Credit Markets Around the World, 1910-2014

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Abstract

How have credit markets evolved in the long-run around the world? I present evidence based on a novel sectorally disaggregated dataset on credit to the private sector for 120 countries for 1940-2014, as well as new series on total credit going back to 1910. Over the last 50 years, household credit has risen dramatically not only in advanced but also emerging economies. Mortgage lending only accounts for part of the story: particularly in developing countries, consumer credit accounts for much of this growth. I show that corporate lending has essentially stalled relative to GDP since around 1980, which is not explained by the development of global bond markets, cross-border lending, or trade credit. While the main drivers are country-specific, the rise of household credit correlates with financial deregulation, information sharing institutions, demographic shifts, inequality, and legal frameworks.

JEL Classifications: E44, F34, G21, N10, N20, O16.

Keywords: Bank lending, household credit, financial history, financial development, credit markets

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1 Introduction

"Anyone who supposes that financing business is the primary function of banking is mistaken."
– John Kay, *Other People's Money* (2015)

The Great Financial Crisis of 2007-2008 has brought banking and credit back to the forefront of macroeconomic enquiry. By now, a flourishing body of research has produced many new insights into how credit markets work, often drawing on detailed microeconomic data. Yet despite this interest, there is a surprising paucity of long-run historical data on credit markets across countries. In particular, very little is known about how private credit is distributed across industries and households, and whether and how this allocation has changed over time. This makes it difficult to address questions such as: What triggers sudden increases in credit availability? Why do some credit booms end badly, while others do not? Has mortgage lending become the dominant business model of financial institutions?

In this paper, I attempt to close this gap by presenting a large dataset on sectoral credit for 120 countries. I combine data from more than 600 primary and secondary sources – many of which were digitalized for the first time – to offer an in-depth look beyond what constitutes total credit to the private sector. Using previously untapped sources, I construct series on total lending back to 1910, and novel data on credit by sector starting in 1940. The harmonized time series offer a much more detailed, disaggregated view of the business model of modern credit institutions, and lets me trace its trajectory over time.

I make three contributions. *First*, I provide researchers with novel harmonized time series on sectoral credit that are consistent with existing aggregate data on private credit. The dataset is the result of an extensive data collection effort, drawing on a wealth of mostly untapped historical publications of statistical agencies, central banks, regulatory authorities, and banking associations around the world. To make them comparable across countries and time, I harmonized the raw series with the generous help of more than 150 individuals working for over 135 national and international organizations, without whom this project would not have been possible. All data sources and adjustments have been documented and cross-validated in detail in an extensive data appendix and spreadsheet collection.

Second, I provide a historical account of changes in the size and composition of credit markets around the world. A simplified standard textbook view of financial

intermediaries is that they channel savings from households to firms. Yet, a number of popular accounts have questioned whether this still makes for an accurate description today (Turner, 2015; Foroohar, 2016; Kay, 2015), supported by studies of the United States (Greenwood and Scharfstein, 2013) and a small group of advanced economies (Jordà et al., 2016). But what holds true for the rest of the world?

As a motivating example, consider the loan portfolio of Deutsche Bank – Germany's largest banking entity with around EUR 1.6 trillion in total assets in 2016, amounting to 55% of German GDP. In 1957, around 58% of the company's outstanding loans were extended to industrial companies, a further 27% to retail and wholesale trade, and only 15% to other sectors including households, real estate, and the financial sector. By 2016, these ratios had reversed: only 9% of Deutsche Bank's loans today are to manufacturing and related industries, retail and wholesale trade are a marginal component with 4%, and most of the remaining 87% are exposures to households, real estate firms, and other financial intermediaries. Does this merely reflect changes in a single institution's business model or have banking systems around the world shifted their credit allocation in a similar manner?

The data lends strong support for the latter. Household credit has surged almost uniformly around the world, despite differences in the growth of the financial sector. While it is well known that the ratio of credit to GDP has strongly increased since the 1980s in advanced economies (Schularick and Taylor, 2012), I show that it has remained essentially flat in emerging economies. The share of household credit, however, has increased everywhere: in non-OECD advanced and emerging countries, the average share increased from around 10% in 1960 to around 40% today.

What is perhaps even more striking is the evolution of corporate credit relative to GDP. With the exception of a recent increase in the wake of the 2008-2009 financial crisis, firm lending has stayed essentially flat in advanced economies over the past 35 years. In emerging economies, corporate credit has in fact *decreased* relative to GDP between 1980 and the mid-2000s by some measures. In other words, firms today do not borrow more from domestic institutions than in 1980. This, of course, is not a necessity from the boom in household lending: credit to firms and households appeared to grow more or less in tandem until a strong decoupling in the early 1980s.

Importantly, there are substantial differences in what accounts for this growth in household debt. In advanced economies, residential mortgages account for a relatively stable share of around 60-70% in total household credit, which has seen a slight increase in the run-up and aftermath of the financial crisis. This is consistent with the

findings of Jordà et al. (2015), who show that mortgages make up an ever-increasing share of total lending in 17 advanced economies. It also meshes with the finding of Greenwood and Scharfstein (2013) who show that mortgage debt has grown dramatically in the United States from 1980 to 2007. I show that the picture differs for emerging economies: consumer credit, credit cards, and car loans make up a larger and *increasing* fraction of household lending, weighing in at around 55% today. Taken together, the data suggest that a simple textbook narrative based on banks taking deposits from households and lending to firms may be an incomplete characterization of the business of modern financial institutions.

Heterogeneity also matters for the evolution corporate lending. While the total amount of firm lending appears to have changed little over the past three decades, its composition certainly has. All over the globe, agriculture and manufacturing make up an ever smaller share of corporate financing, with emerging economies experiencing the largest declines. Apart from the tertiary sector, it appears that construction and real estate has become an increasingly dominant force: even in the reconstruction period following World War II, lending to real estate developers and construction companies only accounted for around 6% of corporate lending in advanced economies. Today, it accounts for more than 20%. But even in developing countries, there has been a noticeable increase in the portfolio share of construction loans, particularly compared to the period 1950-1970.

This range of new stylized facts prompts the question what might explain them. My third contribution is to study the factors shaping the perhaps most profound shift in global private debt portfolios: the rise of household credit. Identifying what *causes* changes in credit allocation, particularly over long stretches of time, is a daunting challenge and beyond the scope of this paper. However, I can test how well a number of candidate theories fare using simple correlations, which – while far from conclusive – will hopefully guide more rigorous future work.

I begin by establishing that much of the variation in the household share in total lending, around 60%, can be accounted for by time-invariant country factors. The addition of global factors affecting all countries simultaneously increases the R^2 by another 20 percentage points; time-varying regional factors do not appear to provide information over and above global factors. This means that, to understand the allocation of credit, we have to understand country-specific aspects and trends spanning the globe.

Next, I consider whether the development of alternative financing sources for firms

can explain their decreasing role in domestic lending. I find that they cannot. Cross-border lending, for example, has in fact decreased in emerging markets relative to domestic credit. It also makes up only a tiny fraction of total debt all over the globe, except in tax havens and for non-bank financial institutions in advanced economies. Corporate bonds market have increased in importance, but only since the mid-1990s. And even after adjusting the ratio of corporate credit to GDP for cross-border lending, bonds, and trade credit, it is still similar today compared to the early 1980s. As it turns out, these and other measures of alternative financing sources – such as the ratio of trade, leasing, or foreign direct investment to GDP – are uncorrelated with the household credit share both across and within countries. Because corporate lending has remained flat despite the rise in household debt and substantial economic growth in many emerging economies – signaling high credit demand – these findings suggest a role for credit supply.

Building on the large literature in law and finance following La Porta et al. (1997, 1998), I also test whether legal frameworks play a role in credit composition across countries. Indeed, it appears that (at least across countries), legal origins, insolvency frameworks, and debt enforcement have some explanatory power for the use of household debt. Measures of income, savings, and demographic factors, however, show much stronger correlations. While it is intuitive that richer countries use more household credit (Cerutti et al., 2017; Badev et al., 2014), I also find a role for the distribution of income. The link between inequality and debt is ex-ante unclear: Beck et al. (2007), for example, find that financial development disproportionally benefits the poor across countries; and related evidence exists for the staggered lifting of US branching restrictions (Beck et al., 2010). An alternative hypothesis is that increases in inequality may be one of the drivers of household debt booms prior to crises (Kumhof et al., 2015; Rajan, 2010; Mian and Sufi, 2011). In the data, I find that higher inequality is associated with a lower household credit share across countries. Conditioning on a country's GDP per capita, however, reverses the correlation; given that the intuition of inequality-fueled credit booms is based on advanced economy experiences, this may not be entirely surprising. Demographic factors have even higher explanatory power. The share of the population living in urban areas and that aged between 30 and 49 – likely the main group taking out mortgages – is associated with household credit within and across countries.

The variables with the highest explanatory power, however, are related to financial deregulation and information sharing institutions. Popular accounts such as Kay

(2015), Foroohar (2016), and Turner (2015) have made the argument that changes to banking regulation have led to a "crowding out" of corporate by household credit. This is also related to empirical work by Mian et al. (2017a) and Di Maggio and Kermani (2017), who show the reallocative effects of boom-bust cycles following deregulation. Chakraborty et al. (2018) also provide some evidence consistent with a crowding out of corporate lending during housing booms. In the data, I find that deregulation has consistently high explanatory power for the household credit share both across and within countries. I also find that household debt is more widely used in countries with higher usage of information sharing institutions, especially private credit bureaus. That is, better information sharing among lenders is not only associated with a higher ratio of credit to GDP (Djankov et al., 2007), but also a shift away from firm to household lending.

My work extends previous efforts by Schularick and Taylor (2012), Jordà et al. (2015), and Jordà et al. (2016) who introduce long-run credit data for 17 advanced economies starting in 1870. It also builds on institutional efforts at the Bank for International Settlements (Dembiermont et al., 2013), World Bank (Cihák et al., 2013), and the International Monetary Fund in providing such data. The database I present differs from their work and other sources by providing considerably more granular estimates of who received credit around the world. To illustrate, the data allow me to compare the composition of manufacturing lending in Austria and Pakistan in the 1960s or trace the trajectory of household credit growth in Switzerland and Peru from the 1940s. Put differently, while existing work was able to shed some light on the *size* of credit markets (e.g. Djankov et al., 2007), my contribution is to study the *allocation* of credit, which was previously impossible due to the lack of cross-country data.

I expect the data to find wide applications for studying the effects of macroeconomic policies on the financial sector, which has largely relied on measures such as value added and sectoral characteristics to proxy for changes in credit allocation (e.g. Rajan and Zingales, 1998; Wurgler, 2000). They might also be helpful in testing models with financial sectors in which sectoral heterogeneity matters (e.g. Schneider and Tornell, 2004; Matsuyama, 2007, 2013; Rancière and Tornell, 2016; Schmitt-Grohé and Uribe, 2016; Bahadir and Gumus, 2016). To be as transparent as possible, the data appendix accompanying this paper lists all sources and adjustment in great detail and compares my data with existing sources. Nevertheless, the data have the potential to be improved and expanded as new sources become available.

The paper proceeds as follows. In section 2 I introduce the new dataset on sectoral

credit in detail and discuss some aspects of its construction and coverage. In section 3 I document a range of new stylized facts about credit markets around the world. Section 4 explores determinants of the share of household credit across and within countries over time. Section 6 concludes.

2 A New Global Dataset on Sectoral Credit

I assemble a novel dataset on credit markets for 120 countries from over 600 individual country sources. The main contribution compared to existing work is that I construct long-run disaggregated data by households, non-bank financial intermediaries, and non-financial corporations, which in turn are broken down by up to 115 individual industries. In addition, I collect data on household credit by purpose, where I can differentiate in many countries between residential mortgages, consumer credit, credit cards, and car loans. I also add data on commercial (i.e. non-residential) mortgages.

To be included, I require countries to have credit data for at least two corporate sub-sectors (e.g. Agriculture and Manufacturing) since 2005. I make four exceptions for countries that do not fulfill this criterion: China, the Netherlands, Luxembourg, Sweden, and the United States.[1] To guarantee that the detailed data are comparable across countries and with existing data sources, I also collect new data on total private credit from national sources. In some cases, these are complemented with existing data from the Bank for International Settlements, the IMF's International Financial Statistics (including old paper versions), the United Nations Statistical Yearbook, statistical publications of the League of Nations, and the advanced economy time series of Jordà et al. (2016).

Given its disaggregated nature, I document the collection and harmonization of the credit data in detail in an extensive data appendix and spreadsheet collection. The data appendix also acknowledges the diligent and tireless support I received from statisticians and bank supervisors in most of the countries in the sample, without whom this project would not have been possible.

[1]The Netherlands publish detailed corporate lending data, but I have not been able to construct reliable long-run time series.

2.1 Data Sources and Concepts

Sectoral credit data have been collected and published in most countries for multiple decades, but not on a harmonized basis. As a result, I draw on hundreds of scattered primary and secondary sources to construct these time series.

To begin, I retrieved data from statistical publications and data appendices published by national central banks and statistical offices. In many cases, I use publications from different organizations even for the same country; much of these are not available online. Large shares of the data were digitalized for the first time and copied by hand, either from PDF or paper documents. Many of the national authorities also shared previously unpublished, non-public data with me via email or mail. In the data appendix, I show a few examples of what the underlying data look like.

A major challenge in working with sectoral credit data is to make them comparable across countries and time to account for changes in the classification of sectors, lending institutions, and debt instruments. For harmonization purposes, I consulted historical meta data in institutional publications and liased closely with all of the national authorities publishing information on sectoral credit via email. The raw data were adjusted for inconsistencies hampering cross-country comparisons and breaks in the time series arising from changes in classifications that are unrelated to fundamentals (such as large scale debt write-offs). The data appendix reports all harmonization procedures and adjustments in the Excel part of the data appendix on the individual time series level.

All data are end-of-period outstanding amounts in national currency. The coverage comprises the broadest set of lending institutions for which data are available; where possible, I include non-bank financial institutions. "Credit" is defined to include all debt contracts (loans or debt securities) denominated in local or foreign currency. In practice, the statistical coverage usually follows the structure of the financial system; countries with high market shares of non-bank lenders usually also report statistics on these, and the same also holds for debt securities.[2] Because a typical country reports time series on loans extended by all monetary financial institutions (MFIs), this makes my data closer to existing sources reporting *bank credit* (such as the World Bank Global Financial Development Database) rather than *total debt* (such as the IMF Global Debt

[2]Note that the issue of lender and debt instrument coverage is typical for data on financial institutions and not a particular feature of the sectoral credit aggregates assembled here. In the few countries where more comprehensive data was available but not included, e.g. Denmark, the rationale is outlined in detail in the data appendix.

Database). I discuss comparison with other sources below and in the data appendix.

Household credit comprises all lending to households and non-profit organisations serving households, as in Dembiermont et al. (2013). In most countries, sole proprietorships are not singled out in household credit statistics, so they are not counted as corporate credit to ensure the data remain comparable.[3] I include as non-bank financial corporations all financial institutions who do not fund themselves with deposits (i.e. non-MFIs); many countries further single out statistics on insurance companies and pension funds.

I also construct time series on "total corporate credit" which equals the sum of non-bank financial and non-financial corporations. This creates a slight difference to the data published by the Bank for International Settlements, for example, who treat total credit as the sum of household and non-financial corporate loans; however, lending to financial institutions makes up a non-negligible part in some countries, which is why I single it out. I exclude credit to national or local governments.[4] Since the overwhelming majority of sources does not differentiate business lending by public or private ownership of the borrower, data on corporate credit in most cases also includes state-owned enterprises; similarly, lending by both private and government banks is included, which includes development banks in some cases.

2.2 Coverage and Comparison with Existing Sources

Table 1 compares existing datasets with my contribution. I extend previous academic and institutional efforts by the Bank for BIS, World Bank, the IMF, and the Jordà-Schularick-Taylor Macrohistory Database (Jordà et al., 2016). The newly compiled data are an extension along four dimensions: sectors, countries, time, and frequency. First, I collect novel disaggregated data on corporate credit, following the United Nations International Standard Industrial Classification (ISIC Rev. 4). Depending on

[3]This creates some differences with existing data by Jordà et al. (2016), who at times appear to count sole proprietorships as corporate credit. Different disaggregation regimes by legal organisation or economic activity further mean that in some countries sectors such as agriculture are largely counted as households. In these cases, I adjusted corporate and household data in consultation with the national authorities to ensure comparability across countries. See the data appendix for more details.

[4]A considerable number of countries reports time series on lending to "public administration and defence; including compulsory social security" (ISIC Rev. 4 section O) as part of disaggregated credit to non-financial corporations. Where it was available, I created additional sub-totals to exclude it explicitly, but in practice the category only makes up for a tiny fraction of the credit market in all sample countries.

their availability, the raw data include between 3 and 115 sub-sectors, with an average (median) of 20 (16) sectors per country. 52 countries report data on manufacturing sub-industries at some point. To maximize data availability, I restrict these to four broad sectors in this paper: agriculture, industry (manufacturing and mining), construction and real estate, and others.

The data lend a new level of detail to the analysis of debt markets, as the aggregate credit to non-financial corporations (NFC) includes industries that may differ strongly in their characteristics. For example, data on NFC credit from existing sources include lending to construction and real estate companies. In many cases, the data reported as "non-financial corporations" also appears to include lending to non-bank financial intermediaries. To my knowledge, I am the first to collect and document systematically data on the latter.

Table 1: Comparison with Existing Data Sources on Private Credit

Dataset	Freq.	Countries	Start	Level of disaggregation
WB GFDD	Y	203	1960	–
BIS	Q	40	1940	NFC, Households
IMF FAS	Y	152	2004	Households, SMEs (limited)
IMF GDD	Y	190	1950	NFC, Households
Schularick and Taylor (2012)	Y	14	1870	–
Jordà et al. (2016)	Y	17	1870	Corporate, Households, Mortgages
Müller (2018)	*M/Q/Y*	*120*	*1910/ 1940*	*NFC by industry* *Households:* *Mortgages* *Consumer credit* *Credit cards* *Car loans* *Total mortgage credit* *Non-bank financial institutions*

Notes: The data on total credit in Müller (2018) starts in 1910 and the sectoral data in 1940. WB GFDD stands for the World Bank's Global Financial Development Database (Cihák et al., 2013). BIS refers to the credit to the non-financial sector statistics described in Dembiermont et al. (2013). The IMF FAS and GDD refer to the International Monetary Fund's Financial Access Survey and Global Debt Database. NFC refers to non-financial corporations.

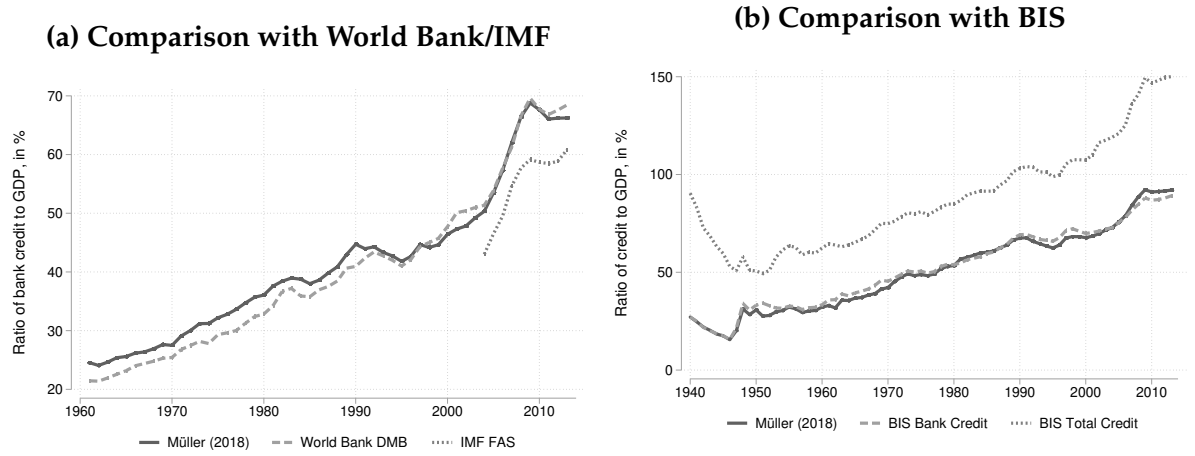
Second, the full database spans across 120 countries. While the country coverage for countries with sectoral data is lower than the near-comprehensive World Bank and IMF GDD data, it considerably expands the coverage of credit to households and non-financial corporates in Dembiermont et al. (2013), which comprises 44 countries

in their dataset. One major contribution is thus the collection of long-run series on household debt for many countries. The coverage spans across all major world economies but also includes many small open economies; even at its lowest point in 1940, I have sectoral data for around 50% of world GDP, and almost 90% today.

Third, many countries report data starting in the 1960s, a significant fraction even from after World War II. The time dimension usually goes significantly beyond what has been available before despite the much higher level of detail (see the appendix for more detail). I report sectoral credit data from 1940 to have a meaningful sample size. I also construct new long-run total credit time series for a substantial number of countries going back to 1910.

Fourth, I collect data in higher frequency than previous efforts, in many cases monthly. This increases the size of the full dataset, which contains more than 1.5 million observations. I restrict the data to year-end values for the largely descriptive analysis in this paper.

Figure 1: Comparison of Private Credit/GDP with Existing Data Sources



Note: This graph plots the ratio of total credit to the private sector from the new database against the ratios from the World Bank, IMF Financial Access Survey, and the BIS for overlapping samples. See the online appendix for more details and validation exercises.

My data are consistent with existing sources. Figure 1a and 1b compares the newly compiled total credit measures with data from the World Bank's Global Financial Development Database (Cihák et al., 2013), the International Monetary Fund's Financial Access Survey, and the BIS data on bank and total credit (Dembiermont et al., 2013) for the respective overlapping samples. In the data appendix, I also compare the data to those recently published in the IMF Global Debt Database and those compiled by

Jordà et al. (2016). Reassuringly, the total credit data I constructed are comparable and follow highly similar trends over time for all sources. A natural interpretation of my data is thus that it represents the underlying sectoral structure of total credit to the private sector others have collected, plus an extension of these total credit series. I present much more comprehensive evidence on the comparability and differences of my data with existing sources in the data appendix.

2.3 Additional Data

I create a long-run data set on macroeconomic data by combining existing data from the World Bank, Penn World Tables, IMF International Financial Statistics, United Nations, Barro and Ursua (2008), the Maddison Project Database (Inklaar et al., 2018), Jordà et al. (2016), Dincecco and Prado (2013), and national sources. I discuss the construction and sources of these variables in the online appendix. I also add data on financial sector characteristics from a wide range of sources, most prominently the World Bank Global Financial Development Database and the Doing Business Project. The exact sources of these variables are also outlined in the online appendix.

3 Loan Portfolios in 120 Countries: Long-Run Evidence

How is credit allocated across different sectors of the economy around the world, and how has this changed over time? In this section, I provide some evidence on the evolution of household and firm lending in 120 economies. I show that household credit has, on average, more than tripled between the early 1950s and 2014. The aggregate trends, however, hide important differences across country groups and sectors. While the mortgage share in household credit has been approximately stable in advanced economies, it is much lower and has in fact *decreased* in the rest of the world; consumer credit, not housing is key to understanding the emerging market household leveraging. I also highlight structural change in corporate financing, which has seen a fundamental shift away from agriculture and manufacturing to construction and real estate and the tertiary sector.

3.1 Aggregate Trends

It is instructive to begin with a look at the development of total private credit to GDP around the world, an important indicator of the depth of financial sector activity. The

novelty of my data for this exercise is the extension of long-run credit series to the period before 1960. I have data on total lending for 51 countries starting before 1940; 61 countries starting before 1950; and 78 countries before 1960. Figure 2 plots the arithmetic mean of the credit to GDP ratio for three country groups: OECD economies, other advanced economies, and emerging economies.[5] While the swift uptick in economy-wide leverage in recent decades has been well-documented for a small group of advanced economies (see e.g. Schularick and Taylor, 2012), it is arguably much less appreciated that a similar "financialization" has *not* taken place to the same extent in emerging economies. While OECD economies in the late 2000s reached an average of more than 100% of private credit to GDP, the figure hovers around 45% for emerging economies.

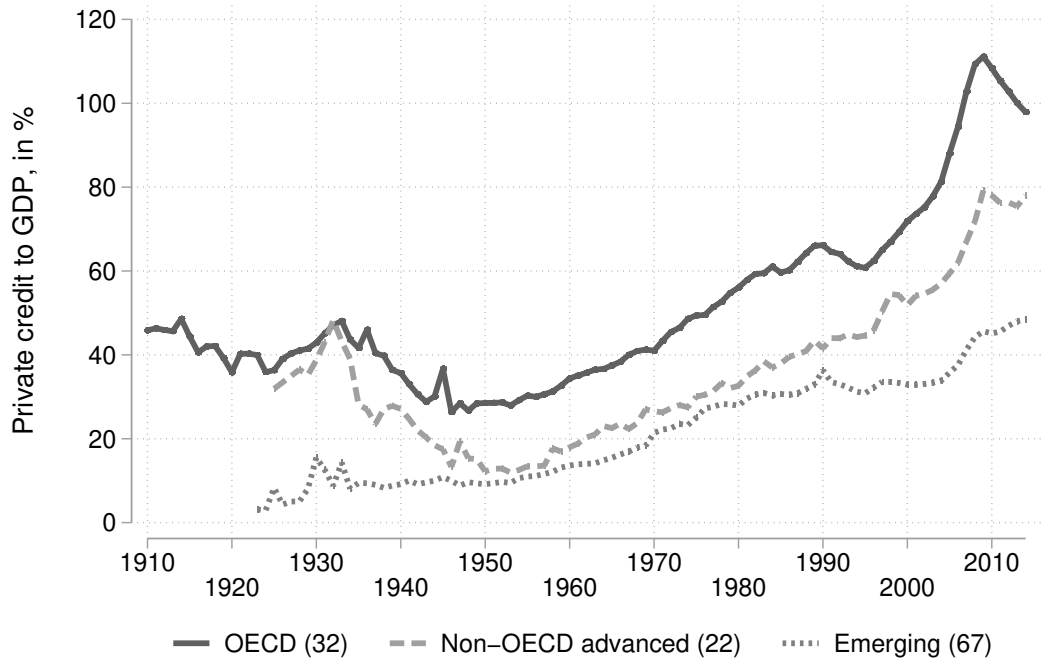
Next, the newly collected data allows a first glimpse at what sectoral credit allocation look like across countries, and how it has evolved over time. Figure 3 visualizes the transformation of credit markets over the 70 year time span in the sample by plotting arithmetic means of sectoral credit to GDP across countries. The compositional changes over time are remarkable. Financial institutions in the mid-1970s used to predominantly lend to non-financial corporations. Starting in the mid-1980s, with the onset of considerable financial deepening, household credit has become increasingly prominent. In fact, the overwhelming bulk of credit growth relative to economic activity has been driven by households, especially since 1990; the ratio of non-financial corporate credit stayed essentially flat between the early 1980s and the mid-2000s. A major trend-break here is the Great Financial Crisis 2007-2008. In the run-up to the crisis, household debt worldwide increased but only picked up in the non-financial corporate sector in 2006 or 2007. As I will show later, this recent growth in corporate lending was primarily driven by lending to the construction and real estate industries. Importantly, the global deleveraging following the crisis was concentrated in corporate lending (both financial and non-financial).

While credit to non-bank financial institutions has also increased, the developments here are surprisingly muted. An important caveat in the case of inter-financial lending, however, is the definition of what constitutes "credit". While the data in many countries include all types of credit contracts – including repos and other often-used instruments of capital market lending – this may lead to important omissions because financial institutions are the main issuers of corporate bonds in many countries (see

[5] I use the World Bank classification; "emerging" refers to middle and low income countries. All of these are defined as of 2014. A list of the countries in each group can be found in the appendix.

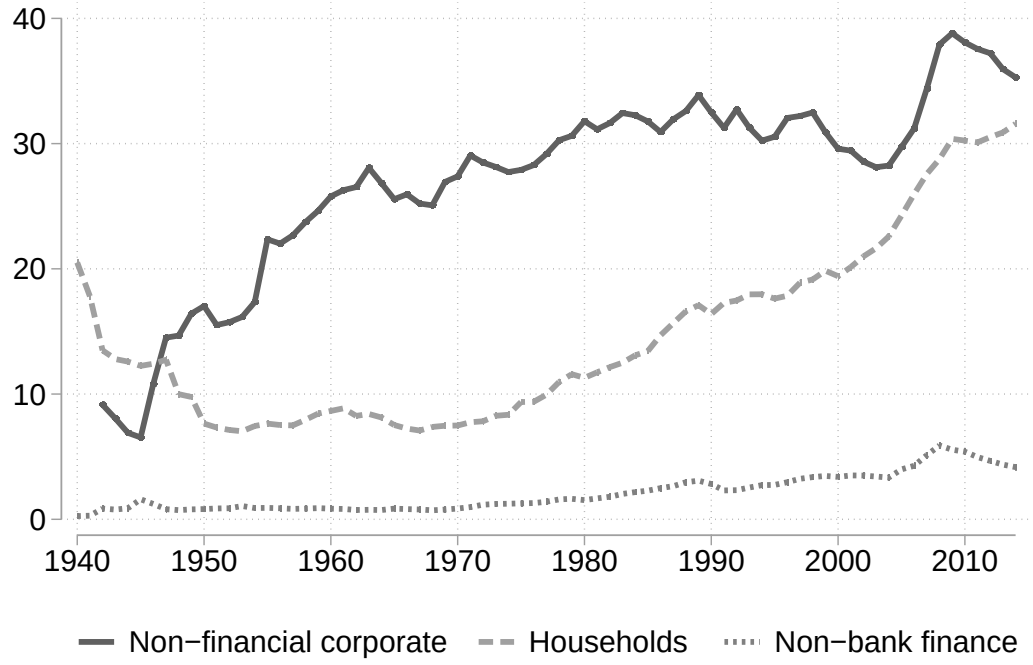
e.g. Gilchrist and Mojon, 2014). As I will show below, the surprisingly stable ratio of credit to financial institutions may also partially reflect that they are disproportionately more likely to use cross-border credit compared to non-financial corporations, particularly in advanced economies. Taken at face value, the data nevertheless suggest that the financing of (non-bank) financial institutions in fact is not a major part of the domestic lending business of credit institutions around the world, which was one of the central messages in Kay (2015).

Figure 2: PRIVATE CREDIT TO GDP (IN %), 1910-2014



Note: Figure 2 shows the arithmetic average of total credit to GDP, broken down by country group. Country classification according to the World Bank.

Figure 3: GLOBAL SECTORAL CREDIT (IN % OF GDP), 1940-2014

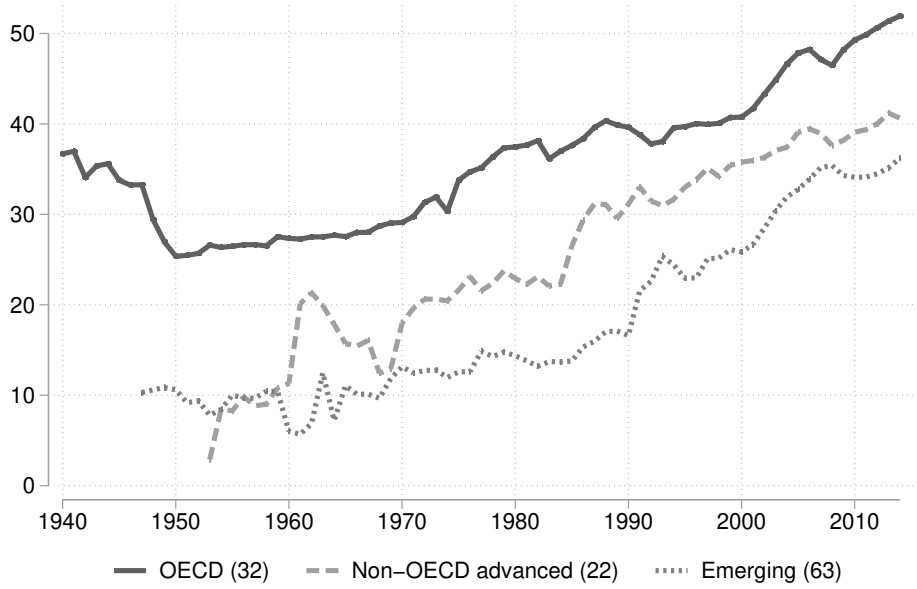


Note: Figure 3 plots the average ratio of sectoral credit to non-financial corporations, financial corporations (excl. banks) and households (incl. non-profits and sole proprietorships) to GDP.

3.2 The Rise of Household Credit

In the previous section, I have documented that credit markets have expanded mainly in relatively advanced economies and that household loans have been a major driver all over the globe. I next turn to the question what accounts for the increase in household credit by differentiating between country groups and loan purposes.

Figure 4: SHARE OF HOUSEHOLD IN TOTAL CREDIT (IN %), BY COUNTRY GROUP



Note: Figure 4 shows the yearly average share of household credit in total credit, broken down by country group. OECD and non-OECD advanced economies are the high income countries as classified by the World Bank, and emerging economies all others.

To begin, figure 4 plots the arithmetic mean ratio of household in total credit by country groups according to their levels of economic development. The resulting picture is striking. Household credit has taken up an ever increasing share in the loan portfolio of banks all over the world.

While the OECD economies started from a much higher level, household lending has seen a constant increase since the end of World War II, with a noticeable boom in the mid-2000s. The picture here resembles the share of mortgage credit assembled in Jordà et al. (2015), which shows a similar post-WWII drop and significant recovery over time. The data suggest that this pattern also holds true for a broader set of 32 OECD countries.

I establish that household loans have also boomed across the rest of the globe. To my knowledge, I am the first to document this stylized fact. Starting from a much

lower base, the share of non-business credit has increased dramatically, from around 10% of total loans up to the late 1960s to around 40% today in both non-OECD advanced and emerging economies. This represents nothing short of a transformation of the lending activity of banking systems.

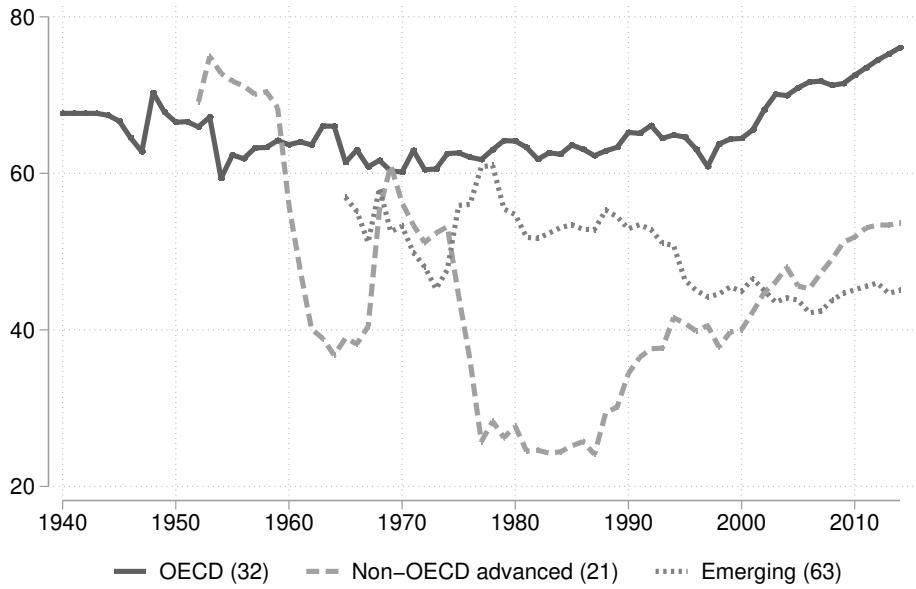
Household lending has become a major part of banks' business model around the world. But what accounts for this staggering rise? In influential work, Jordà et al. (2015) show the importance of mortgage credit for understanding financialization in the major OECD economies. However, the lack of comparable cross-country data has prevented an understanding of what drives household leverage in other countries. In figure 5, I thus break down household lending into its mortgage and non-mortgage component. Non-mortgage credit here largely represents consumer credit; technically, it also includes other categories such as loans to households for the purchase of financial instruments or student loans.[6] The cross-country difference are again stark. In OECD economies, residential mortgages have made up a relatively constant fraction of around 60-70% of household loans between 1950 and today. Maybe unsurprisingly, the housing boom of the 2000s can also be seen in the shares of debt taken on by households: the average ratio increased from around 60% in 2000 to 75% today.

The picture looks fundamentally different in non-OECD advanced and emerging economies. In the former, the residential mortgage share has been on a constant increase between 1980 and today, but is still below that of OECD countries at just over 55% in 2014. While I discuss more robustness for these findings below, the data for non-OECD advanced economies is somewhat noisy due to the relatively small number of countries, most of which do not report long-run data. In developing countries, the mortgage share has in fact *decreased* over the past decades and today hovers at just over an average of 40%. Taken together with the evidence in figure 4, this implies that consumer credit, not mortgages are at the heart of the emerging market credit boom. In support of this, I show in the online appendix that the share of residential mortgages to GDP has remained almost constant between around 1960 and 2014, while it has doubled in OECD and quadrupled in non-OECD advanced economies. The "great mortgaging" appears to be an advanced economy phenomenon (Jordà et al., 2015).

Given its importance in emerging countries, it is interesting to look at the composition of consumer credit, which is also possible using my data. Unfortunately, these

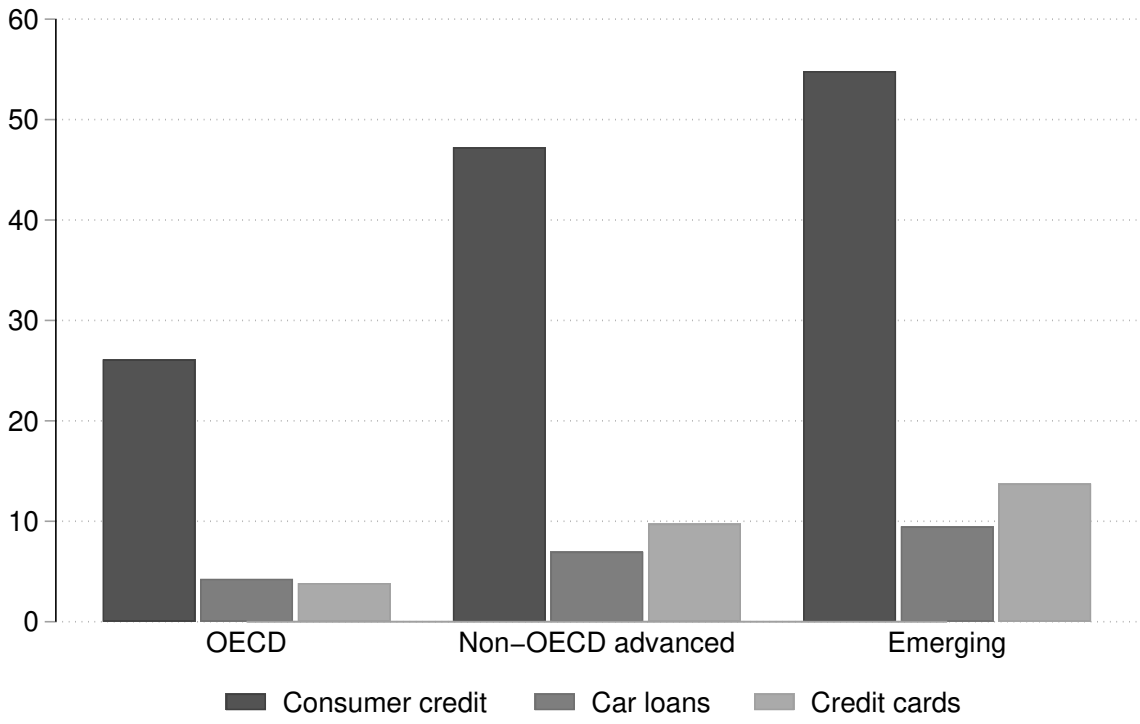
[6] As I discuss in the data appendix, the classification of consumer credit across countries does not follow consistent patterns. As a result, some countries treat all non-mortgage lending to households as "consumer credit", while others only include the financing of durable goods. Using the share of non-mortgages is thus a reasonable approximation of consumer lending.

Figure 5: MORTGAGE SHARE IN HOUSEHOLD CREDIT (IN %), BY COUNTRY GROUP



Note: Figure 5 plots the average ratio of residential mortgages in household credit, broken down by country group.

Figure 6: SHARE OF CONSUMER IN HOUSEHOLD CREDIT, IN %



Note: Figure 6 plots the 2009-2014 average ratio of different consumer credit types in total household credit, broken down by country group.

time series are available for a much smaller number of countries and (except in a few cases) only for a shorter time span. In figure 6, I present average ratios of different types of consumer credit in total household lending for the period 2008-2014 only. I calculate these values from 99 countries for total non-mortgage ("consumer") credit and 46 (26) countries for credit cards and car loans, respectively.[7] The pattern confirms the time series trend regarding residential mortgages: the share of consumer credit declines with a country's level of development. Again, the quantities here matter, given the importance of household lending around the world. More than 15% of household credit in emerging economies is accounted for by credit cards alone, and another 10% by car loans. These ratios are much lower for OECD economies.[8]

The patterns presented in this section have important implications. Both theoretical and empirical studies of household finance have, in many cases, focused on mortgage credit (e.g. Badev et al., 2014; Cerutti et al., 2017). These papers, however, tell us very little about why consumer credit has expanded rapidly in emerging economies. Also, a prominent mechanism for amplification effects between asset prices and credit is that land values boost the liquidation values of housing assets, which in turn increases debt capacity (see e.g. Chaney et al., 2012; Liu et al., 2013). These explanations are, however, silent on the role of unsecured credit. In section 4, I explore a few potential explanations for the rise of household credit.

3.3 Structural Change in Corporate Credit

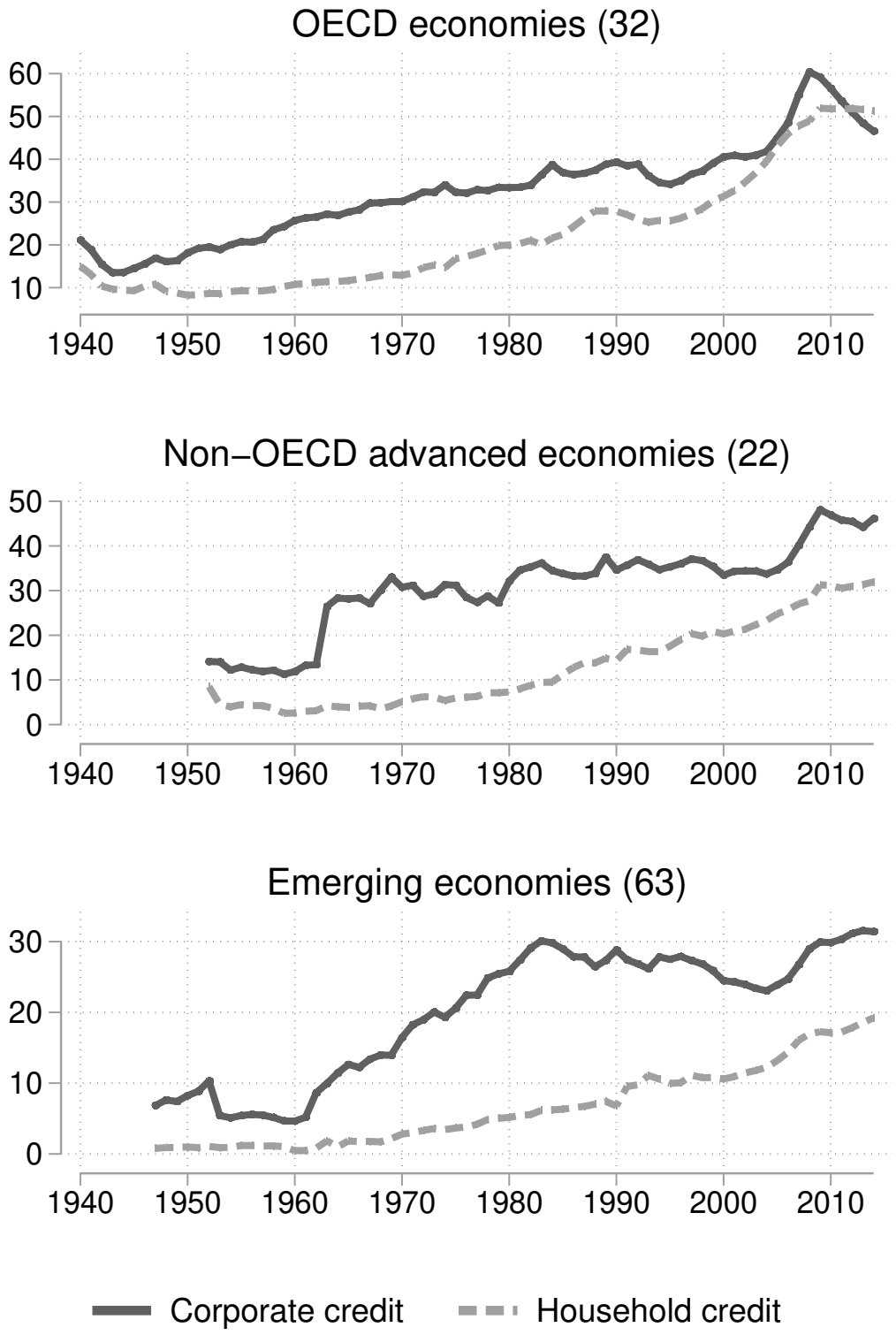
Next, I turn to developments in the corporate credit market. It is a well-known phenomenon that countries undergo economic structural change with increases in development, mainly away from primary sectors towards manufacturing and then service sectors. As such, one would expect to find similar trends in corporate credit. On the other hand, the findings for residential mortgages above suggest an increasing role of the housing sector, at least in advanced economies. Can we detect complementary patterns in the composition of corporate financing?

Figure 8 plots the share for four sectors in total corporate lending: agriculture, industry (consisting of manufacturing and mining), construction (which also includes real estate developers), and all other sectors. Again, I differentiate between emerging

[7]The pattern looks almost equivalent if I restrict the sample to countries for which I have either credit card or car loan information or both.

[8]The numbers for car loans in OECD economies should be interpreted with caution because I only have data for the US, Sweden, and Canada.

Figure 7: CORPORATE AND HOUSEHOLD CREDIT (IN % OF GDP)



Note: Figure 7 shows the yearly average ratio of corporate and household credit to GDP, broken down by country group.

and advanced (OECD and non-OECD) economies. Consistent with structural change, the share of lending to agriculture and industry has declined consistently since 1950. What is striking, however, is just how similar this trend is between country groups. The financing of industry, for example, has not "migrated" from advanced to emerging economies; rather, the decline appears to be relatively uniform, which is somewhat surprising, given the relocation of many manufacturers to developing countries.

The second major trend is that construction and real estate lending have come to make up considerable shares of the aggregate corporate loan portfolio. In OECD economies, which likely faced the highest demand for financing reconstruction after World War II, in fact had a negligible share of construction credit (around 6%) in the 1950s. Today, this share has risen to more than 20%. While the housing boom of the 2000s has clearly played a role, the share had already grown in the 1990s. The trends are almost equivalent in non-OECD advanced economies. Strikingly, a similar pattern also holds true in developing countries. In the 1950s, lending to industry and agriculture accounted for more than 70% of corporate financing. Today, the ratio is closer to 25%. At the same time, construction and real estate has increased from around 5% to almost 20%. The loan portfolio of emerging markets has thus seen a profound shift.

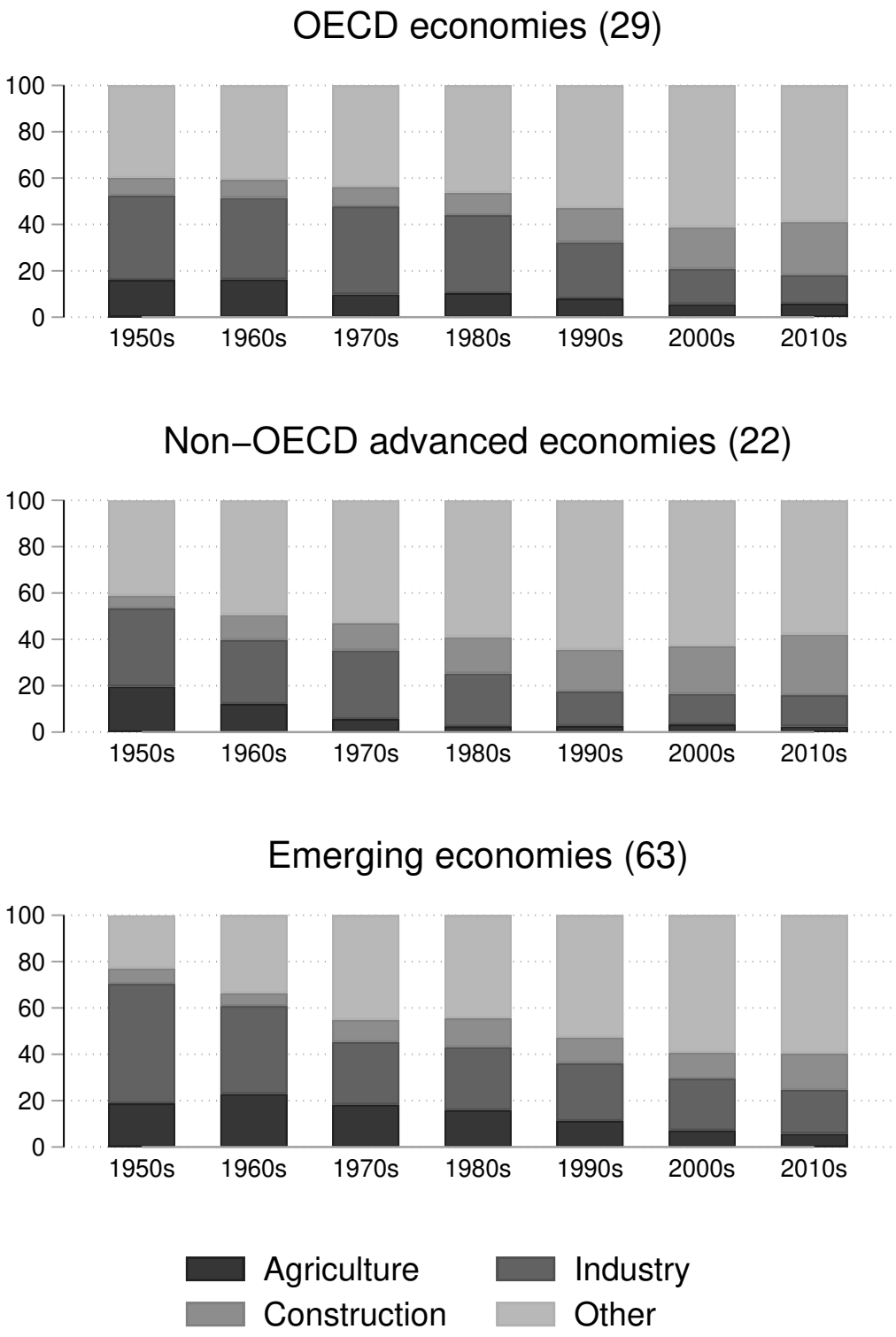
What about other types of lending? Almost all over the globe, the tertiary sector has increased its lending share by a substantial margin. In advanced economies, its share has increased from around 40% in the 1950s to around 60% in recent years. Emerging economies have seen an increase from around 20% to 60% over the same time period. Taken together, these findings suggest that the portfolio composition of Deutsche Bank mentioned in the intro appears to be the rule rather than the exception: the financing of manufacturing and mining industries, the activity perhaps most commonly associated with banking, has come to play only a miniscule role in understanding credit markets.

3.4 Robustness

In the online appendix, I challenge the stylized facts I document above to a number of sensitivity analyses. In particular, I present additional figures based on more balanced samples and also allow for weighted averages based on a country's GDP. The latter is to identify whether the shifts I document are driven by the relatively large number of small open economies in my sample, which contribute little to world GDP.

It is worth highlighting a few cases where these adjustments make a difference to the results. First, the long-run evolution of credit to GDP by country groups is influ-

Figure 8: CORPORATE CREDIT COMPOSITION (IN %), 1950-2014



Notes: These figures plot the average composition of corporate credit over time. All values are in percent of total corporate credit. *Industry* refers to the manufacturing and mining sectors, *Construction* includes real estate services where available, and *Other* are all other sectors.

enced by weighting countries by their share in world GDP. China plays a pivotal role here: because it makes up a large fraction of world GDP, and has recently experienced a sustained credit boom, its inclusion in fact pushes the average credit-to-GDP ratio *above* that of advanced economies. Without China, however, the difference between the financialization of advanced economies and the rest of the world becomes, in fact, considerably larger when weighting by GDP (see figure 1 in the online appendix).

Using balanced samples for countries with data before 1960, 1970, or 1980, as well as GDP-weighting, also creates an even stronger relative increase in the ratio of global household debt to GDP (see figure 2 in the online appendix). For countries with data before 1960, household credit now clocks in at over 50% of GDP alone, followed by non-financial corporate lending at 40%. The other results presented up until now are qualitatively unchanged when allowing for different adjustments and presnted in the online appendix.

4 What Explains Higher Shares of Household Credit?

Up to this point in the paper, I have documented how credit markets have evolved in the long-run all over the globe. One of the most striking stylized facts I uncover is the rise of household credit, particularly in emerging economies. But what explains whether countries have more or less household compared to firm credit? In this section, I consider a few candidate theories to gain intuition, and find that some of them are strongly rejected by the data; others, however, are consistent with a number of simple correlations. While far from conclusive, this first set of results will hopefully motivate and guide more rigorous empirical analysis in future work.

4.1 Country-specific, regional, or global factors?

Before diving into specific drivers, it is instructive to briefly assess how much of the variation in the household debt share can be explained by time-invariant country factors, as compared to time-varying global or regional factors. These can be neatly summarized by the (adjusted) R^2 of regressing the household credit share on dummies for countries, regions, years, or combinations thereof.

The results in table 3 suggest that a large fraction of the variation in household debt is due to country-specific factors that do not change over time ($\approx 59\%$), but adding year fixed effects helps to raise this fraction to $\approx 81\%$. Region-specific time dummies,

Table 3: EXPLAINING THE SHARE OF HOUSEHOLD CREDIT - FIXED EFFECTS R^2

Dependent variable: Share of household credit in total credit						
	Region FE	Country FE	Year FE	Region × Year FE	Country + Year FE	Country + Region × Year FE
Adj. R^2	15%	59%	11%	29%	81%	82%

Notes: This table presents the adjusted R^2 for regressions of the share of household in total credit on fixed effects as indicated. The regions correspond to the World Bank classification of East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa.

while informative by themselves, do not add anything above global time factors once time-invariant country factors are taken into account. This suggests that the bulk of what explains the use of household credit is either due to individual country factors that do not change over time or caused by global changes that affect countries more or less similarly over time.

4.2 Alternative Sources of External Financing

A straightforward explanation for the relative boom in household credit, particularly in emerging economies, could be that firms have shifted to alternative sources of external financing. Recall that, due to data constraints, my data only cover *domestic* credit and are often – but not always – limited to bank loans. However, it is well known that corporate bond markets and cross-border lending have expanded rapidly in some countries, and globalization has additionally fostered the use of trade credit. Can these factors explain the apparent stalling of corporate credit growth?

The data suggest that alternative sources of external financing cannot explain the rise of household credit. Let us begin by looking at total cross-border loans to the non-bank sector, as reported in the BIS locational banking statistics, for which a long time series is available. Panel A of figure 9 plots the arithmetic mean of the ratio of such cross-border loans to total domestic credit from my database over time, by country groups.[9] While emerging economies have seen the most obvious lack of growth in corporate credit over GDP, the share of cross-border lending has in fact *decreased* in these countries since the mid-1980s. In the online appendix, I show that this is re-

[9] I exclude a number of tax havens with extraordinarily high ratios of cross-border to domestic loans. Note that I scale over total credit because there is also cross-border lending to households, but this does not drive the results (see below).

markably robust with regard to sample composition, the choice of scaling variable, and different methods of collapsing the data. For the years 2013 and 2014, I can also differentiate between cross-border lending to non-financial corporations and financial institutions (excluding banks). The data in panel B of figure 9 suggest that only financial institutions in advanced economies use a relatively high share of cross-border loans. Taken together, this makes it quantitatively implausible that corporations in emerging economies have substituted domestic for foreign bank loans.

What about the development of bond markets? Figure 10 plots the arithmetic mean ratio of bonds to non-financial corporations to total corporate credit over time by development levels. The data indeed suggest that bond markets have grown in importance, but only since the late-1990s – considerably later than the stalling of corporate (bank) credit. Again, I show in the online appendix that this finding is highly robust. Because the average share of bonds over total domestic credit hovers at around 10-15% in emerging markets, it appears too low to account for the shift to household credit.

To get a better understanding of the relative importance of alternative sources of external financing, figure 11 plots domestic corporate credit and adds data on outstanding bonds to non-financial corporates, export credits from Berne, as well as the recent data on cross-border loans to non-financial corporates.[10] The data show that, even though alternative sources have become more important, they cannot account for the stalling of corporate lending: the sum of domestic loans, bonds, export credits, and cross-border loans today is still below that in the mid-1980s. Weighing these ratios by a country's GDP leads to a slightly larger share of other sources of external financing, but their fraction nevertheless remains small.

Regression evidence also suggests that household credit did not grow disproportionately in countries where alternative financing sources have become more common. Panel A in table 4 plots the estimated coefficients of regressing the household debt share on different measures of external financing and year fixed effects (or year and country fixed effects). This is equivalent to asking whether other sources are correlated with a shift away from domestic corporate lending across and within countries. From bonds and cross-border loans to measures of trade credit, leasing, and FDI, none of the other financing sources are significantly correlated with the increase in household lending, and the (within) R^2 is close to zero in all specifications. It is unlikely that domestic corporate credit has been substituted by other lenders.

[10] I restrict the sample to country-years with data on domestic credit *and* bonds to avoid changes in composition.

4.3 Law and Finance

An influential body of work, starting with La Porta et al. (1997, 1998), argues that legal systems are crucial to understanding financial sector outcomes. For the case of credit markets, La Porta et al. (1997) show that countries with French or Nordic legal origin have lower ratios of debt to GDP. Could it be that legal origins also affect the *composition* of credit? I put this to the test in column (1) of panel B by regressing the share of household credit in a country on legal origin dummies.[11] Note that, because legal origins are time-invariant, both regressions only include year fixed effects. Indeed, I find that French origin is associated with a lower household credit share, and Nordic origin with a higher one; the R^2 in these regressions, however, explains little of the 59% variation due to time-invariant country factors.

Creditor rights are one key correlate of legal origins that matter for credit markets across countries (e.g. Djankov et al., 2007; Qian and Strahan, 2007; Haselmann et al., 2010; Bae and Goyal, 2009). Building on this insight, I regress the household credit share on the creditor rights index from Djankov et al. (2007), which turns out to be statistically insignificant with and without country fixed effects. Using the strength of insolvency frameworks from the World Bank Doing Business Survey for 2014, however, is positively associated with household lending. The Legal Rights index from the same source – which measures how conducive collateral and bankruptcy laws are for lending – is also positive and statistically significant. This meshes well with previous cross-sectional evidence in Warnock and Warnock (2008) and Cerutti et al. (2017), who show correlations of legal rights with the ratio of mortgage debt *to GDP*, but do not show whether this implies higher overall *shares* of household lending. The index, however, does not have predictive ability for within-country variation in household debt.

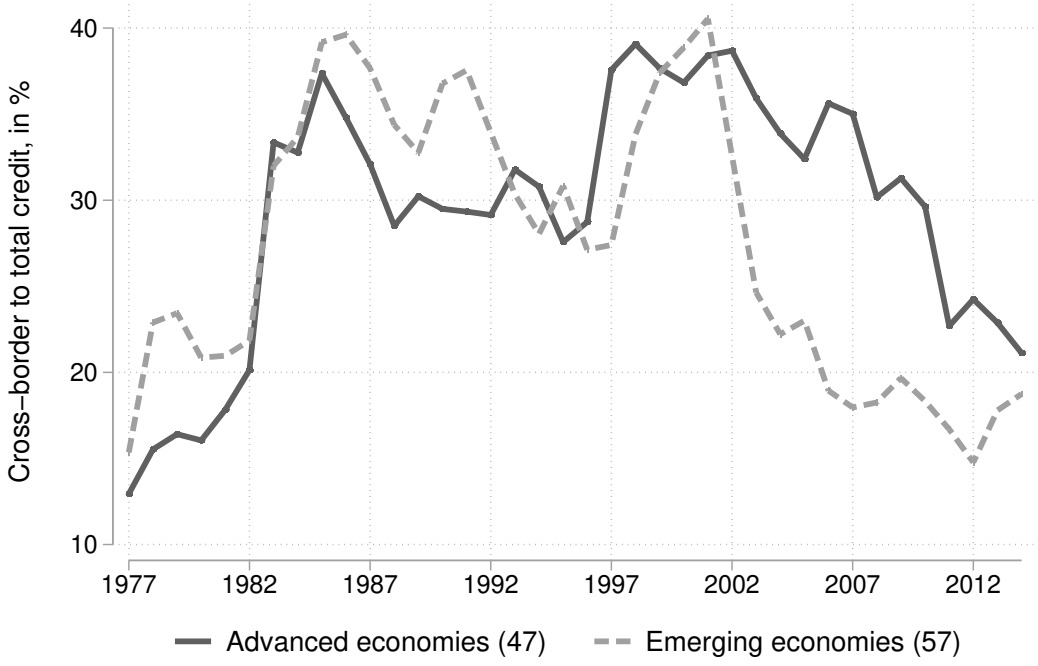
I also consider indicators of debt *enforcement* (Djankov et al., 2008), also based on World Bank Doing Business data. I find that higher costs of court claims and recovery rates for creditors are associated with household lending. The latter yields a R^2 of almost 17% and is also informative about the share of household debt *within* countries.[12]

[11] For brevity, I only plot the bivariate correlations for French and Nordic origin, because these are the only ones that are statistically significant in a multivariate regression that also include a dummy for German origin (with Common Law serving as comparison group).

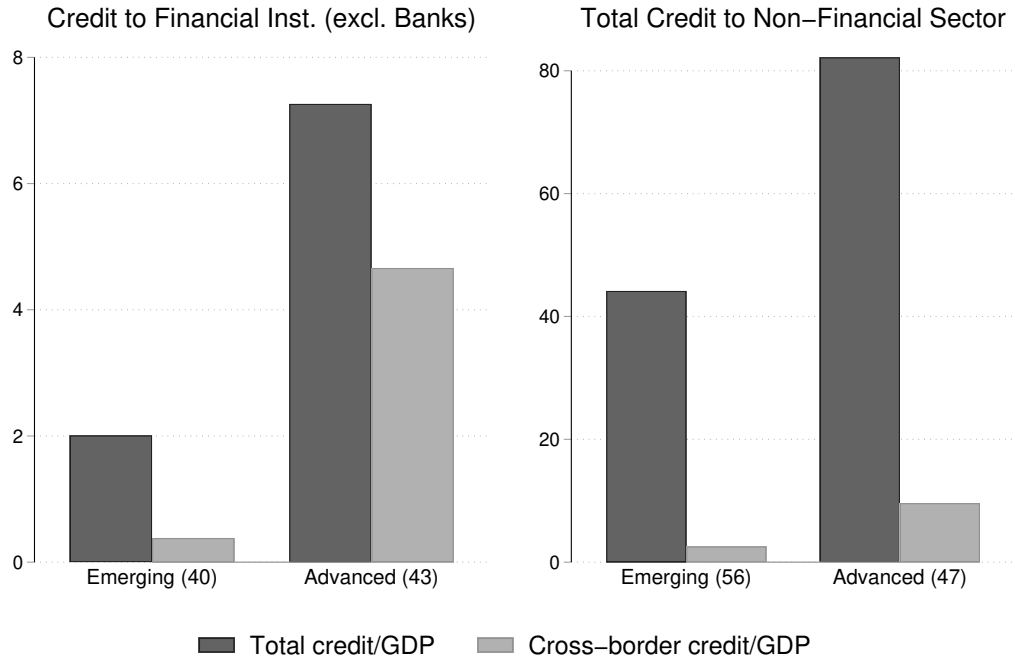
[12] The purely cross-sectional indicator of debt enforcement from Djankov et al. (2008) is also statistically significant when restricting the data to the post-2000 period (unreported).

Figure 9: COMPARING DOMESTIC AND CROSS-BORDER CREDIT

Panel A: Ratio of Cross-Border to Domestic Lending (in %)

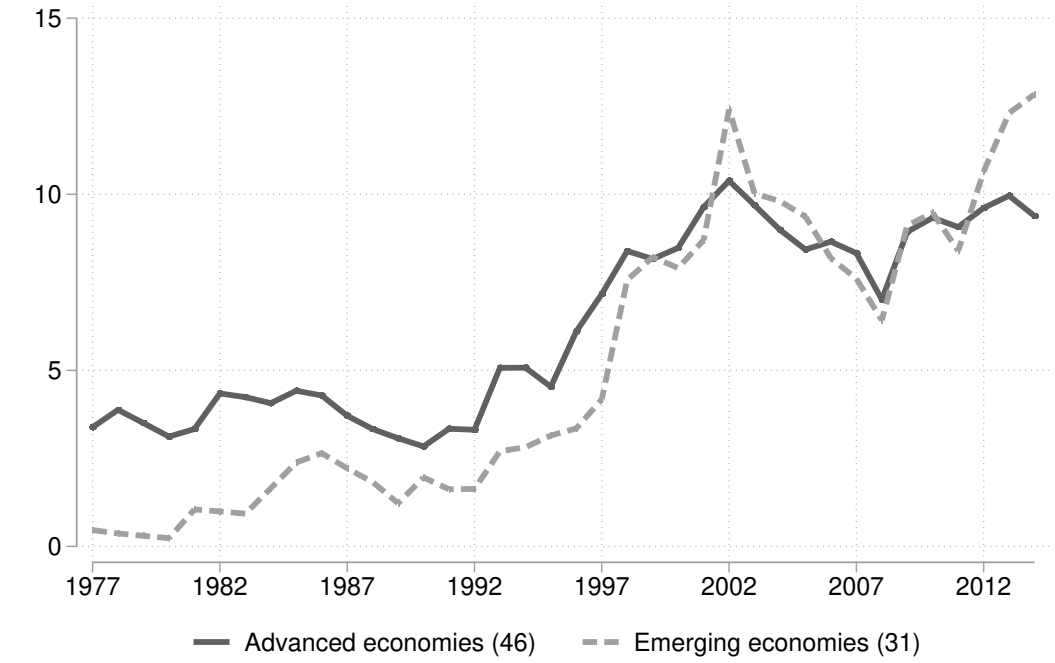


Panel B: Financial vs. Non-Financial Sector (2013-2014, in % of GDP)



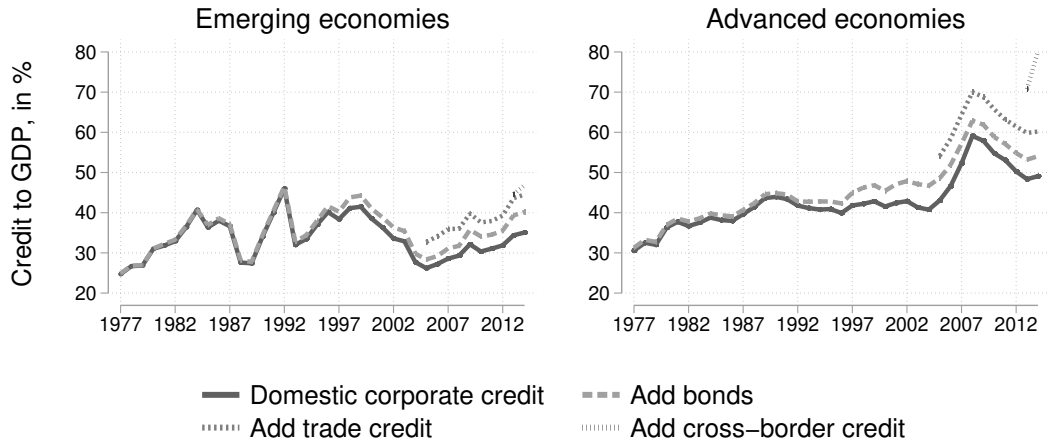
Note: Panel A plots the ratio of cross-border lending to the non-bank sector to total domestic credit to the private sector, broken down by country group. Panel B plots the average share of cross-border and domestic credit to GDP for 2013-2014, where I differentiate between lending to the financial sector (excl. banks) and all other sectors (i.e. households and non-financial corporations). I exclude tax havens (see text and online appendix).

Figure 10: SHARE OF BONDS IN CORPORATE CREDIT, IN %



Note: Figure 10 plots the ratio of outstanding bonds of non-financial corporations to total corporate credit, broken down by country group. I exclude tax havens (see text and online appendix).

Figure 11: COMPARING SOURCES OF EXTERNAL FINANCING, IN % OF GDP



Note: Figure 11 plots all sources of external financing as a fraction of GDP for countries that report data on domestic corporate credit and non-financial corporate bonds. I exclude tax havens (see online appendix).

Table 4: Explaining the Share of Household Credit – Panel Regressions

Dependent variable: Share of household credit in total credit												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Country FE		Yes		Yes		Yes		Yes		Yes		Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel A: Alternative sources of external financing												
	Oustanding bonds/GDP		Cross-border loans/GDP		Export credits/GDP		Trade/GDP		Leasing/GDP		Inward FDI/GDP	
Predictor	0.039	-0.033	0.019	-0.004	0.038	0.014	-0.009	0.014	0.428	-0.935	0.012	0.019
	(0.063)	(0.039)	(0.015)	(0.012)	(0.068)	(0.039)	(0.016)	(0.014)	(1.113)	(0.945)	(0.020)	(0.016)
Observations	1,804	1,798	3,054	3,054	1,102	1,102	4,027	4,027	710	702	3,203	3,203
Countries	76	70	110	110	112	112	115	115	66	58	112	112
Adj. R^2	0.029	0.829	0.079	0.811	0.000	0.938	0.111	0.811	0.049	0.861	0.078	0.810
Adj. R^2 (within)	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.001	0.000	0.011	0.000	0.000
Panel B: Legal frameworks and enforcement												
	Legal origin†		Creditor rights		Insolvency framework		Legal rights		Cost of court claims		Recovery rates	
	French	Nordic										
Predictor	-8.032***	18.689***	0.570	-1.225	0.973**	–	1.326***	0.074	-0.173*	0.028	0.237***	0.142***
	(2.763)	(5.584)	(1.780)	(1.868)	(0.448)		(0.485)	(0.272)	(0.089)	(0.039)	(0.051)	(0.051)
Observations	4,094	4,094	1,375	1,373	109		1,071	1,071	1,161	1,161	1,161	1,161
Countries	116	116	86	84	109		111	111	111	111	111	111
Adj. R^2	0.158	0.184	0.000	0.884	0.053		0.041	0.940	0.052	0.932	0.168	0.934
Adj. R^2 (within)	0.054	0.083	0.000	0.001	0.053		0.042	0.000	0.051	0.001	0.167	0.023

(Continued on next page)

Table 4: Explaining the Share of Household Credit – Panel Regressions (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Country FE		Yes		Yes		Yes		Yes		Yes		Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel C: Demographics, income, and savings												
	GDP per capita (log)		Top 10 income share		Consumption/ GDP		Savings/ GDP		Urban pop. share		Population aged 30-49	
Predictor	10.510***	6.478***	-0.404**	-0.001	-33.552***	-9.675*	0.267***	-0.016	0.281***	0.267**	134.758***	50.296**
	(1.261)	(2.336)	(0.200)	(0.164)	(7.955)	(5.544)	(0.084)	(0.053)	(0.070)	(0.112)	(29.273)	(24.545)
Observations	3,933	3,933	1,510	1,507	3,815	3,815	3,351	3,351	3,695	3,695	3,909	3,909
Countries	113	113	102	99	111	111	111	111	113	113	112	112
Adj. R^2	0.398	0.812	0.119	0.793	0.166	0.814	0.121	0.821	0.233	0.820	0.214	0.816
Adj. R^2 (within)	0.331	0.030	0.035	0.000	0.069	0.006	0.036	0.000	0.141	0.017	0.118	0.014
Panel D: Financial regulation and credit information sharing												
	Financial deregulation		Credit market freedom		Private bureau exists		Private bureau coverage		Public registry exists		Public registry coverage	
Predictor	55.213***	4.542	4.829***	1.291***	15.252***	4.415***	0.167***	0.029*	-1.888	4.019*	0.109*	0.006
	(6.839)	(4.845)	(0.671)	(0.387)	(2.012)	(1.459)	(0.033)	(0.017)	(3.316)	(2.121)	(0.056)	(0.027)
Observations	1,595	1,594	1,641	1,639	3,458	3,458	1,180	1,180	3,458	3,458	1,180	1,180
Countries	75	74	105	103	113	113	111	111	113	113	111	111
Adj. R^2	0.337	0.861	0.246	0.834	0.237	0.822	0.167	0.931	0.086	0.820	0.015	0.931
Adj. R^2 (within)	0.329	0.003	0.182	0.032	0.167	0.027	0.166	0.007	0.002	0.016	0.014	0.000

Notes: This table presents the results from individual regressions of the share of household in total credit on a predictor. † indicates regressions with time-invariant predictors, for which I can only include year fixed effects. Heteroskedasticity-robust standard errors in parentheses are clustered by country. See the online appendix for variable definitions and summary statistics. ***, **, and * indicate statistical significance at the 1, 5, and 10% level, respectively.

4.4 Demographic Factors, Income, and Inequality

The perhaps most obvious correlation one would expect with the share of household credit is a country's income level, as measured by GDP per capita. Cerutti et al. (2017) and Badev et al. (2014) , for example, find some evidence that the depth of mortgage markets is higher in richer countries. In my data, I find that this measure alone explains around 33% of the variation in the household *share* in total lending in panel C, and remains highly correlated even within a given country.

In principle, household credit might also depend on how a country's income is distributed between its citizens. Beck et al. (2007), for example, find that financial development disproportionally benefits the poor across countries, and Beck et al. (2010) find similar evidence for the staggered state-level lifting of US branching restrictions. Across countries, I also find that more unequal incomes are associated with a *lower* share of household debt. This contrasts with the argument that one driver of the expansion in household credit in the run-up to the Great Depression and Great Recession may have been an increase in inequality (Kumhof et al., 2015; Mian and Sufi, 2011), also stressed by Rajan (2010). Figure 12 shows that a country's income level is an important mediator: once I include the log of GDP per capita as a control variable, a higher income share of the top 10% has a *positive* correlation with household credit.[13] Given that the intuition in the latter group of papers is that households use debt to make up for a decline in real incomes in advanced economies, this may not be completely surprising.

Because income inequality is linked to saving-consumption decisions, the same pattern also holds true for the ratio of consumption to GDP and savings to GDP. Jappelli and Pagano (1994), for example, argue that better access to household credit may decrease the savings rate. In a large cross-section of 111 countries, I indeed find a negative correlation, but only after conditioning on GDP per capita; without that control a higher savings rate is associated with *more* household debt. Because savings and consumption are negatively correlated, I find similar results for consumption to GDP (with the opposite sign).

It is also intuitive that demographic factors should play a key role in shaping the use of household credit across countries. This is probably most obvious for financing housing, for which demographic variables are key drivers (e.g. Mankiw and Weil, 1989; Takats, 2012). In the newly collected data, I also find that the household credit

[13]Note that including the log of GDP per capita does not change the results of the other regressions presented here qualitatively.

share is highly correlated with the share of the population between 30 and 49 – likely the main group to take out a mortgage in most countries. Consistent with Badev et al. (2014), urbanization and household debt also appear to go hand-in-hand, both across and within countries. This is likely driven by supply as well as demand factors, e.g. because cities have higher house prices and smaller households, or because creditor rights are easier to enforce where the collateral is located closely to a bank's branches.

4.5 Financial Deregulation and Information Sharing

Financial deregulation is perhaps the single most prominent factor featured in popular accounts of changes to the nature of financial intermediation (e.g. Kay, 2015). Easing restrictions on lending, the story goes, have enabled financial institutions to extend ever more household credit – at the expense of businesses serving the "real" economy (Foroohar, 2016; Turner, 2015).

There is some empirical evidence to support this narrative. Mian et al. (2017a) show that US banking deregulation in the 1980s was associated with a boom-bust cycle in household debt and house prices. Relatedly, Favara and Imbs (2015) show that inter-state branching deregulation increased mortgage credit and house prices and Di Maggio and Kermani (2017) find similar effects using federal preemptions to local laws against predatory lending. These findings are also consistent with recent models that allow for a relaxation of borrowing constraints to households (e.g. Bahadir and Gumus, 2016; Justiniano et al., 2015), one source of which may be changes to regulation. Chakraborty et al. (2018) argue that, in the United States, mortgage lending crowds out corporate lending during housing booms.

Can changes to regulatory frameworks also help to explain the share of household credit across countries? I take this hypothesis to the data in columns (1) through (4) in panel D, using the financial reform index from Abiad et al. (2010) and the Fraser Institute's measure of credit market freedom as indicators of deregulation. The estimated coefficients are positive and highly statistically significant in 3 out of 4 cases.[14] The regressions also yield the highest R^2s I find outside of the results for GDP per capita,

[14]Note that the correlation with the deregulation index from Abiad et al. (2010) is absorbed by the year fixed effects, but is statistically significant at the 1% level with country fixed effects only. This is likely because deregulation occurs in waves, and including time dummies may thus be "over-controlling" (Mian et al., 2017b), i.e. wash away some of the "true" effect of deregulation. Indeed, a regression of the deregulation index on year fixed effects yields an adjusted R^2 of around 48% in my sample.

but they do not seem to be driven by differences in income levels: figure 12 shows that they are largely unaffected when controlling for the log of GDP per capita. This suggests that the short and medium-term deregulation effects identified in previous work are also reflected in long-term correlations within and across up to 105 countries.

Another critical institutional input for household lending are information sharing institutions (Pagano and Jappelli, 1993; Frame et al., 2001; Petersen and Rajan, 2002). In developing countries in particular, private credit bureaus and public credit registries have been associated with more lending relative to GDP (Djankov et al., 2007), both to firms (Jappelli and Pagano, 2002; Brown et al., 2009) and households (Warnock and Warnock, 2008; Jappelli et al., 2008). However, it is unclear whether better information sharing should lead to a higher *share* of household credit. I put this question to the test in columns (5) to (12), where I differentiate between private bureaus and public registries, as well as between the existence of such institutions (measured by a dummy variable) and their coverage (as % of adults, only available from 2004). The data strongly suggest that household credit is more prominent where private credit bureaus are present across but also within countries. The evidence for public registries is considerably weaker, as in previous papers, which may reflect heterogeneity across country groups (also see Djankov et al., 2007). As in the case of financial deregulation, these findings are unaffected by controlling for GDP per capita (unreported).

4.6 Summary

To summarize, the data reveal a few striking patterns. First, alternative sources of firm financing do not explain higher shares of household credit. Second, legal frameworks are not only associated with the *size*, but also *composition* of debt markets, at least across countries. Third, demographic factors such as the level and distribution of income, as well as aging and urbanization, are highly correlated with household lending. Fourth, financial deregulation and information sharing institutions have the highest explanatory power for the share of household in total private debt, outside of GDP per capita. These correlations should not be taken as definitive answers, but rather as a guide for future work, which should attempt to establish causal relationships using more rigorous empirical designs.

5 Discussion

After uncovering a new set of stylized facts about credit markets around the globe, it is instructive to consider how this evidence squares with existing theories of financial development and macro-financial linkages. In his classic survey of the financial development literature, Levine (2005) summarizes the functions of financial systems as (1) producing information ex ante about possible investments and allocate capital; (2) monitoring investments and exert corporate governance after providing finance; (3) facilitating the trading, diversification, and management of risk; (4) mobilizing and pooling savings; and (5) easing the exchange of goods and services. "Financial development", then, is defined as an improvement in how well financial systems perform these functions. It seems like a fair characterization that most of the literature on the role of credit in financial development has at least implicitly focused on these functions in the context of *corporate* financing. For example, Levine (1997) uses the parable of Fred, a hypothetical truck manufacturing entrepreneur, to illustrate how finance affects economic growth. Two of the key insights of his excellent summary are that "production requires capital" and "Fred will require outside funding if he has insufficient savings to initiate his truck project."

A more efficient allocation of resources between firms and industries in particular has also been at the core of many empirical studies of finance and growth (e.g. Rajan and Zingales, 1998; Wurgler, 2000; Bertrand et al., 2007). These papers, however, tell us very little about the massive increase in household credit around the world I have documented here. In fact, the samples studied in many papers, often limited to manufacturing, account for an ever decreasing share of banks' loan portfolio. To pick up Levine's parable, Fred's ability to take out a mortgage or a car loan appears to have become an increasingly important part of what banks do, rather than the provision of working capital. Of course, this does *not* imply that firms necessarily face credit constraints as a result. But it does suggest that many papers neatly identify effects on the *intensive* margin, which have to be interpreted alongside the *extensive* margin of the actual credit allocation across sectors.

Studies of the amplifying effects of leverage on business cycles (starting with classic work by Kiyotaki and Moore, 1997; Bernanke et al., 1999) have largely focused on interactions between *firm* balance sheets and the financial sector (see e.g. Caballero and Krishnamurthy, 2003; Brunnermeier and Sannikov, 2014). The evidence I present here suggests that models with a focus on *household* balance sheets may be increasingly in-

formative, given the prominence of household lending (see e.g. Justiniano et al., 2015; Greenwald, 2016; Schmitt-Grohé and Uribe, 2016; Martin and Philippon, 2017; Mian et al., 2017b). The compositional shifts in corporate credit are also worth highlighting here. In advanced economies, approximately 20% of corporate credit today is extended to construction and real estate companies, and another 20% to financial institutions. This suggests that modeling heterogeneity in sectoral characteristics may be a fruitful endeavour going forward.

A key question raised by my study is which factors are responsible for the boom in household debt all over the world, and for composition of household debt into mortgages and non-mortgages. While I provide some first evidence, this should be seen as a guidance for future work, rather than as providing definite answers. It is also unclear whether the stalling of corporate credit, particularly in emerging economies, reflects supply or demand factors. A first indication is that external financing sources do not seem to have offset the lack of growth in corporate credit, despite the fact that GDP and household credit have grown substantially in developing countries; situations one would not characterize as typical for a lack of credit demand. It thus seems plausible that credit supply might at least be partially responsible, which raises the question whether household credit has "crowded out" firm lending – as argued by, among others, Turner (2015), Kay (2015), and Foroohar (2016).

The dataset I present also opens a wealth of opportunities for future research. For one, it remains largely unclear why some credit booms end in crises and others are associated with productivity miracles. Analyzing whether booms can be differentiated depending on the sectors in which they occur is particularly relevant for policy makers. The data may also prove to be a useful laboratory for understanding why different types of credit can exhibit boom-bust patterns (Mian and Sufi, 2018). One particular interesting case are episodes of financial liberalization, the effects of which remain somewhat contested. On one hand, evidence on the deregulatory process in the United States has overwhelmingly found beneficial effects (see Kroszner and Strahan (2014) for an excellent survey). On the other hand, there is also some evidence that liberalization is often followed by crises with substantial output costs (e.g. Demirgüç-Kunt and Detragiache, 1998). Going forward, it seems worth investigating whether changes in credit composition can explain these divergent experiences.

6 Conclusion

The Great Financial Crisis 2007-2008 has prompted a call to arms to study macro-financial linkages, in particular the role of credit in the macroeconomy. Despite this research interest, the paucity of comparable cross-country data has forced researchers to work either with broad macroeconomic aggregates or draw on usually confidential data from credit registries or proprietary sources. At the same time, analyzing the nature of financial crises and the effects of financial reforms has been hampered by a lack of detailed credit data that cover a country's entire banking system. I present a large novel dataset on sectoral credit for 120 countries to remedy these problems.

The data show that aggregate measures of private credit conceal considerable changes in the *composition* of lending over time and across countries. Indeed, these shifts are nothing short of a transformation of what financial institutions do, both in advanced and emerging economies. I provide a few tentative answers about what can and cannot explain these findings. While only a first step, I show that the stalling of corporate credit is unlikely a result of the development of corporate bond markets, cross-border lending, or other alternative sources of external financing. Rather, higher shares of household debt are associated with demographic factors, the income distribution, financial deregulation, and the development of information sharing institutions. I also find some evidence that legal frameworks play a role. These insights will hopefully guide more empirical work going forward.

The trends I uncover here also present us with major new questions: Why do households in advanced economies use mortgages so much more frequently than those in emerging economies? Has household credit crowded out corporate credit? Do composition shifts in corporate credit reflect industrial change, or are other forces at work? Which types of credit are most important for understanding the relationship between financial development, financial crises, and economic growth? I expect that the data unveiled here will give impetus to new research into a better understanding of credit markets and their interlinkages with macroeconomic dynamics.

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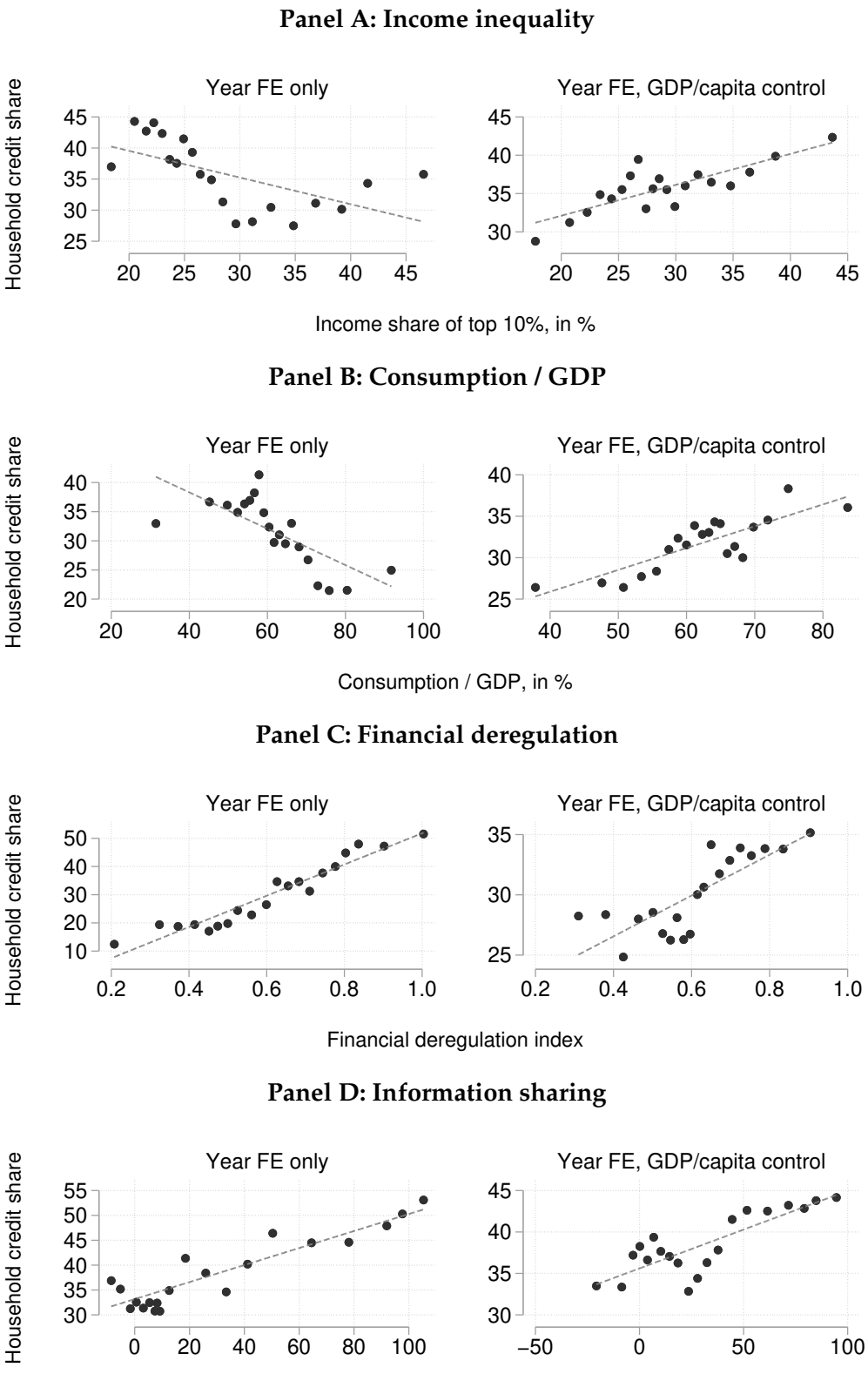
Appendix

Table 5: COUNTRY GROUPS, WORLD BANK CLASSIFICATION (2014)

OECD	Non-OECD advanced	Emerging	
Australia	Antigua & Barbuda	Albania	Kenya
Austria	Argentina	Anguilla	Kyrgyz Republic
Belgium	Bahrain	Armenia	Lesotho
Canada	Barbados	Azerbaijan	Macedonia
Chile	Cyprus	Bangladesh	Malawi
Czech Republic	Hong Kong	Belize	Malaysia
Denmark	Kuwait	Bhutan	Maldives
Estonia	Latvia	Bolivia	Mauritius
Finland	Lithuania	Botswana	Mexico
France	Malta	Bulgaria	Mongolia
Germany	Oman	Cambodia	Montserrat
Greece	Qatar	China	Morocco
Hungary	Russian Federation	Colombia	Nepal
Iceland	Saudi Arabia	Costa Rica	Nicaragua
Ireland	Seychelles	Curacao & Sint Maarten	Nigeria
Israel	Singapore	Dominica	Pakistan
Italy	St. Kitts & Nevis	Dominican Republic	Panama
Japan	Taiwan	Egypt	Peru
Luxembourg	Trinidad & Tobago	El Salvador	Philippines
Netherlands	United Arab Emirates	Ethiopia	Romania
New Zealand	Uruguay	Fiji	Sierra Leone
Norway	Venezuela	Georgia	South Africa
Poland		Ghana	Sri Lanka
Portugal		Grenada	St. Lucia
Slovak Republic		Guatemala	St. Vincent
Slovenia		Guyana	Suriname
South Korea		Haiti	Tanzania
Spain		Honduras	Thailand
Sweden		India	Tunisia
Switzerland		Indonesia	Turkey
United Kingdom		Iran	Uganda
United States		Jamaica	Ukraine
		Jordan	Zimbabwe
		Kazakhstan	

Figure 12: EXPLAINING THE HOUSEHOLD CREDIT SHARE: GDP/CAPITA CONTROL



Notes: These figures show binned scatter plots of the household credit share and the variables listed in the panel headers. All values were adjusted for year fixed effects; the plots on the right further include the natural logarithm of GDP per capita in constant USD from the Maddison Project as control variable.