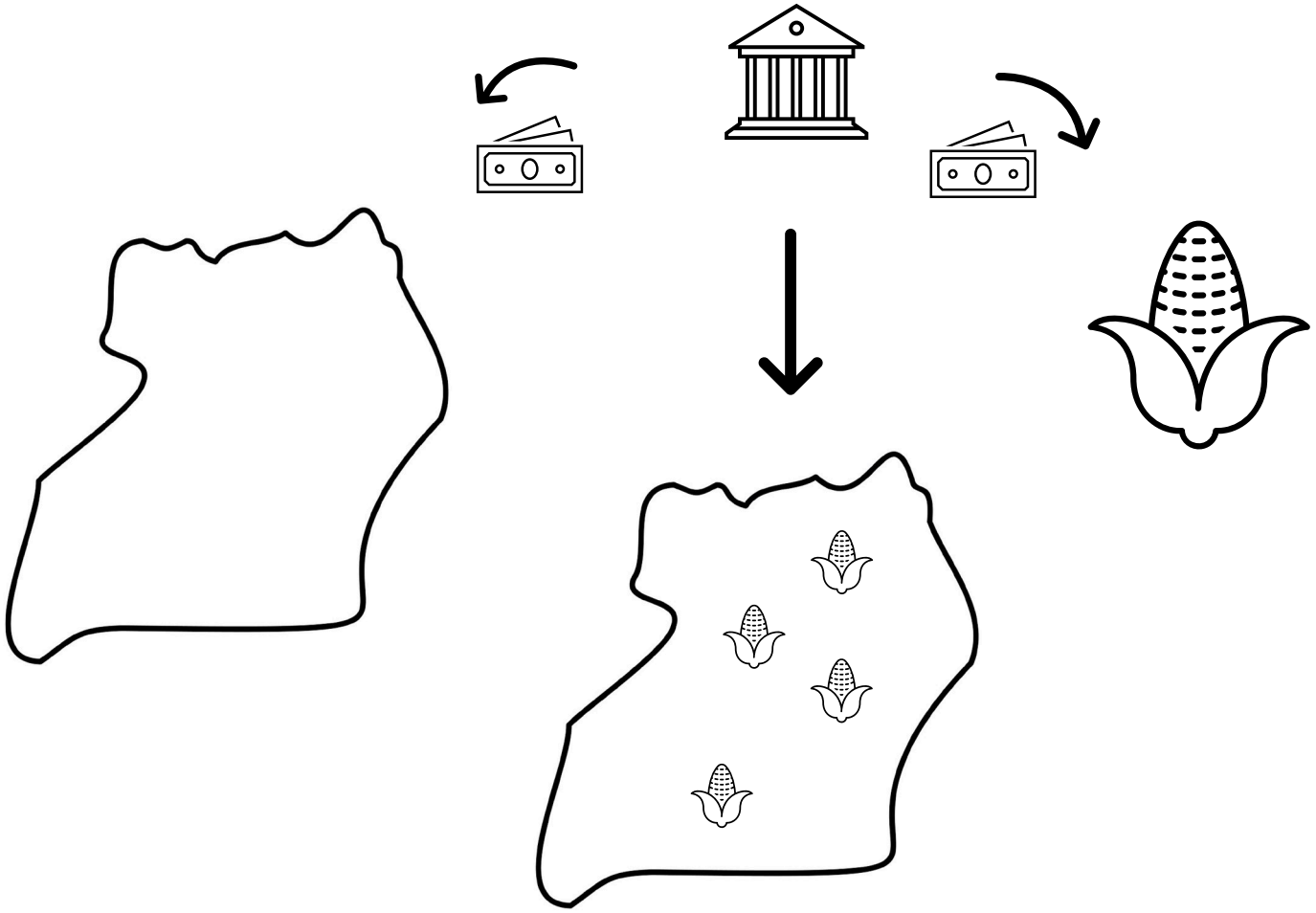
Terms of the loan: Summary

- Firms borrowing longer pay slightly lower interest rates. The magnitude of this effect is rather small: we estimate that firms borrowing for 5+ years pay interest rates 0.5 percentage points lower than those borrowing for only 1 year.
- Firms borrowing longer receive higher loan amounts. We estimate that firms borrowing for 5+ years receive loans 25% larger than those borrowing for only 1 year.
- We estimate that borrowers are most likely to default on loans after having interacted with lenders for 2-4 years.
- Loan amounts are higher from the first loan onwards for firms who will eventually borrow longer from lenders. We find moderate evidence that interest rates are lower from that start for firms who will eventually borrow longer from lenders.

Lender experience

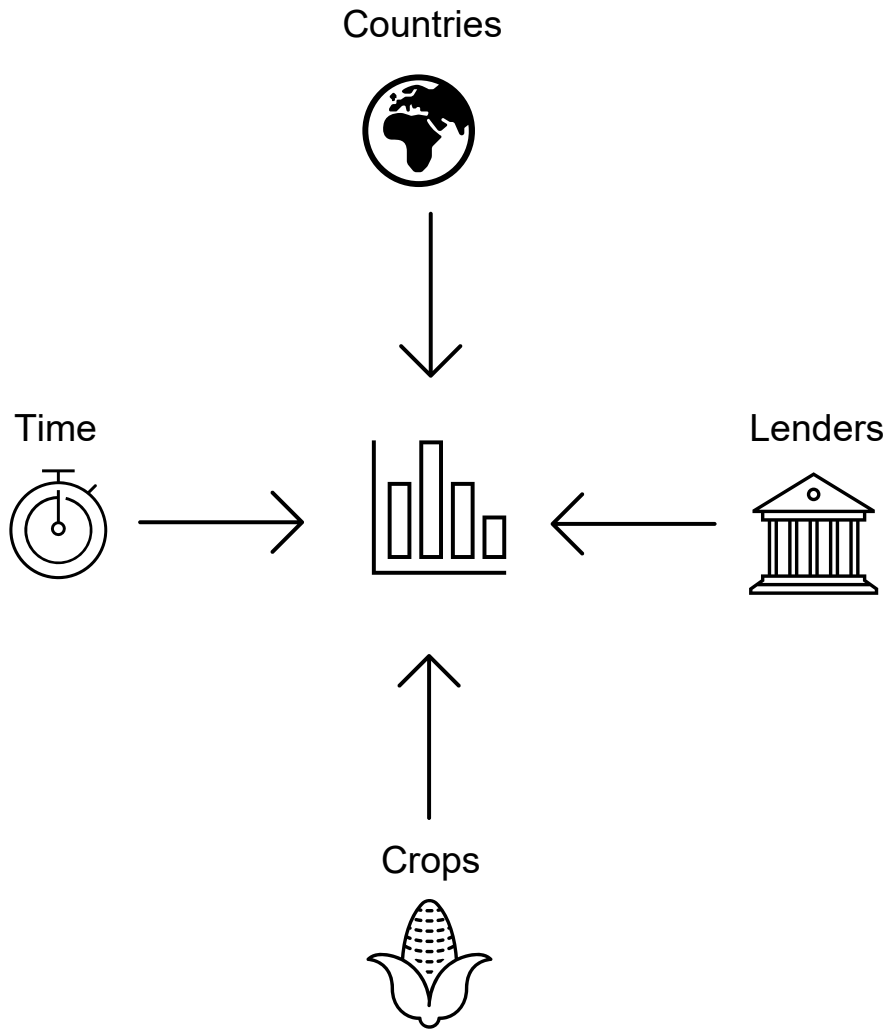
Lender experience (1): Intuition

- Lenders give out loans in countries, in crops, and in a country-crop pairings.
- For the sake of this analysis, we define a country-crop paring as a “market”
- We can ask how experience related to country lending, crop lending, and country-crop lending translates into certain loan outcomes. More specifically we can look at aggregate credit made available, average interest rates charged, and average default rates.
- We estimate (i) the sum of credit made available (ii) average interest rates and (iii) average default rates in a country-crop pairing, each year, as a function of (a) the number of loans given out in that country (b) the number of loans given out in that crop and (c) the number of loans given out in that country-crop pairing up to that year.



Lender experience (1): Econometric model

- Again, we want to eliminate any biases which might affect the estimation of our results.
- Hence, in the analysis we will control for biases constant across country, year, lender, and crop.



Lender experience (1): Summary statistics

- The table to the right provides summary statistics for our experience measures.
- A unique observations represents a lender operating in a given market in a given year.
- The number 2152 refers to the number of unique country-crop-lender-year parings.
- Experience is measured as the number of loans issued in a country, crop, or country-crop paring by a lender prior to the beginning of each year.
- To illustrate, the max country experience number (348) in the top right corner represents the Cocoa-Peru market of a specific lender in 2020. It means that this lender, prior to 2020, has issued 348 loans in Peru which were not in Cocoa.

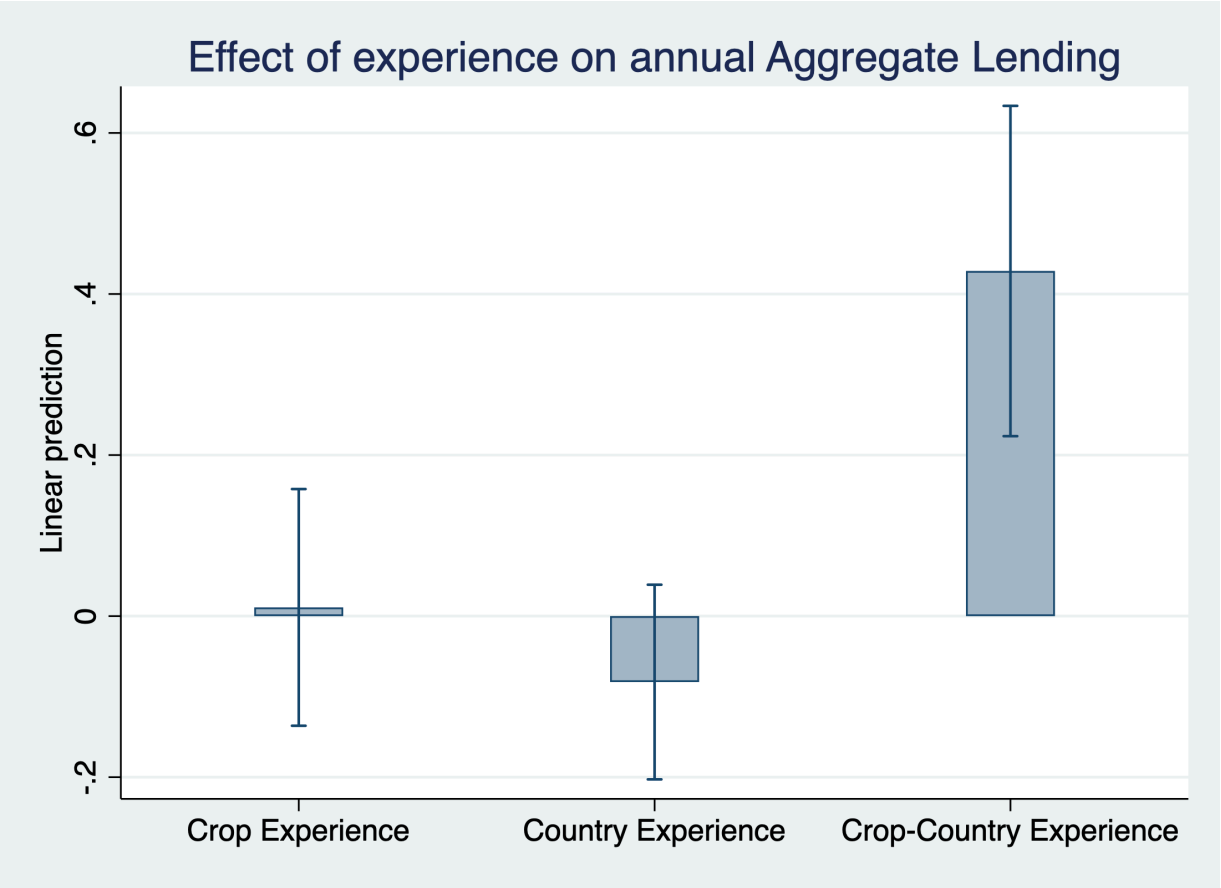
Experience Measures	Observations	Mean	sd	min	max
country experience	2,152	20.66	41.61	0	348
crop experience	2,152	76.97	150.06	0	1,049
country crop experience	2,152	10.13	19.88	1	277

(Figure 15) Summary statistics for measures of lender specific market experiences. Note that sd = standard deviation.

Lender experience (1): Results (1)

Lenders lend more in markets in which thy have prior country-crop experience

- The more a lender lends in a specific country-crop paring (e.g., Coffee in Peru) , the more credit that lender provides in that pairing in consequent years.
- However, we do not find that accumulating experience in only a country or only a crop translates into more credit being issued in that pairing in consequent years.
- In contrast, we find that, when holding country-crop experience constant, increasing your general lending in a country translates into less credit being made available in any given country-crop pairing the consequent year.
- These findings are indicative of the fact that having accumulated experience in crop A in country B would crowd out credit made available in crop C in country B.

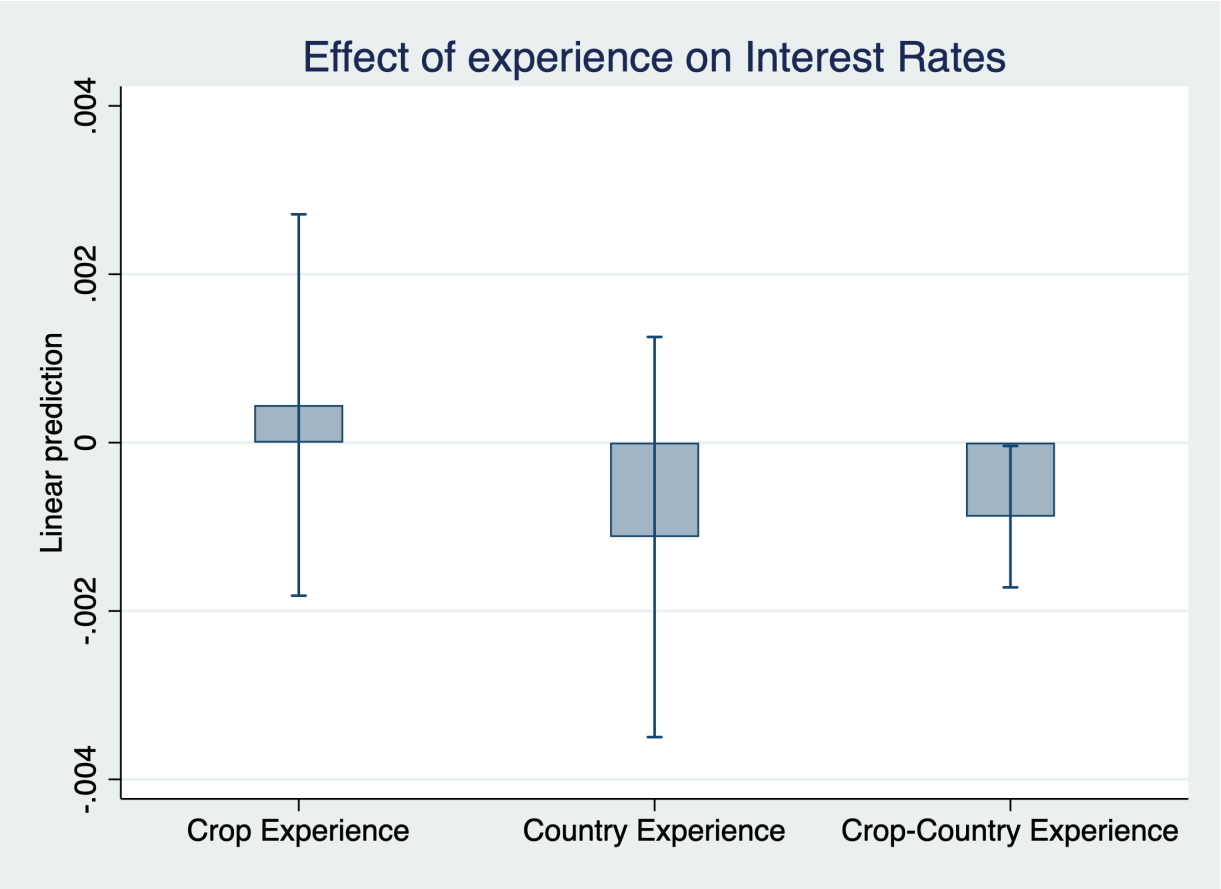


(Figure 16) Regression coefficients when regressing aggregate credit issued by a lender in a given market in a given year on our measures of experience.

Lender experience (1): Results (2)

Interest rates decrease slightly with increased country-crop and country experience

- As lenders accumulate experience in a country and in a country-crop paring, interest rates decrease slightly.
- As the estimated coefficients are rather small, the effect of experience on interest rates seems to be marginal.

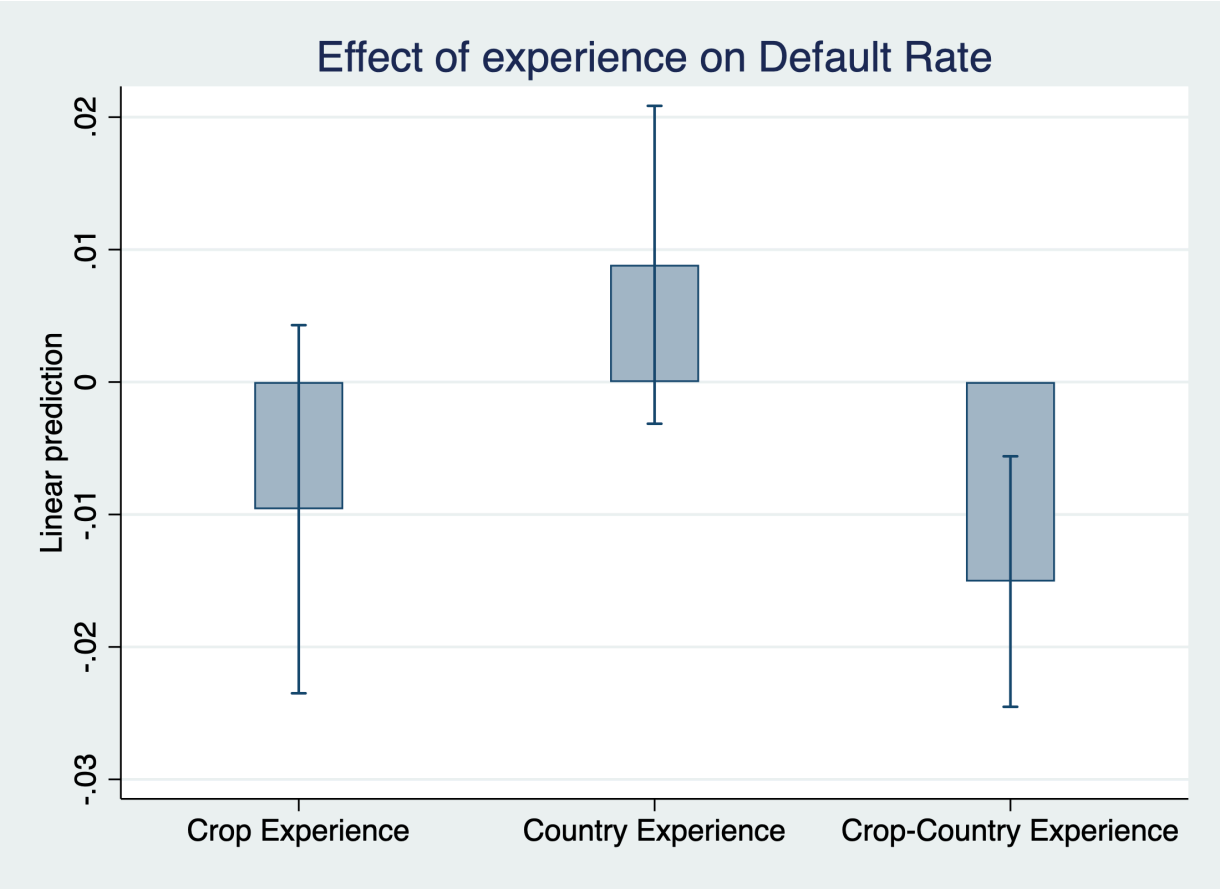


(Figure 17) Regression coefficients when regressing average interest rates charged by a lender in a given market in a given year on our measures of experience.

Lender experience (1): Results (3)

Default rates decrease as lenders gain crop and country-crop experience

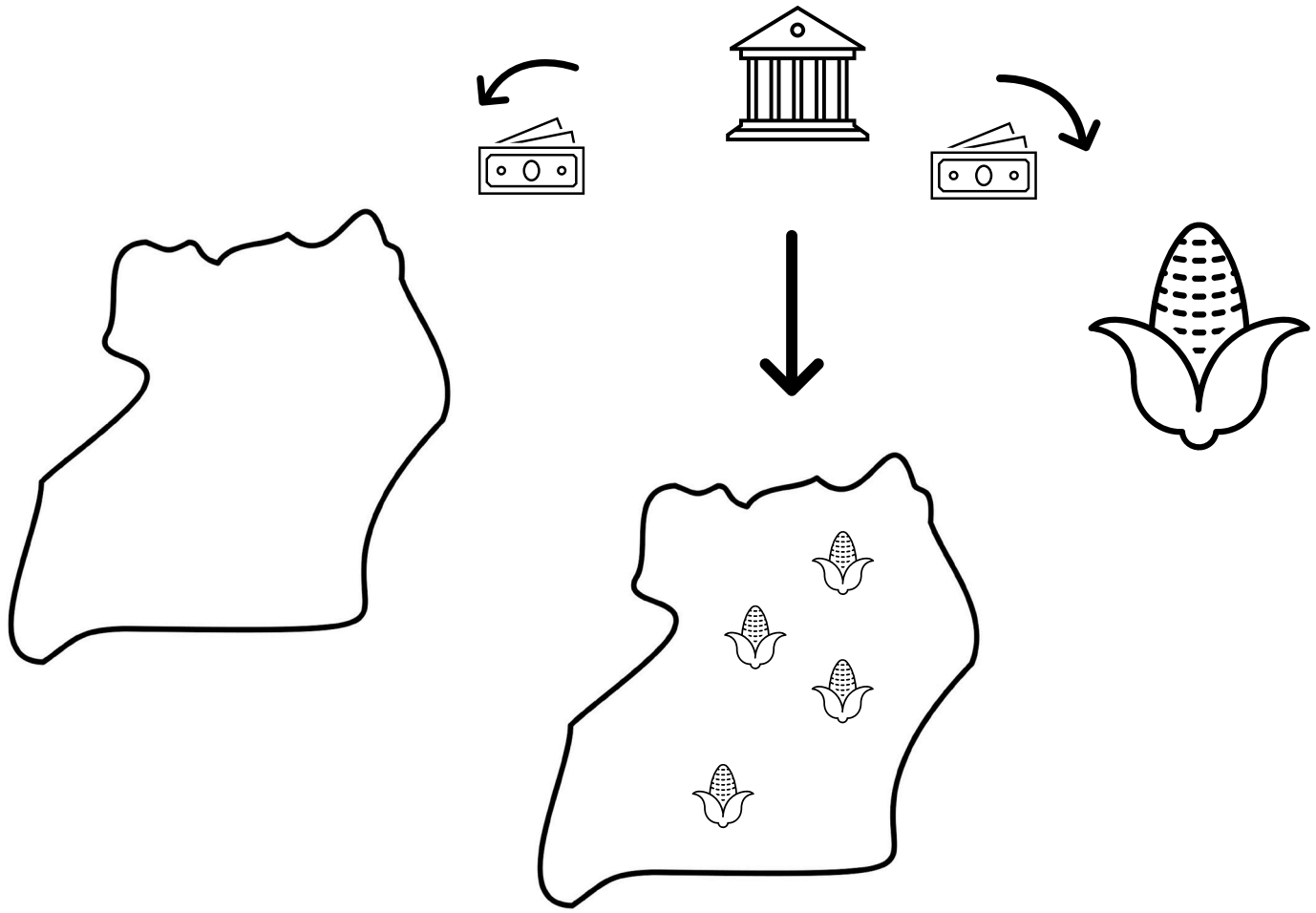
- As lenders accumulate experience in a crop and a country-crop pairing, default rates within their country-crop portfolio decrease.
- This finding suggests that either lenders become better at screening potential borrowers as they accumulate experience **or** that lenders choose to acquire experience in crops and country-crop pairings which are inherently less risky.
- We find the reverse relationship to hold for country experience. Holding market experience constant, as lenders accumulate experience in a country, default rates within their country-crop portfolio seem to increase.



(Figure 18) Regression coefficients when regressing average default rates by a lender in a given market in a given year on our measures of experience.

Lender experience (2): Intuition

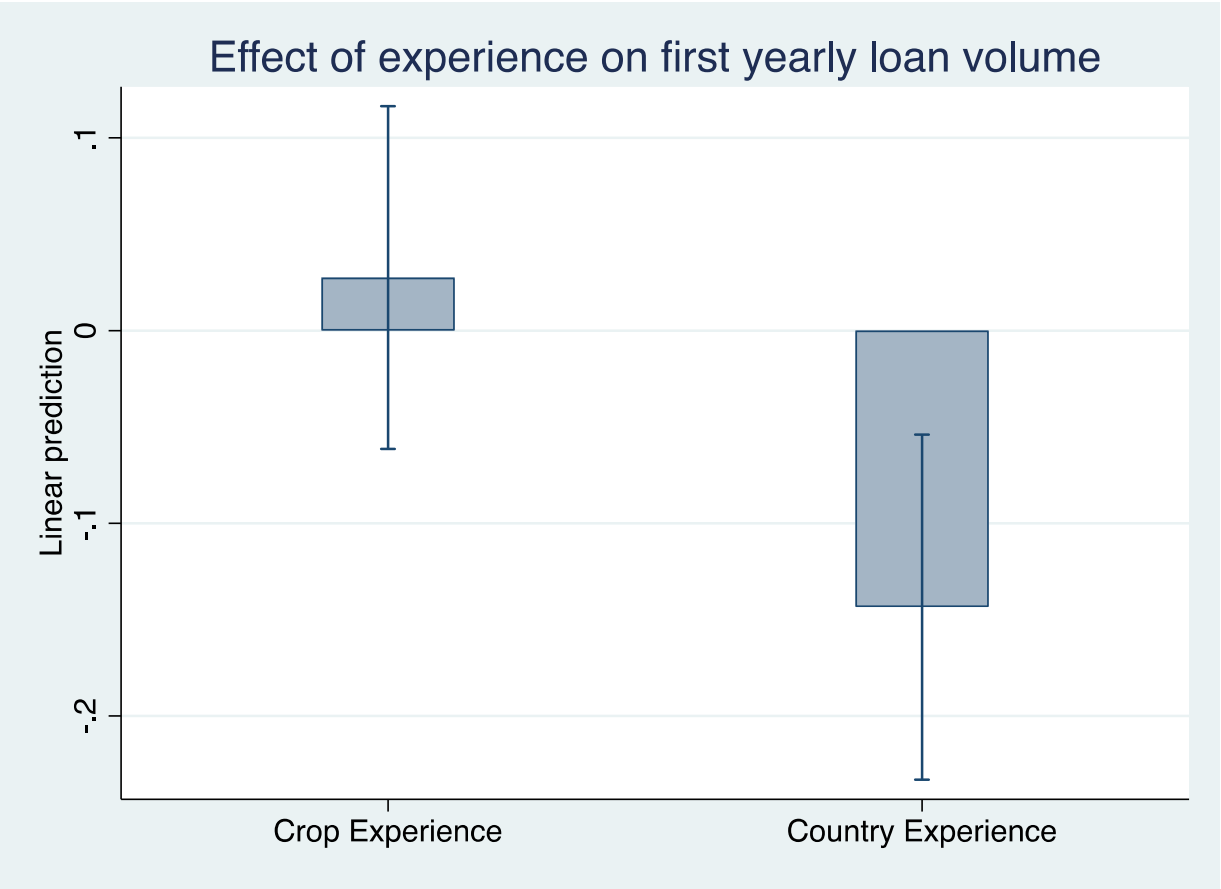
- Secondly, we can ask how country experience and crop experience relate to lending, at the time in which a lender enters a new country-crop pairing (new market).
- We can estimate the sum of credit made available, the average interest rate charged, and the average default rate, during a lenders first year operating in a new country-crop pairing, as a function of country experience and crop experience leading up to their entry.



Lender experience (2): Results (1)

Lenders give out less credit in a new market when they have already accumulated experience in that country

- Aggregate loan amounts in the first year of entering a new crop in a familiar country are lower when a lender already has a lot of experience in that country.
- This could be indicative of the fact that lenders, in a country in which they already operated in, collect the “low hanging fruit” first – those crops which represent the biggest market.
- We cannot replicate this result for crop experience.

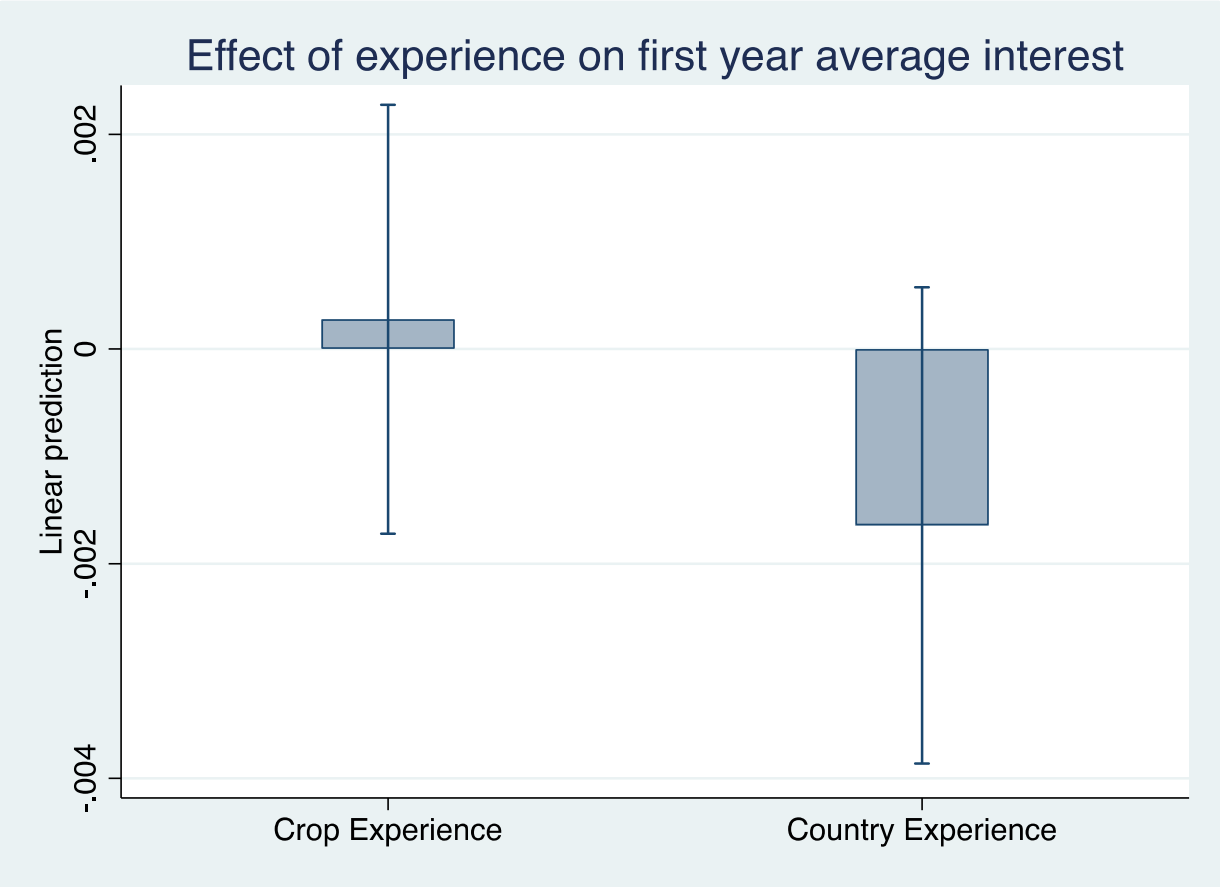


(Figure 19) Regression coefficients when regressing aggregate loan volume of a lender in the first year of operating in a new market on our measures of experience

Lender experience (2): Results (2)

Lenders give out loans at slightly lower interest rates in new markets in which they have prior country experience

- Average interest rates charged during the first year of operation in a new country-crop pairing are lower in countries where lenders have prior experience
- Average interest rates during the first year of entry do not vary if the lender has previous experience lending in that crop.

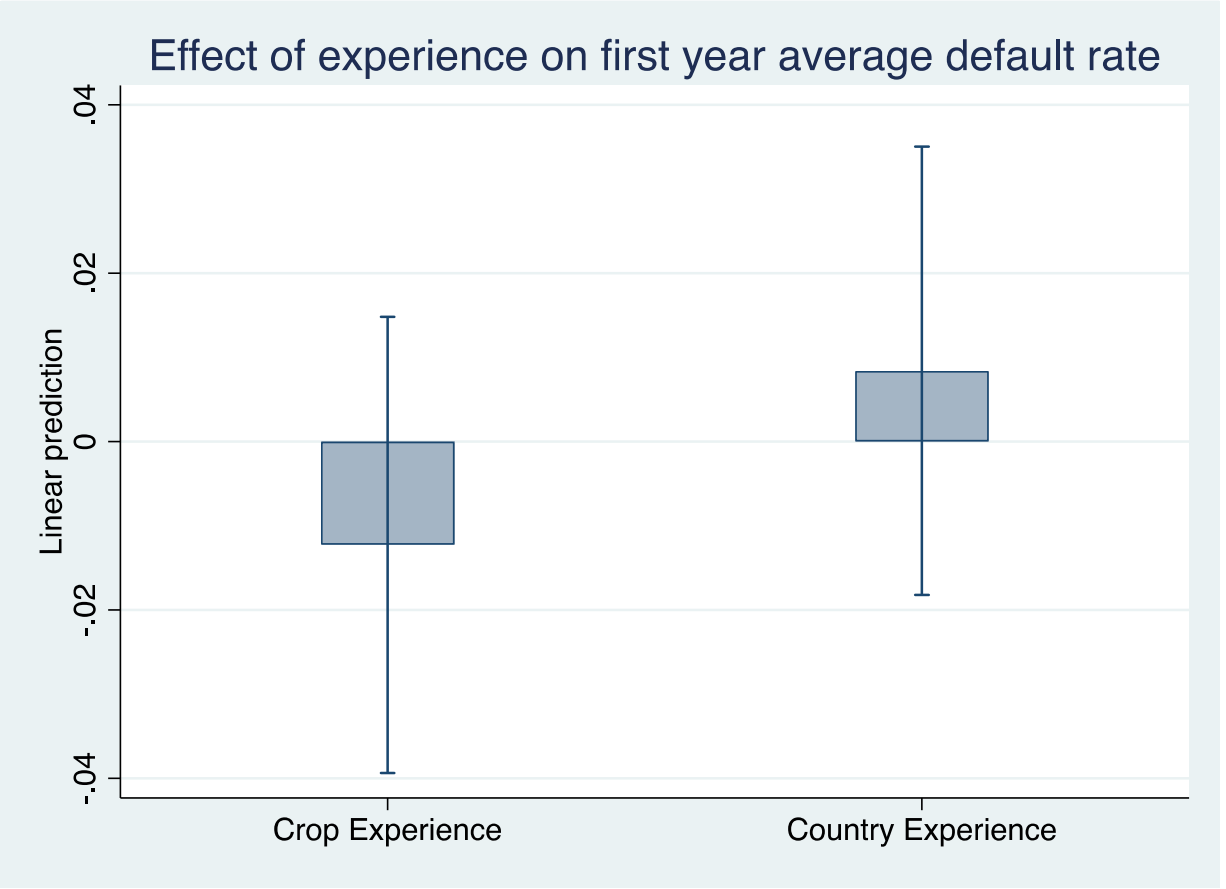


(Figure 20) Regression coefficients when regressing average interest rates charged by a lender in the first year of operating in a new market on our measures of experience

Lender experience (2): Results (3)

Average default rates in a new market are lower when lenders have prior experience in that crop

- Average default rates in a lender's first year of operating in a new market are slightly higher when a lender has accumulated experience in that country prior to entering a new market.
- It might be that, within a country, lenders enter less risky crops first before deciding to move into riskier crops later.
- Default rates seem to be lower when a lender has accumulated experience in that crop prior to entering a new market.



(Figure 21) Regression coefficients when regressing average default rates experienced by a lender in the first year of operating in a new market on our measures of experience

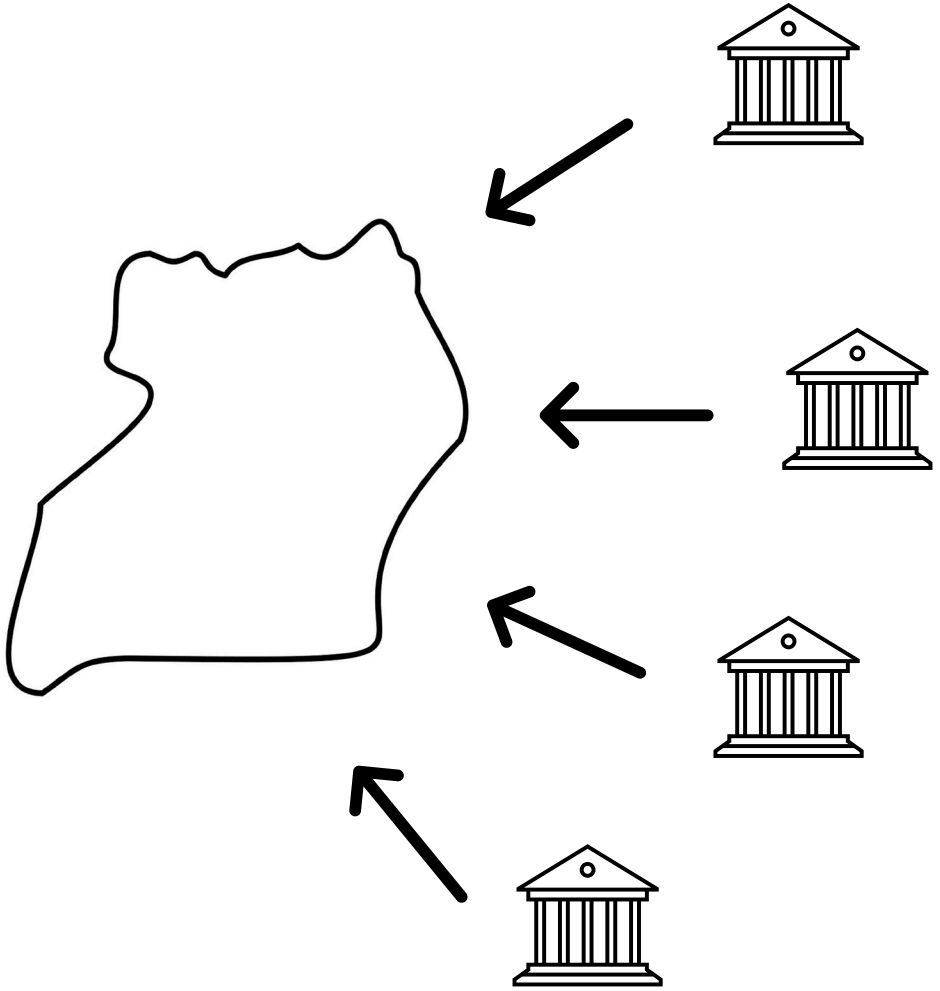
Lender experience: Summary

- The more a lender lends in a specific country-crop paring, the more credit that lender provides to that pairing in consequent years.
- As lenders accumulate experience in a country and in a country-crop paring, interest rates decrease slightly.
- As lenders accumulate experience in a crop and a country-crop pairing, the probability of default within their lending portfolio decrease.
- Aggregate loan amounts in the first year of entering a new crop in a familiar country are lower when a lender already has a lot of experience in that country. This could indicate that lenders, in a country in which they already operated in, enter the largest markets first.
- Average interest rates charged during the first year of operation in a new country-crop pairing are slightly lower in countries where lenders have prior experience. Average default rates in a new market are higher when a lender has prior experience in that country and lower when a lender has prior experience in that crop.

Lender competition

Competition: Intuition

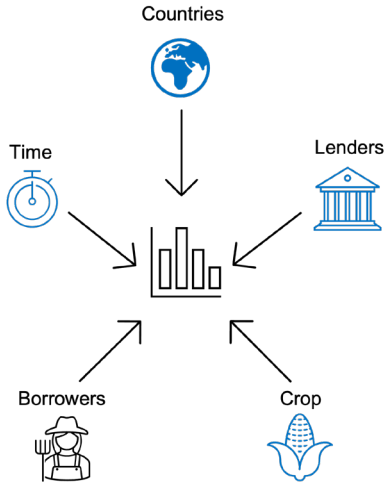
- As more lenders enter a market, we would assume that this market would become more competitive.
- Lenders can compete in many dimensions but for the sake of this analysis we will look at (i) loan amounts (ii) interest rates charged and (iii) the average default probability of a borrower receiving a loan.
- We can look at how these variables change as more lenders enter a market.



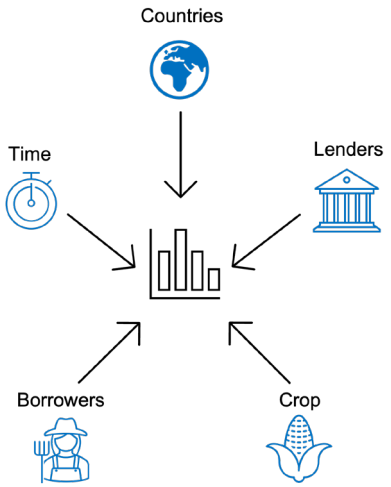
Competition: Econometric model

- Again, we progressively control for more potential biases throughout the specifications.
- In Specification 1 we control for any biases which are constant across country, lender, and crop.
- In Specification 2 we do the same but also hold borrower characteristics constant.
- In Specification 3 we hold year-country, crop-country, and crop-year characteristics constant, as well as borrower and lender characteristics.

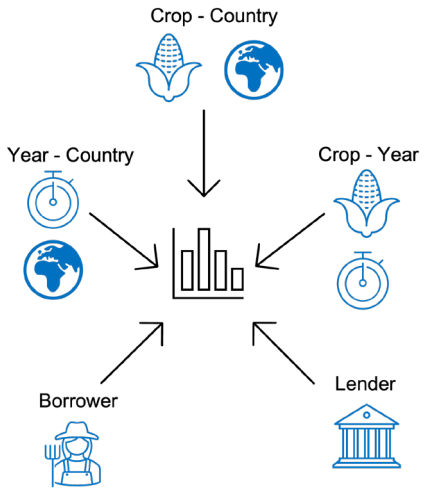
Specification 1



Specification 2



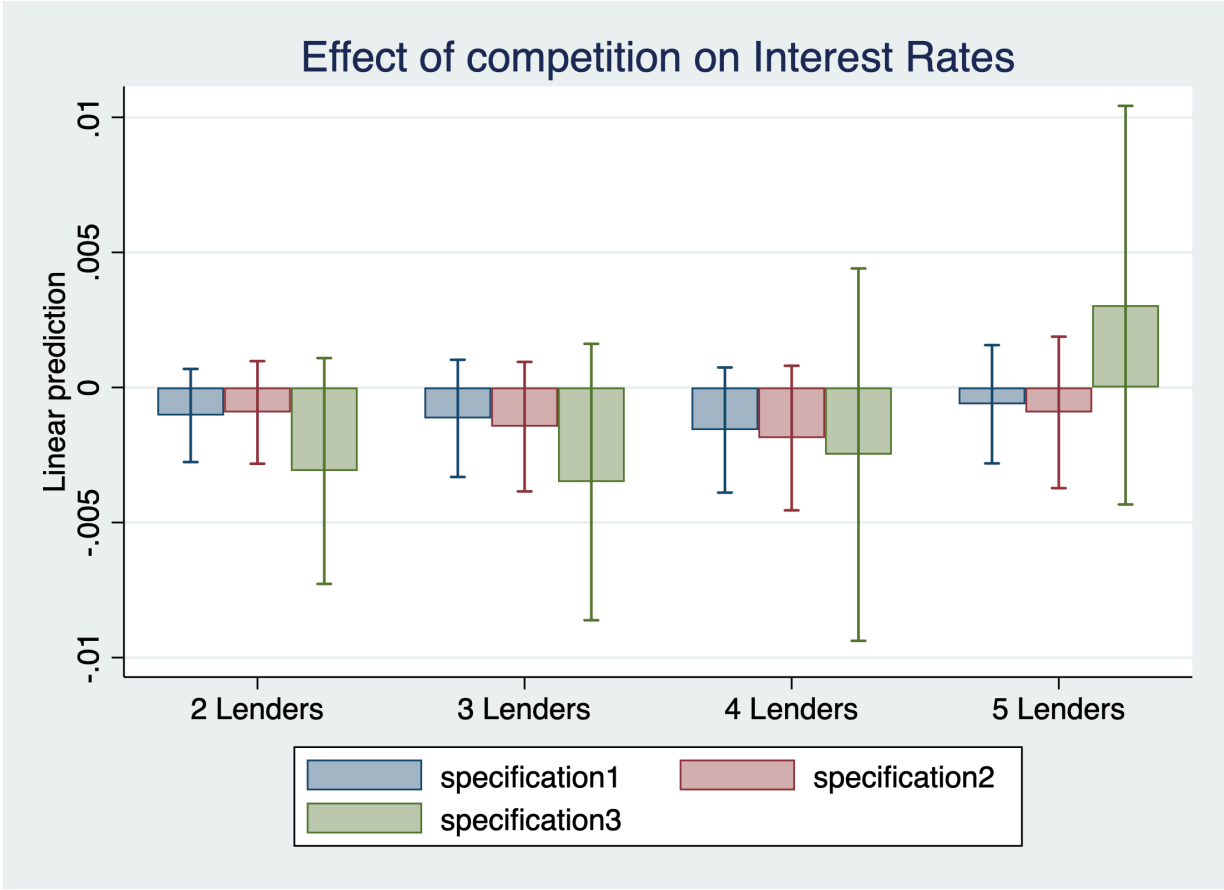
Specification 3



Competition: Results (1)

Borrowers pay slightly lower interest rates within markets in which more lenders operate in

- We find moderate evidence that in markets with multiple lenders, borrowers pay lower interest rates on their loans even though the effects seem small.
- This leads us to believe that interest is not a significant channel through which lenders compete.

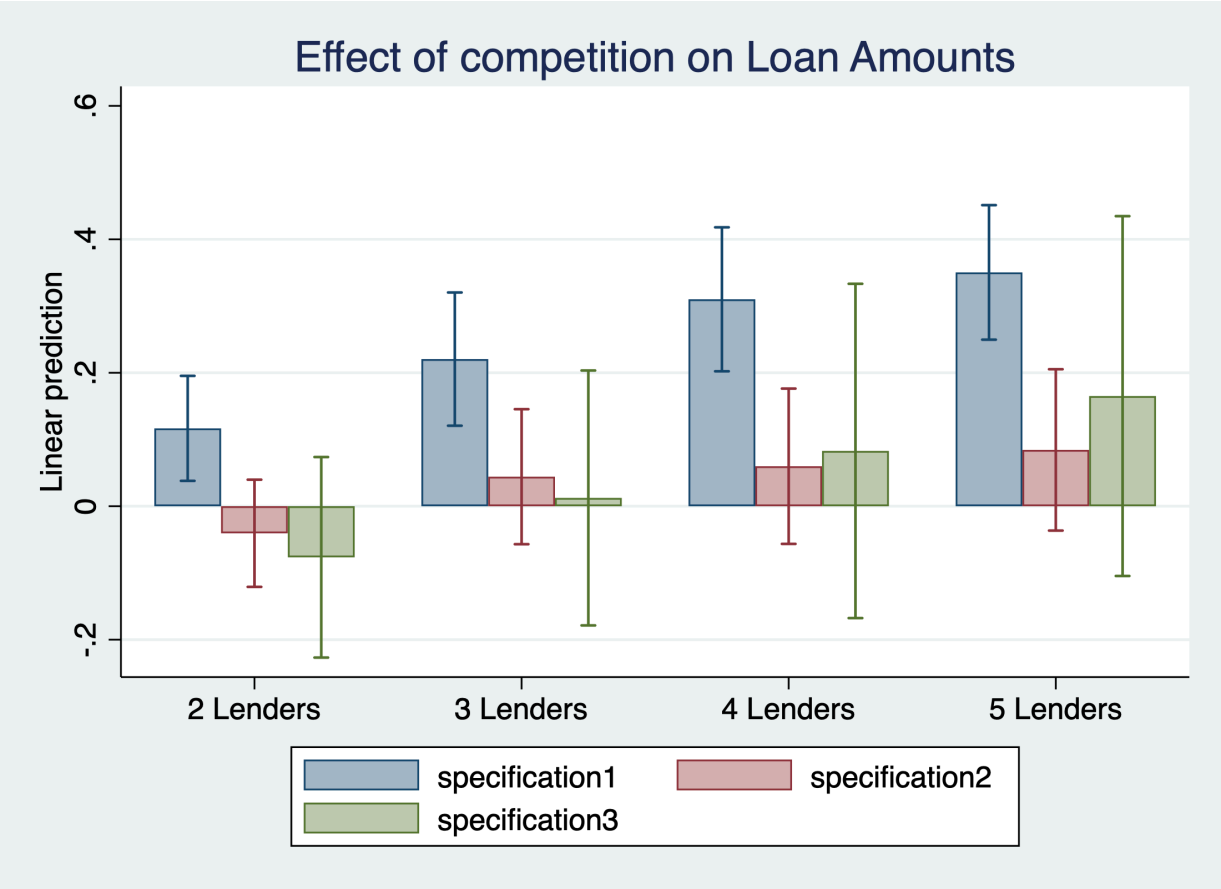


(Figure 22) Regression coefficients when regressing average interest rates on number of lenders operating in a market – Specification 1, 2 & 3

Competition: Results (2)

Borrowers receive larger loans with increased competition

- We find that in more competitive markets, on average, borrowers receive higher loan amounts.
- We estimate that borrowers in markets with 5+ lenders receive individual loans nearly 20% higher than in markets with only 1 lender.
- Either lenders compete in average loan amounts issued *or* they decide to enter markets which issue higher loan amounts.

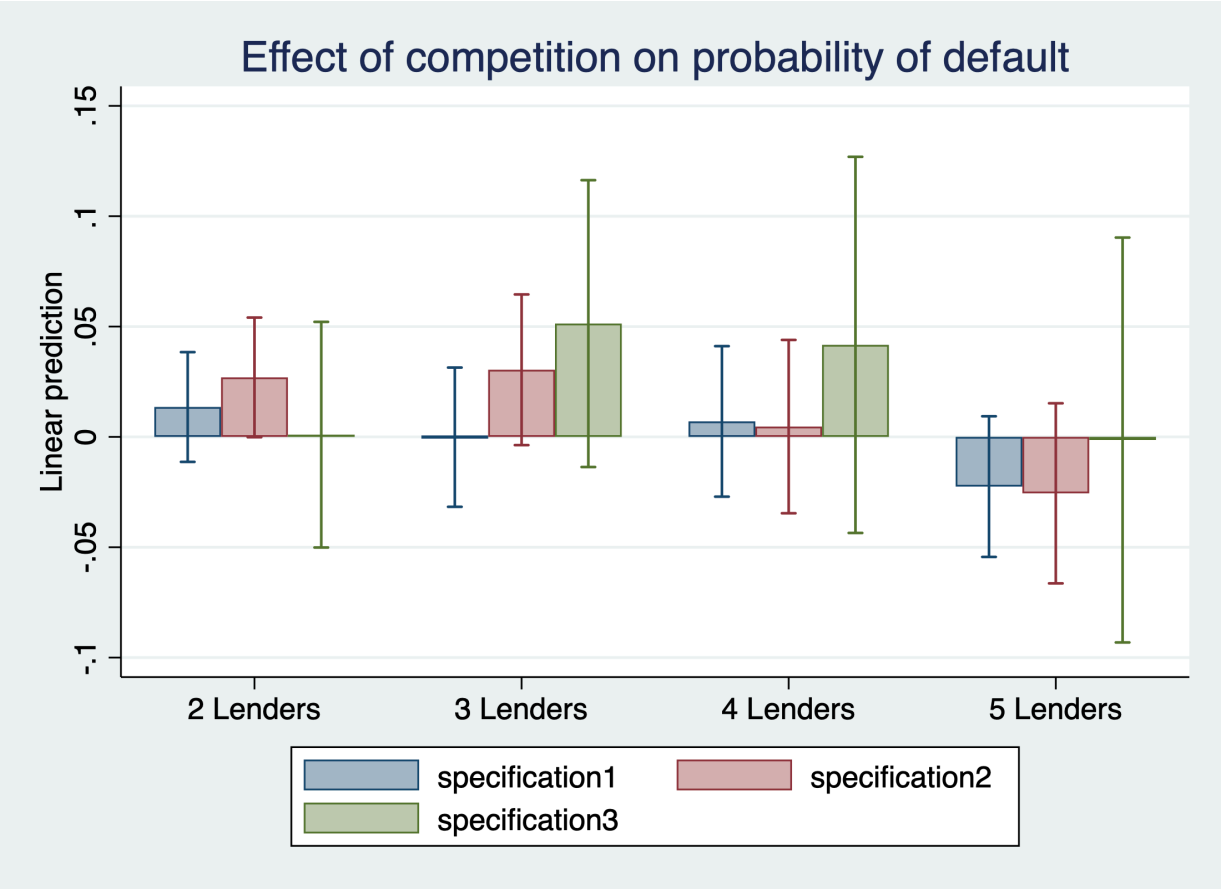


(Figure 23) Regression coefficients when regressing average loan amounts on number of lenders operating in a market – Specification 1, 2 & 3

Competition: Results (3)

We find an inverted U-shaped relationship between competition and default

- We find an inverted U-shaped relationship between competition and default probability. Default probabilities peak at 3 lenders and consequently fall as more lenders move into a market.
- While we can establish these relationships, it is hard to disentangle the root cause for what drives them. As such, intuition is required to make sense of the estimated correlations.
- Furthermore, it might be that rather than competition causing these relationships, lenders self-select themselves into markets with certain characteristics.



(Figure 24) Regression coefficients when regressing probability of default on number of lenders operating in a market – Specification 1, 2 & 3

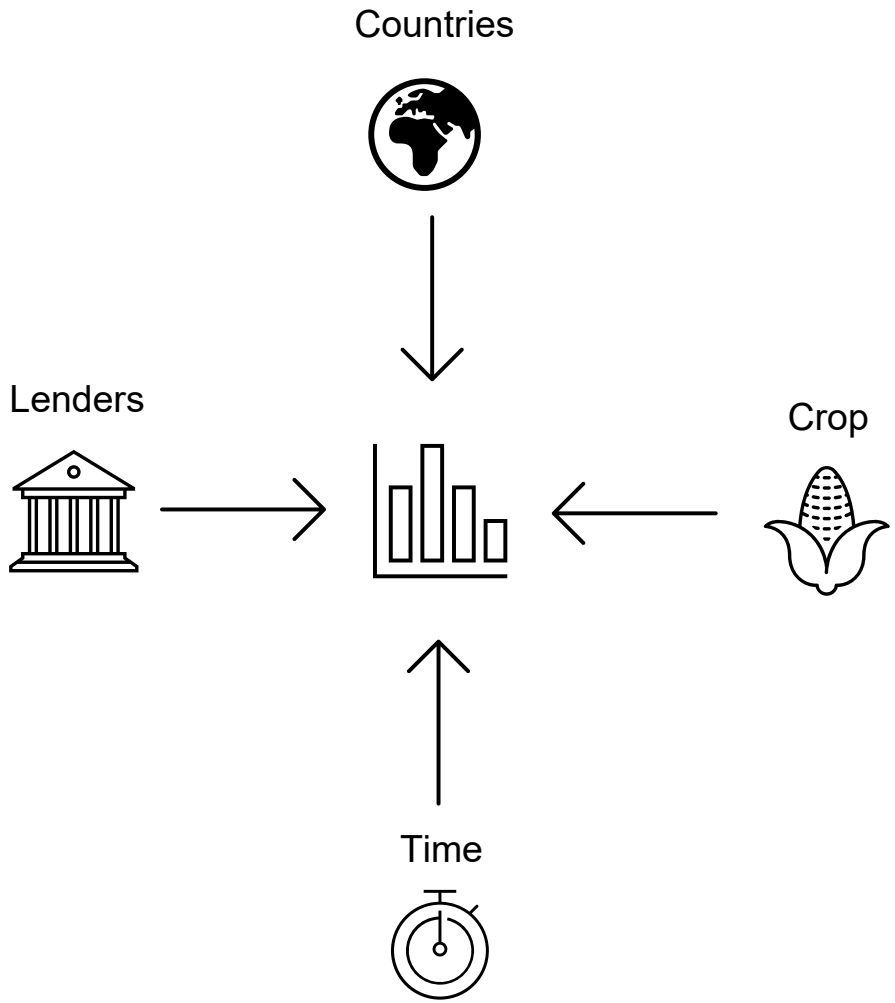
Lender competition: Summary

- As more lenders operate in a market, on average, borrowers pay lower interest rates on their loans. However, the effects seem small and lead us to believe that interest is not a significant channel through which lenders compete within markets.
- As more lenders operate in a market, borrowers receive higher loan amounts.
- Default probabilities peak at 3 lenders and consequently fall as more lenders move into a market.
- It can be argued that rather than competition causing these relationships, lenders self-select themselves into markets with certain characteristics.

Default risk by country and crop

Default risk: Intuition and econometric model

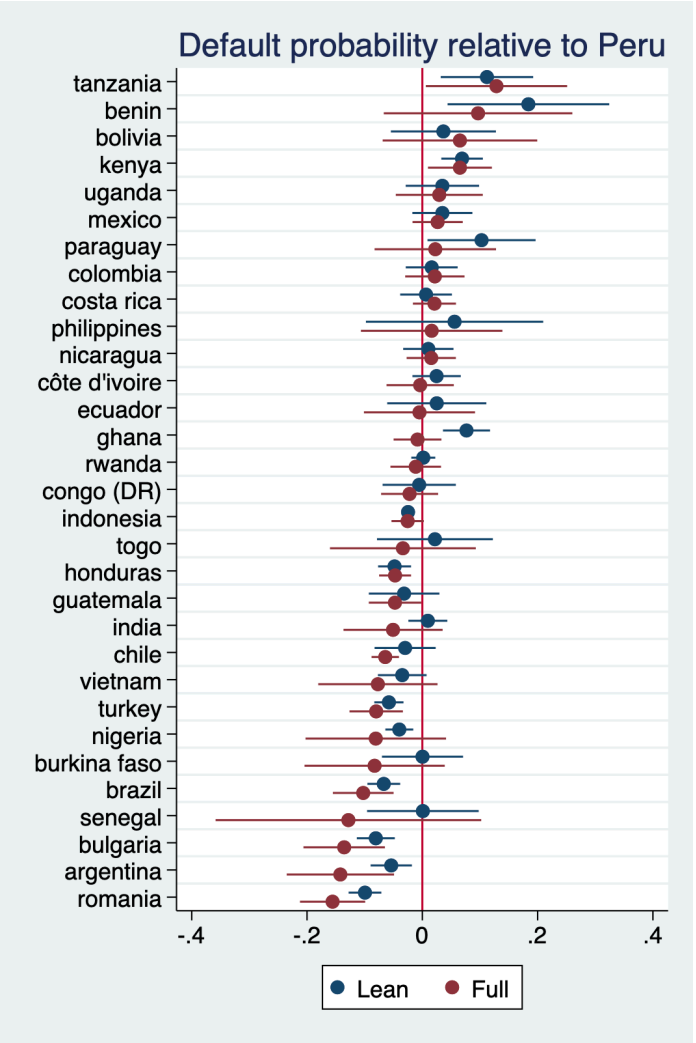
- The structure of the dataset lets us explore if certain crops or countries are riskier to lend in.
- Hence, we can look at the relationship between default and the country or crop in which a loan was issued.
- Again, it might be that our coefficients are influenced by a variety of factors.
- In the ”lean” regression we will want to control only for the specific year in which a loan was issued.
- In the ”full” regression we will additionally control for lenders, crops (when looking at defaults in a country), and country (when looking at defaults in a crop).



Default risk: Results (1)

We find differences in the average default rate between countries after controlling for time, lender, and crop

- The estimated coefficients are relative to Peru, the country with the largest concentration of lending.
- If a coefficient is positive, the average default rate in that country is higher compared to Peru, and if negative, the average default rate is lower compared to Peru.
- The country coefficients are sorted by the “full” regression, controlling for time, lender and crop.

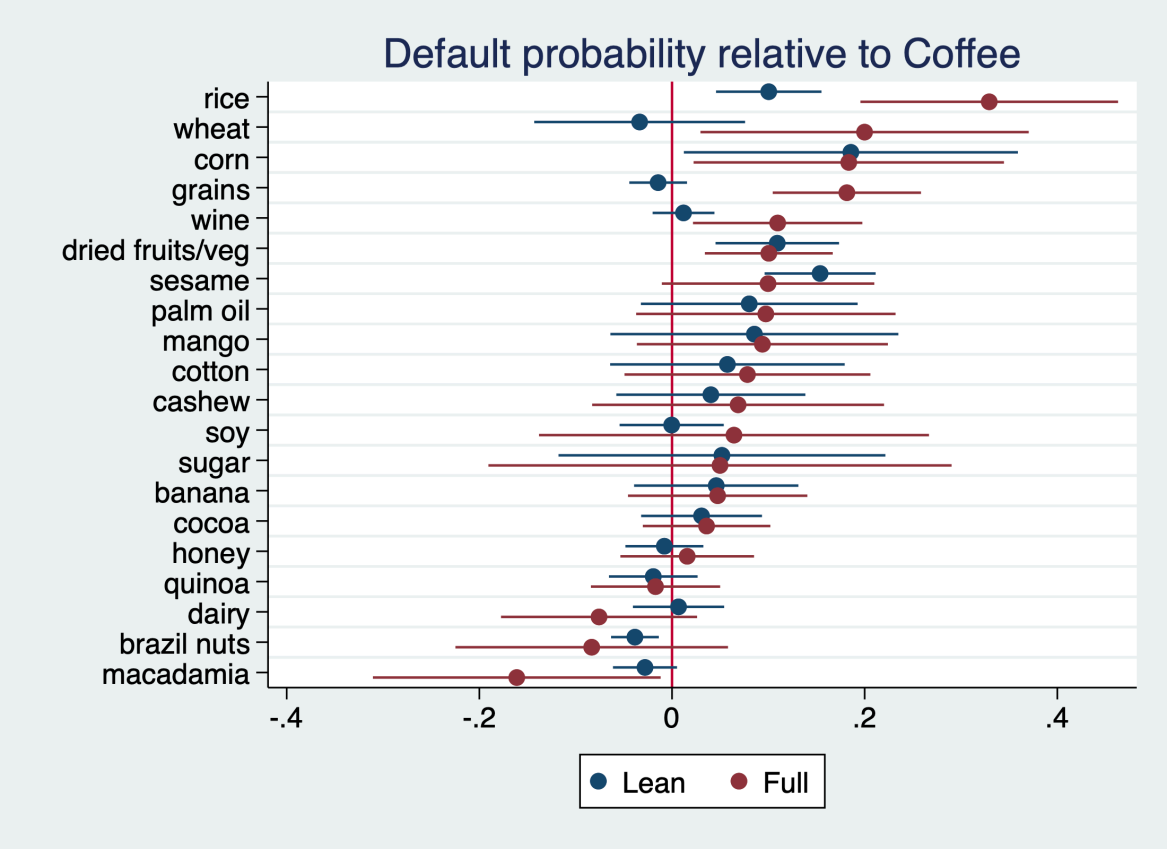


(Figure 25) Regression coefficients when regressing default on the primary country of a borrower – lean & full regression

Default risk: Results (2)

We find differences in the average default rate between crops after controlling for time, lender and country

- The estimated coefficients are relative to Coffee, the crop with the largest concentration of lending.
- If a coefficient is positive, the average default rate in that crop is higher compared to Coffee, and if negative, the average default rate is lower compared to Coffee.
- The crop coefficients are sorted by the “full” regression, controlling for time, lender and country.



(Figure 26) Regression coefficients when regressing default on the primary crop of a borrower – lean & full regression

Default risk: Summary

- We find differences in average default rates between crops and countries after controlling for observable characteristics.
- We must note that the datapoints we observe are conditional on receiving credit. Furthermore, the decision to give out a loan is not random. Lenders might lend more conservatively in riskier countries which are unobservable patterns we cannot control for.
- Concessional capital, market interventions, and policy reforms could be strategically designed to mobilise capital to riskier markets that are more difficult for lenders to serve. As the data pool expands, visibility into probability of default will become more precise.

Limitations and follow-up work

Limitations and follow-up work

How do **firms grow** throughout the relationship with lenders?

- We do not observe firms that would have liked to borrow but did not. Hence, we cannot make causal interpretations concerning the coefficients we estimate on firm growth.
- Exploring experimental or quasi-experimental variation in credit issuance, either through a randomised controlled trial or regression discontinuity design, would allow for a more causal interpretation of estimated coefficients.

How does **lender experience** relate to loan terms & loan outcomes?

- The decision to enter a market is not random. Hence, it would be optimal to isolate random variation in experience to obtain a more accurate estimate of the causal link between experience and loan terms/outcomes.

In which dimensions do **lenders compete** with one another?

- One could model firm entry and look how large a market needs to be in order to accommodate a certain number of lenders.

Appendix

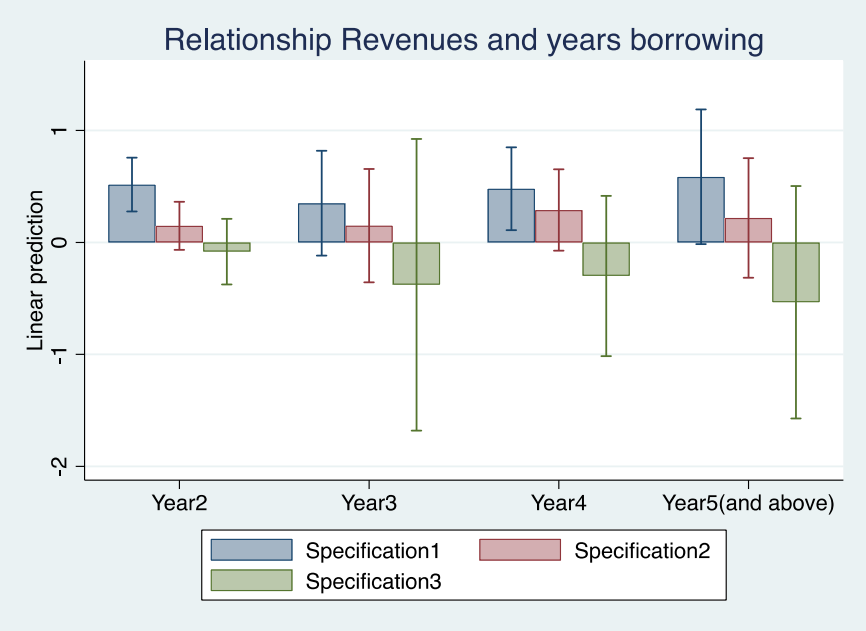
- Using a larger data set would allow for more accurate estimations of heterogeneity across countries.

Appendix

Firm growth: Appendix

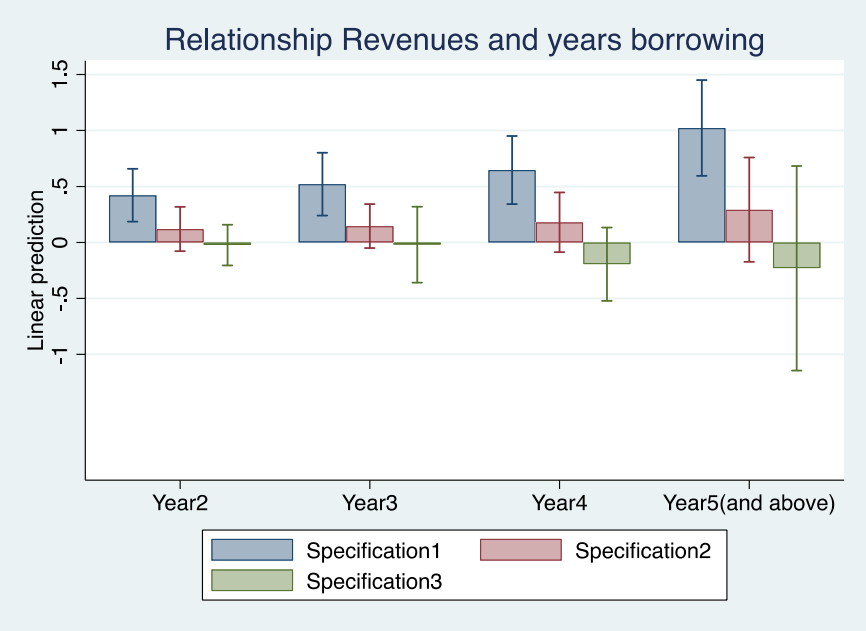
Growth effects seem larger in countries with better financial development

Fin = 0



(Figure 27) Regression coefficients when regressing revenues on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3 – restricted to countries with relatively poorer financial access

Fin = 1



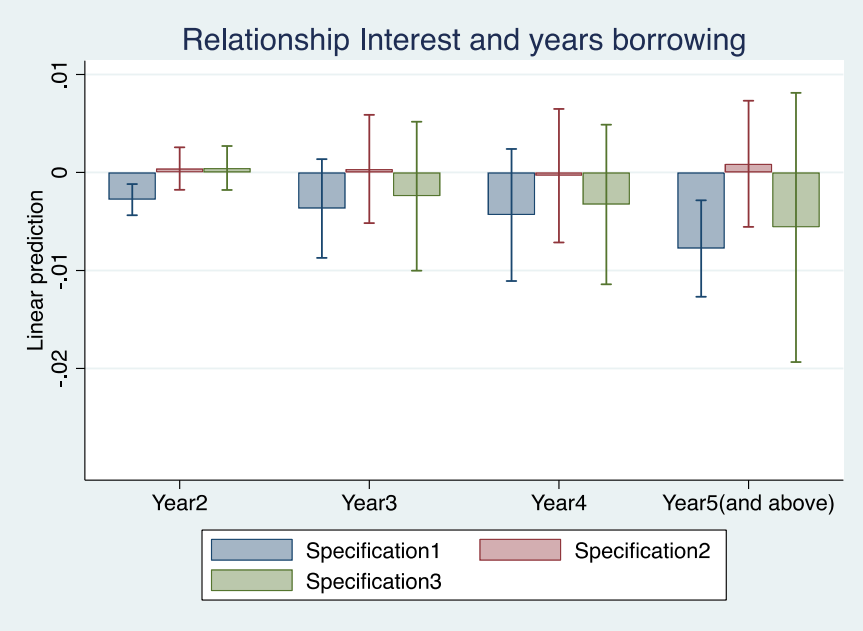
(Figure 28) Regression coefficients when regressing revenues on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3 – restricted to countries with relatively better financial access

- Fin = 0 implies that the average financial development score of the country is below the median in the sample.
- Controlling for borrower fixed effects and selection, we find that firm growth seems to be larger in countries with better developed financial systems.

Terms of the loan: Appendix (1)

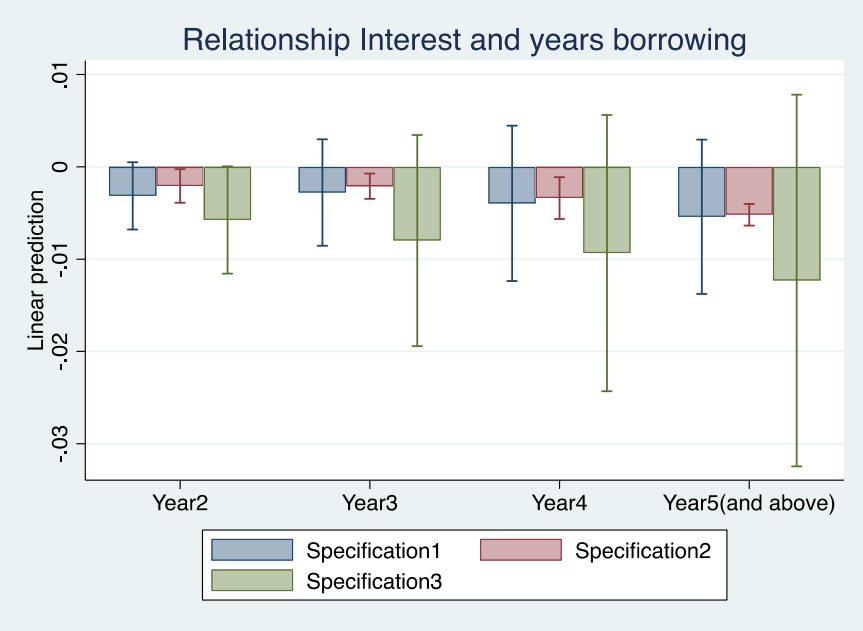
Interest rates decrease more in countries with better financial development

Fin = 0



(Figure 29) Regression coefficients when regressing interest on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3 – restricted to countries with relatively poorer financial access

Fin = 1



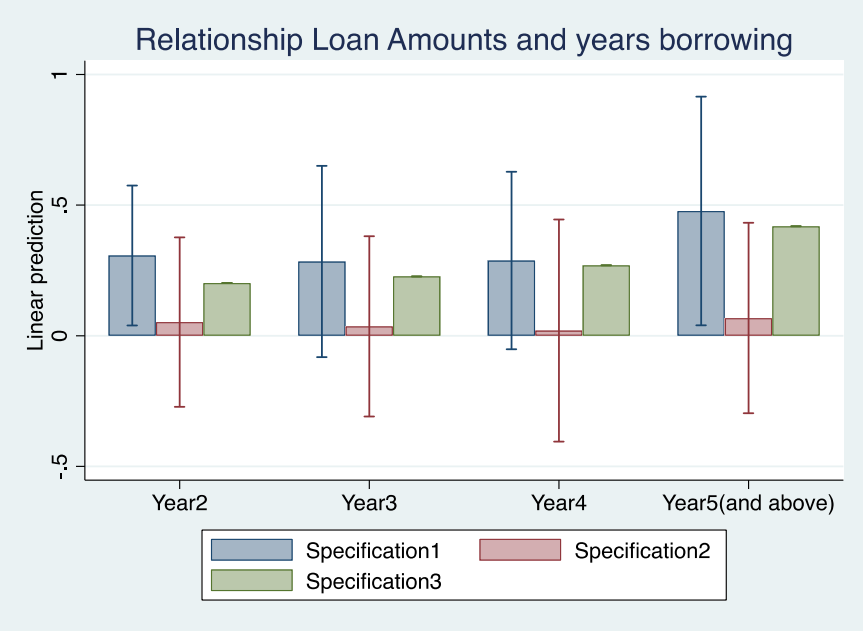
(Figure 30) Regression coefficients when regressing interest on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3 – restricted to countries with relatively better financial access

- After controlling for selection and borrower fixed effects, interest rates seem to decrease more in countries with better developed financial systems.

Terms of the loan: Appendix (2)

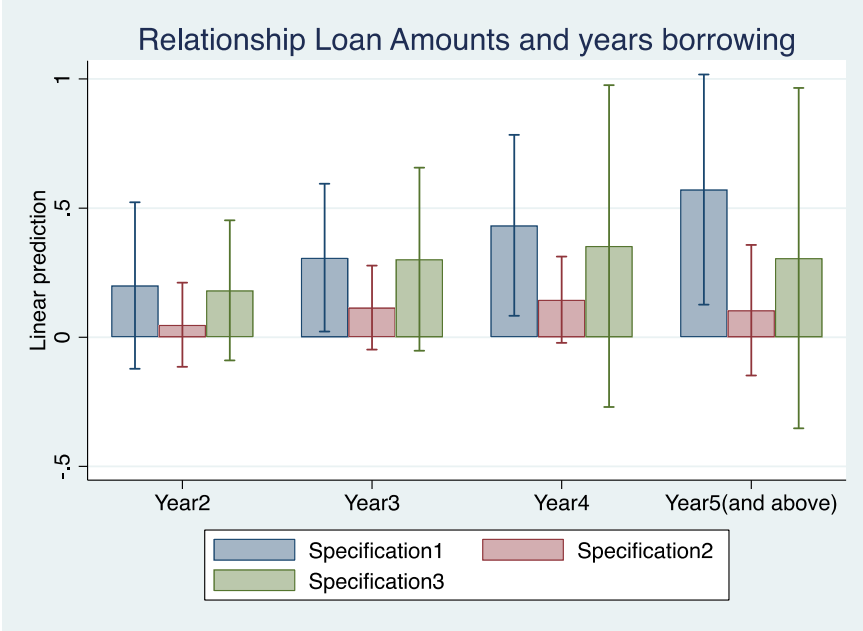
Loan amount increases do not seem to vary between countries with different financial development

Fin = 0



(Figure 31) Regression coefficients when regressing loan amounts issued on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3 – restricted to countries with relatively poorer financial access

Fin = 1



(Figure 32) Regression coefficients when regressing loan amounts issued on number of years a borrower has been borrowing from lenders – Specification 1, 2 & 3 – restricted to countries with relatively better financial access

- After controlling for selection and borrower fixed effects, loan amounts seem to develop irrespective of financial development.

Contacts

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