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# Enterprise credit, household credit and growth: New evidence from 126 countries

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Florian LEON, CREA, Université du Luxembourg

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For editorial correspondence, please contact: crea@uni.lu
University of Luxembourg
Faculty of Law, Economics and Finance
162A, avenue de la Faïencerie
L-1511 Luxembourg

# Enterprise credit, household credit and growth: New evidence from 126 countries

Florian Léon*
University of Luxembourg - CREA

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**Abstract**

This paper attempts to distinguish the effects of household and enterprise credit on economic growth. To do so, I create a new, hand-collected database covering 143 countries over the period 1995-2014 (126 countries are employed for econometric analysis). Estimation results confirm recent evidence documenting the absence of the effect of total credit to growth. Findings also show that household credit has a negative effect on growth, but I fail to provide robust support for a positive effect of business credit.

*Keywords:* Financial development, Household credit, Enterprise credit, Economic growth
*JEL classification:* E44, G21, O16

*Address: 162a, Avenue de la Faiencerie L-1511 Luxembourg. Email: florian.leon@uni.lu. I am grateful to Laurent Weill for his comments.

# 1 Introduction

A common belief found in the literature is that greater financial depth facilitates faster growth. A large number of papers using different methodologies and data have provided support for this view (for a review, see Ang, 2008). However, in the wake of the recent financial crisis, doubts have been raised about this notion and recent studies have confirmed these doubts. For instance, Rousseau and Wachtel (2011) point out that empirical studies are fragile and ambiguous. They document that the link between finance and growth has weakened considerably over time and they show that the positive relationship between the two has been vanishing since the 1990s.[1] Using a meta-analysis approach, Valickova et al. (2015) confirm the "vanishing effect" of credit on growth in studies focused on recent years.

Several theories have been put forward to justify the vanishing effect. One explanation is based on the idea that too much finance reduces growth. Some authors argue that beyond a certain threshold, financial depth no longer has a positive effect on growth (Law and Singh, 2014; Arcand et al., 2015). Other explanations have also been advanced to explain the vanishing effect, even for countries with moderate financial development levels. Financial development may only affect convergence towards equilibrium and may not have any effect on steady-state growth (Aghion et al., 2005). Others argue that financial liberalization has made financial deepening less effective. Yet another hypothesis is based on the idea that equity market growth has substituted for the role of banks. However, existing empirical papers fail to provide clear support for any of these views (Rousseau and Wachtel, 2011).

This work explores a different explanation based on the distinction between household and enterprise credit.[2] The recent increase in financial depth has been driven by the expansion of credit to households. Using a new database (see below), I document that

[1] They document that coefficients associated with financial depth are not positive for recent years (1990-2004) as expected. In some regressions, coefficients are even negative and statically significant. Other studies provide similar results indicating that financial depth does not spur growth (Arcand et al., 2015; Bezemer et al., 2016).

[2] In this paper, I employ enterprise credit, firm credit and business credit synonymously.

the ratio of household credit to total credit has increased over the past decade from 30 % in 2000 to 42 % in 2014 in a context of expansion of total credit. Interestingly, this evolution is not specific to developed economies but also applies to developing countries.

The expansion of household credit could explain the absence of effect of credit to growth. Arguments in favor on financing to stimulate growth implicitly concentrate on firm credit, while theory provides ambiguous predictions about the effect of household credit on economic growth. Jappelli and Pagano (1994) underline the negative effect of household credit for the savings rate, and therefore for long-term growth. In addition, expansion of household credit raises the debt-burden in the present without delivering higher flows in the future if credit is not used for developing income-generating activities. Household overindebtness is detrimental for growth (Cecchetti et al., 2011) and increases the likelihood of a banking crisis (Büyükkarabacak and Valev, 2010). By contrast, some authors argue that household credit can be positive for growth by facilitating human capital investment and accumulation (Galor and Zeira, 1993). In addition, household credit may help to smooth consumption and may limit macroeconomic volatility.

Beck et al. (2012) were the first of the few studies to disentangle the impact of enterprise credit and household credit to growth. To do so, they hand-collect data for 45 countries over the period 1994-2005. Using cross-sectional regressions, they find evidence that enterprise credit raises economic growth whereas household credit has a limited effect on economic growth. Sassi and Gasmi (2014) use a panel of 27 European countries over the period 1995-2012. They confirm the positive effect of enterprise credit to growth but also document that household credit has a negative effect. Bezemer et al. (2016) also employ a panel analysis based on 46 countries over the period 1990-2011 but they challenge previous findings. They distinguish between credit for financial activities (mortgage loans and credit to financial institutions) and non-financial activities (credit to non-financial corporations and consumer loans). Contrary to a large consensus in the literature, they find a negative effect of credit to growth on average that is explained by the stock of credit for financial purposes. However, they fail to prove that the stock of

credit to non-financial activities spurs growth. Such conflicting results in the literature can be explained by the samples considered (and varying methodologies).[3]

This paper has two aims. First, I provide a new database on credit structure (Credit Structure Database) covering a large range of countries. To do so, I hand-collected data on household credit and enterprise credit for 143 countries over the period 1995-2014. Using this new data, I provide some interesting facts about the structure of credit around the world and its evolution over time. First, I document that not only the level but also the structure of credit is related to the level of development. Simple data description highlights that the share of household credit is positively correlated with the level of economic development (and financial) development. Second, data show that the composition of bank credit has substantially changed in recent years to reflect an increase of the share of household credit. This increase is particularly strong in developing countries.

I then employ this new database to assess the differential impact of household and business credit on growth. I replicate methodology employed in most recent studies using both cross-country and panel regressions (Arcand et al., 2015; Bezemer et al., 2016). Due to the limited data on control variables, regressions are estimated on a sub-sample of 126 countries. In a first step, I assess the effect of total credit on growth, confirming the "vanishing effect" reported in recent works (Valickova et al., 2015). Econometric results show that total credit has no statistical impact on growth. Next, I disentangle the impact of household credit and business credit. The results prove interesting. First, household credit has a detrimental effect on growth, in line with previous studies (Sassi and Gasmi, 2014; Bezemer et al., 2016). However, I do not confirm the positive effect of enterprise credit. The sign of the coefficient associated with enterprise credit is often positive but rarely statistically significant. These findings are robust to various specifications and are not specific to either developed or developing countries.

[3]These papers focus on a small, limited number of countries mainly from the developed world. One exception is Beck et al. (2012) who also consider developing countries but only report cross-sectional results due to the lack of time-variation.

The remainder of the paper is organized as follows. Section 2 describes the data and provides some basic pictures on the structure of credit around the world and its evolution over time. Section 3 presents the methodology and Section 4 displays descriptive statistics. Section 5 discusses the economic impact of total credit. Section 6 presents results on the differential impact of enterprise credit and household credit. The final section concludes.

# 2 Credit structure around the world

## 2.1 Credit Structure Database

Data were hand-collected from Central Bank publications including Central Bank annual reports, supervision department/agency annual reports, annual bulletins and statistical digests. The most difficult task consisted in harmonizing data from diverse sources with their own classifications. Some basic filters were applied to allow comparison across countries. From the supply-side, I focused on credit provided by commercial banks. Put differently, I did not consider credit provided by non-banking financial institutions as data on loans provided by non-banking financial intermediaries are not always available. In some countries, total credit provided by the financial sector can be very different from credit provided by the banking system (e.g., in the US). However, in the majority of countries, loans are mainly provided by commercial banks. A second filter concerns the demand-side. I excluded credit allocated to central and local administration because I focus my attention on private credit. In addition, we also excluded credit to financial companies. Based on these filters, I considered all countries for which I was able to identify a consistent data source. Household credit was defined as credit to household, credit to individuals or a similar item. Enterprise credit was defined as credit allocated to non-financial corporations.

I faced two major issues. The first was whether to include credit to state-owned enterprises. This issue concerns only a handful of countries (such as those with transition

economies) but can be important for them. To avoid (spurious) breaks due to privatization of former state-owned companies in recent years, I considered credit to state-owned enterprises as part of business (private) credit. The second issue was the difficulty to distinguish between household and firm credit for sole proprietorship. For the majority of countries, I had no information on individual enterprises. However, when I was able to obtain sufficient disaggregated data, loans to individual companies were considered as an element of firm credit. Based on this data, I computed total credit as the sum of enterprise credit and household credit. Finally, we divided the amount of (enterprise, household and total) credit to current GDP to get the usual ratio of credit to GDP.

The Credit Structure Database (CDS) differs from existing datasets in two aspects. Firstly, it considers 143 countries spanning different periods, depending on data availability, from 1995 to 2014. Other databases covered less than 50 countries.[4] Considering a large range of countries allows to include economies from all levels of development and from all continents. Twenty countries were classified as low-income countries in 2015, 67 as middle-income countries and 56 as high-income countries. The sample includes 42 countries from Europe, 29 from Latin America and the Caribbean, 2 from North America, 4 from Central Asia, 20 from East Asia and the Pacific, 6 from South Asia, 30 from Sub-Saharan Africa and 12 from the Middle-East and North Africa. The list of countries and the period considered, by country, as well as classification of each country (region and income group) are reported in the Appendix (Table A1). In addition, panel data structure allows to study evolution of credit structure over time and provide more robust econometric estimations. Obviously, I could not get data for all years in all countries. However, for a large number of countries, I was able to provide a sufficient time span to study evolution of credit structure (see Table A1, column Sample - Evolution).

Secondly, obtaining reliable information on household credit is difficult, especially in less developed countries. A solution is to define credit to household has a residual. For

[4] 45 countries for Beck et al. (2012)'s database, 27 European countries for Sassi and Gasmi (2014)'s database and 46 countries for Bezemer et al. (2016)'s database

instance, Beck et al. (2012), who collect data only on business credit, compute credit to household as the difference between overall credit (extracted from the Financial Structure Database) and enterprise credit. I did not adopt the same methodology. Rather, I reported credit to household when explicit data was reported, therefore improving reliability of data.[5]

Before investigating the database in detail, I scrutinize whether the Credit Structure Database (CDS) provides reliable data. To do so, I compare the ratio of total credit to GDP computed as the sum of business and household credit with the ratio of private credit to GDP extracted from the Financial Structure Database (Beck et al., 2010). Correlation coefficients range from 87 % (one observation per country: 143 countries) to 90% (country-year observations: 1,947 observations). When I regress total credit obtained from the CDS to the private credit provided by the Financial Structure Database, the estimated coefficient is highly significant and its magnitude is around one. In other words, the CDS provides a close picture than that depicted in the usually used Financial Structure Database.

## 2.2 Data exploration

### 2.2.1 Comparison across country

I first present some basic statistics about credit structure around the world.[6] Total credit represents on average 51% of GDP, household credit 21% of GDP and enterprise credit 30%. The ratio of household credit to total credit accounts for one third of total credit on average (see Table 1).

However, there is large variation across countries. Both the level of credit to GDP and the composition of credit differ greatly. Guinea-Bissau had the lowest overall level

[5]It should be noted that we were able to collect data on business credit for 18 additional countries (Bangladesh, Bolivia, Brazil, Burundi, the Democratic Republic of Congo, Ghana, Iran, Jordan, Laos, Liberia, Nigeria, Rwanda, Samoa, Sudan, Suriname, Tanzania, Taiwan and Yemen) but I did not include them in this study because I was unable to retrieve data on household credit for these countries.

[6]When not explicitly specified, we consider all 143 countries included in the CSD.

Table 1: Credit Structure Database - Summary statistics

| Variables | Obs.† | Mean | SD. | Min | $25^{th}$ | Median | $25^{th}$ | Max |
|---|---|---|---|---|---|---|---|---|
| Credit to GDP | | | | | | | | |
| Total credit | 1,947 (143) | 51.92 | 40.95 | 0.49 | 20.39 | 41.28 | 74.48 | 309.82 |
| Enterprise credit | 1,947 (143) | 30.24 | 24.03 | 0.32 | 13.92 | 24.03 | 40.38 | 171.02 |
| Household credit | 1,961 (143) | 21.64 | 21.80 | 0.00 | 4.60 | 14.54 | 32.56 | 141.80 |
| Ratio | | | | | | | | |
| Household credit/Total credit | 1,947 (143) | 35.20 | 18.00 | 0.00 | 22.06 | 36.95 | 48.96 | 87.02 |

† the number of countries is reported in parentheses

of credit over the sample period with a credit to GDP ratio of 2.3% while Cyprus has the highest overall level of credit with over 250%. The interquartile ratio (Q3/Q1) was 3.5 with one quarter of countries having a ratio below 20% and one quarter having a ratio above 75%. Table 2 shows that the level of private credit is related to the level of development. The ratio of total credit to GDP was 77% for high-income countries but less than 15% for low-income countries.

Table 2: Credit structure, by group of countries

| | Credit to GDP | | | HC/TC† | # Obs. |
|---|---|---|---|---|---|
| | TC† | EC† | HC† | (in %) | |
| All countries | 51.92 | 30.24 | 21.64 | 35.20 | 1,947 |
| By income | | | | | |
| High income | 77.4 | 41.4 | 35.8 | 45.3 | 854 |
| Upper middle-income | 43.6 | 26.7 | 16.9 | 36.8 | 483 |
| Lower middle-income | 27.8 | 20.1 | 7.8 | 24.6 | 380 |
| Low-income | 14.6 | 13.0 | 1.7 | 11.7 | 230 |
| By level of financial development§ | | | | | |
| $1^{st}$ quartile | 12.12 | 9.53 | 2.59 | 20.30 | 478 |
| $2^{nd}$ quartile | 29.40 | 20.18 | 9.22 | 31.07 | 462 |
| $3^{rd}$ quartile | 56.04 | 31.65 | 24.39 | 43.11 | 500 |
| $4^{th}$ quartile | 109.81 | 59.43 | 49.41 | 45.77 | 478 |

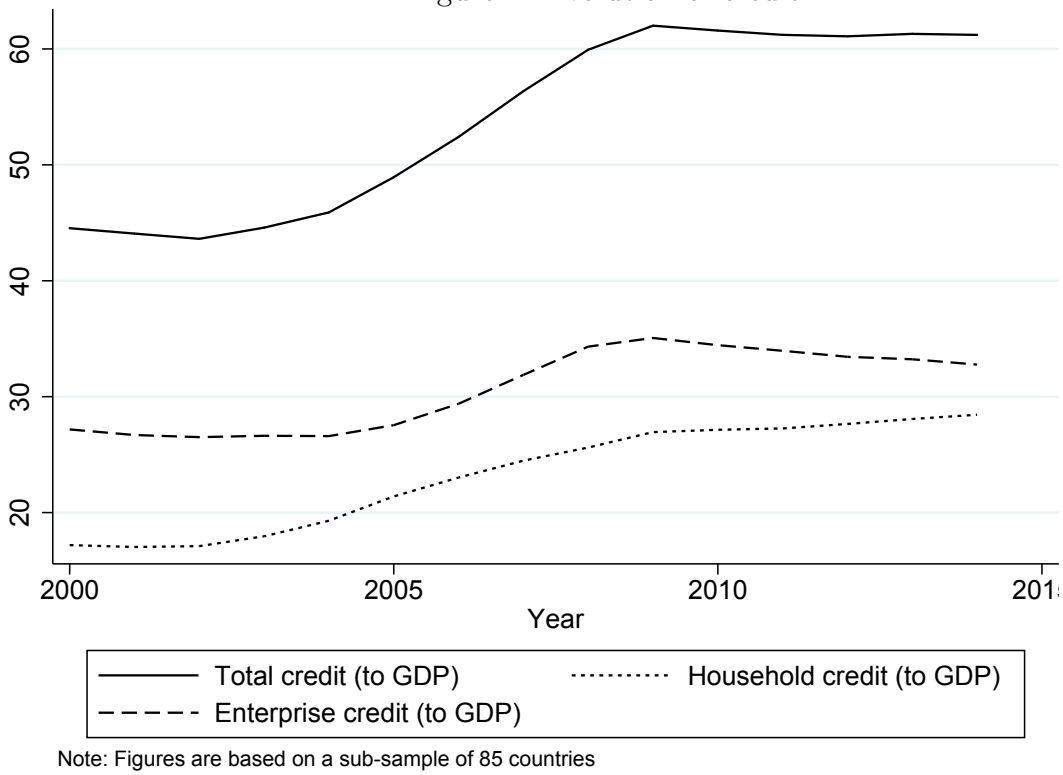
† TC: Total credit; EC: Enterprise credit; HC: Household credit
§ 1st quartile: TC<20%; 2nd quartile: 20%<TC<40%; 3rd quartile: 41%<TC<75%; 4th quartile: TC>75%

The composition of credit presents similar heterogeneity. Household credit represents more than four fifths of credit in Canada, while household credit is almost non-existent in some African countries (Bénin, Côte d'Ivoire, Ethiopia, Guinea). Table 2 shows that the share of household credit is related to the level of economic and financial development. For instance, in high-income countries the ratio of household credit represents almost 50% of total credit but only 11% in low-income countries. In Table 2, I also divide the sample according to the level of total credit. I observe that the ratio of household credit is related

to the level of financial development. This ratio ranges from 20% for the least financial developed countries to 45 % for the fourth quartile countries. This feature is interesting: as a country develops a larger share of credit is oriented towards the household.

### 2.2.2 Evolution over time

Figure 1: Evolution of credit

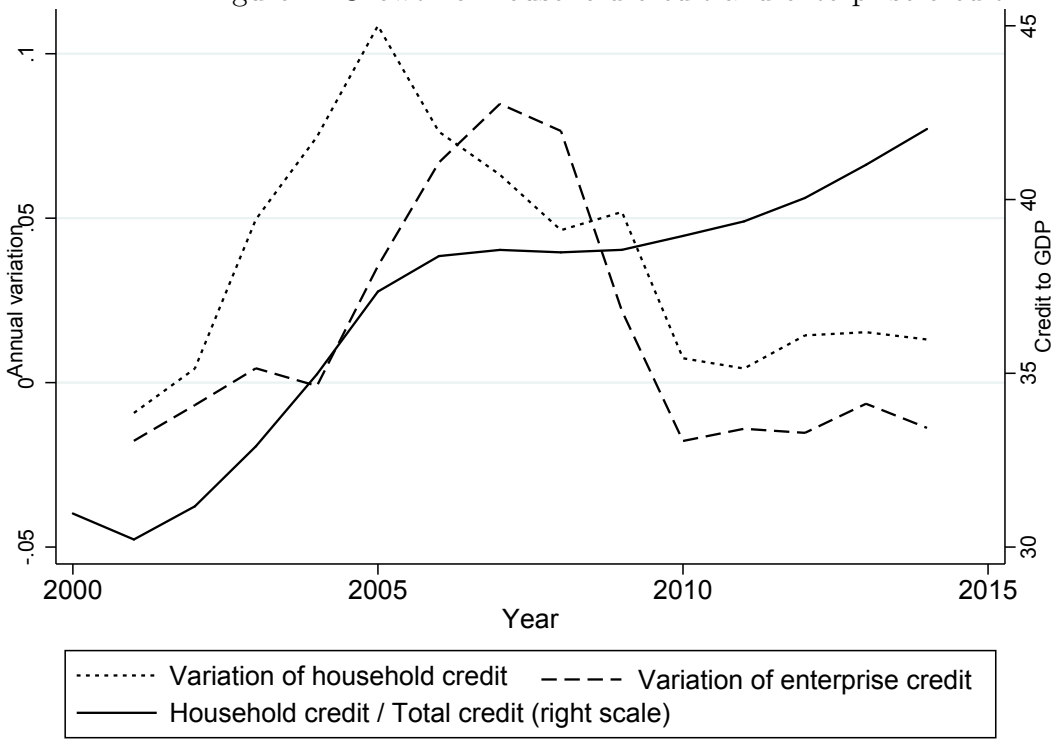



Note: Figures are based on a sub-sample of 85 countries

Until now, I have focused our analysis on differences across countries. I now turn to evolution of credit composition. To provide a comparable analysis, we consider a sub-sample of 85 countries for which we could obtain information from 2002 to 2014 (see Table A1, column sample - evolution). This sub-sample includes 7 low-income countries, 40 middle-income (including 18 lower middle income and 22 upper-middle income) countries and 38 high income countries. Figure 1 displays the evolution of total credit, household credit and enterprise credit over the period 2000-2014 for these countries. I observe a sharp increase of total credit from 2004 to 2009. The average ratio of total credit to GDP increased by 17 points in five years (from 45% in 2005 to 62% in 2009). This increase

was driven both by expansion of enterprise credit (+ 9 points from 26% to 35%) and expansion of household credit (+ 8 points from 19% to 27%). Figure 2 scrutinizes in detail the growth of household and enterprise credit in recent years, especially during the credit boom preceding the 2008 global financial crisis. The dashed line indicates the average annual rates of growth of business credit and the dotted line those for household credit, by year. The solid line shows the average ratio of household credit to total credit. I observe that the growth of household credit preceded the expansion of enterprise credit and reached a higher peak than enterprise credit peak. The growth of business credit outpaced that of household credit only from 2006 to 2009. As a result, the ratio of household credit to total credit increased over time. After the beginning of the financial crisis, household credit continued to expand, while we observe a decline of enterprise credit.

Figure 2: Growth of household credit and enterprise credit




Note: Figures are based on a sub-sample of 85 countries

A related question is whether these trends were driven by developed countries. To treat this question, I divide the sample of 85 countries into two groups: 38 developed

(high-income) countries and 47 developing (low-income and middle-income) countries. Figure 3 plots the ratio of total credit to GDP for both groups as well as the ratio of household credit to total credit (this gives us a picture of whether household credit growth exceeds business credit growth). Two main observations can be made. Firstly, total credit increased in both groups of countries. The ratio of total credit to GDP increased by 12 points in developing countries from 2005 to 2009 (from 27% to 39%) and by 22 points in developed economies (from 69% in 2005 to 91% in 2009). Secondly, household credit is an important driver of growth not only in developed countries but also in developing countries. Indeed, the growth of credit was driven by household credit from 2001 to 2006 and after 2009 in both developed and developing countries. The ratio of household credit to total credit increased from 20% to 31% (+11 points) in developing countries and from 40% to 47% (+7 points) in developed countries between 2001 and 2006. After 2006, we observe a stagnation of this ratio until 2012 in developing countries. However, after a reduction in 2007 and 2008, the share of household credit continued to grow in developed countries to over 50% in 2014.

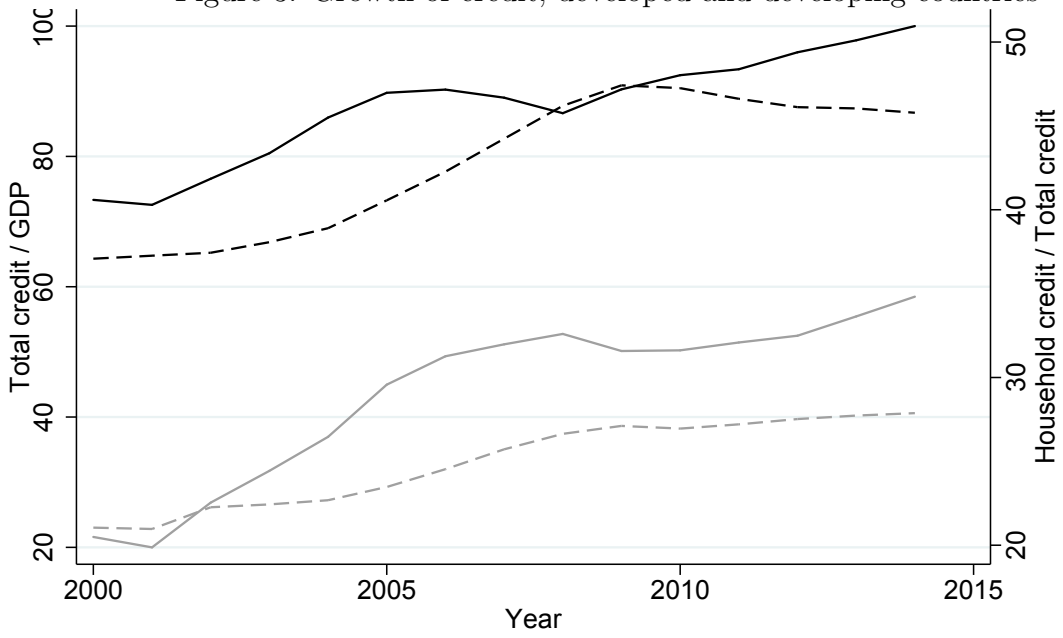
# 3 Methodology

The main objective of this paper is to assess the contribution of credit structure to growth. I merely replicate the usual methodology employed in the finance-growth literature (Beck and Levine, 2004; Arcand et al., 2015). To empirically investigate the effect of credit to growth, a Barro-style growth regression is used. I begin by considering the overall credit to GDP. This first model is used to confirm (or not) the absence of effect of total credit (vanishing effect). Formally, the estimated model is as follows:

$$Y_{it} = \alpha + \beta TC_{it} + \Gamma \mathbf{X}_{it} + u_{it} \tag{1}$$

where $i$ and $t$ refer to country and period, respectively. $Y_{it}$ is the average growth rate of real GDP per capita, $TC_{it}$ is the initial level of total credit to GDP (defined as the sum

Figure 3: Growth of credit, developed and developing countries




Note: Figures are based on a sub-sample of 85 countries

of household and business credit) and $\mathbf{X}_{it}$ is a set of explanatory variables. According to the standard finance-growth literature, $\beta$ should be positive indicating that finance spurs growth. However, recent studies document that finance has not spurred growth in recent years and we could observe that $\beta = 0$ (confirming the vanishing effect). Finally, $\beta < 0$ implies that the stock of overall credit has been negative for growth in recent years.

In a second step, I remove total credit and include household credit to GDP and business credit to GDP.[7] The empirical model becomes:

$$Y_{it} = \alpha + \beta_1 HC_{it} + \beta_2 EC_{it} + \Gamma \mathbf{X}_{it} + u_{it} \tag{2}$$

where $HC_{it}$ is the initial level of household credit to GDP and $EC_{it}$ the enterprise credit over GDP. Existing literature on credit structure (Beck et al., 2012; Sassi and Gasmi, 2014) points out that business credit is beneficial for growth, while household credit is

[7] I also include household credit and enterprise credit independently. Results are not reported but are close to those that considering household and enterprise credit simultaneously.

not. I therefore expect that $\beta_2 > 0$ and $\beta_1 = 0$ (or $\beta_1 < 0$). However, according to Bezemer et al. (2016)'s findings, both $\beta_1$ and $\beta_2$ could be negative.

To select the list of control variables, I follow the finance-growth literature. Control variables ($\mathbf{X}_{it}$) include the initial level of GDP per capita, the inflation rate (computed from the consumer price index), the level of education assessed by the secondary school enrollment rate, trade openness (i.e. imports plus exports to GDP) and government final consumption expenditure to GDP. All of these variables are extracted from the World Development Indicators. To reduce any simultaneity bias, initial values rather than average values for all explanatory variables are employed. All control variables are in logs. I consider both the level and log of the credit variables ($TC_{it}$, $HC_{it}$, and $EC_{it}$). The definitions of variables are provided in the Appendix (Table A2).

Following the finance-growth literature (King and Levine, 1993; Beck and Levine, 2004; Rousseau and Wachtel, 2011; Arcand et al., 2015), I begin the analysis with a simple cross-country regression. In spite of its limitations, a cross-sectional analysis is a transparent way to describe the data. In a second step, I exploit the time dimension by using a panel model. It is usual in the literature to employ non-overlapping five-year periods to control for business cycles. Given the short time span, we follow Bezemer et al. (2016) and use 3-year periods. All panel estimates include period fixed effects. I start with a baseline fixed-effect (FE) model. The presence of initial GDP per capita, however, puts the model inside the context of a dynamic panel model and FE model is no longer valid. As is now standard in growth literature with limited time-periods, I employ the GMM-system estimator proposed by Blundell and Bond (1998). All explanatory variables are considered as weakly exogenous and available lagged values are used as internal instruments.[8] To improve identification, I add external instruments, namely legal origin and religious composition. These external instruments are frequently used (Beck et al., 2012; Sassi and Gasmi, 2014). I use the two-step procedure proposed by Arellano and Bond (1991) and obtain robust standard errors using the Windmeijer (2005)

[8]Considering all explanatory variables as endogenous and therefore using two lags and more as instruments provides close results.

finite sample correction.

Regressions are run on a sample of 126 countries over the period 1995-2014. Indeed, I cannot use all 143 countries for which I collected data on credit due to the lack of data regarding control variables. The list of countries considered for estimations is presented in Table A1 (column sample - regression).

# 4 Descriptive statistics

Before implementing econometric regressions, I scrutinize the data in detail. Tables 3 and 4 report descriptive statistics and correlations for annual (panel A), 3-year (panel B) and cross-country observations (panel C), respectively. The most striking feature is the negative correlation between (total, household and enterprise) credit and economic growth. These figures are in line with the findings from Bezemer et al. (2016) but also contradict a large body of the literature documenting a positive relationship between finance and growth (Ang, 2008).[9]

To investigate whether the relationship between credit and growth has changed over time, I plot correlation coefficients between credit and growth by year in the Appendix. To get comparable data, I keep only countries for which I have data from 2000 to 2014 (the sub-sample of 85 countries employed in Section 2). Figure A1 displays annual correlations between growth and total credit (using data from the Credit Structure Database and from the Financial Structure Database). I observe that results are not specific to the database considered and that growth and credit to GDP have been negatively correlated since 2001 (i.e., before the 2008 global financial crisis). I also plot correlation coefficients between growth and household credit and between growth and firm credit by year. Figure A1 shows that even if absolute coefficients are higher for household credit, enterprise credit

[9]To be sure that this negative correlation is not driven by misleading data, I run correlation between private credit to GDP extracted from the Financial Structure Database (FSD) and growth. As stated above, correlation between total credit to GDP from our data and private credit to GDP from FSD is around 0.9. I also confirm the negative correlation with a coefficient ranging from -0.22 (annual observations) to -0.26 (3-year period observations).

Table 3: Descriptive statistics

*Panel A: Annual observations*

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| GROWTH | 1,732 | 2.324762 | 3.989473 | -15.2841 | 33.03049 |
| TC | 1,732 | 53.59536 | 41.67179 | 0.49 | 309.82 |
| HC | 1,732 | 22.72153 | 22.41668 | 0 | 141.8 |
| EC | 1,732 | 30.87376 | 22.74632 | 0.32 | 171.02 |
| IGDP | 1,732 | 13119.35 | 15896.93 | 205.4306 | 87772.69 |
| GOV | 1,732 | 16.54879 | 6.890008 | 3.460335 | 104.8991 |
| TRADE | 1,732 | 90.5557 | 49.41419 | 16.7497 | 455.2767 |
| INF | 1,732 | 5.605183 | 11.72403 | -18.1086 | 293.6787 |
| EDUC | 1,340 | 86.30569 | 27.6468 | 6.75819 | 163.101 |

*Panel B: 3-year period observations*

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| GROWTH | 631 | 2.336648 | 3.250973 | -11.828 | 25.11444 |
| TC | 631 | 51.2545 | 41.00806 | 0.56 | 309.82 |
| HC | 631 | 21.29176 | 21.83201 | 0 | 138.8 |
| EC | 631 | 29.96292 | 22.56078 | 0.34 | 171.02 |
| IGDP | 631 | 12632.85 | 15606.9 | 205.4306 | 85490.77 |
| GOV | 631 | 16.52886 | 6.902227 | 3.460335 | 103.5452 |
| TRADE | 631 | 88.45555 | 47.39703 | 16.7497 | 449.9926 |
| INF | 631 | 6.177558 | 16.63824 | -4.47994 | 293.6787 |
| EDUC | 545 | 84.91988 | 28.2035 | 6.89066 | 158.797 |

*Panel C: Cross-country observations*

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| GROWTH | 126 | 2.272255 | 2.269427 | -5.64269 | 8.967809 |
| TC | 126 | 41.43151 | 34.60325 | 1.74 | 170.3 |
| HC | 126 | 15.50492 | 17.17625 | 0.14 | 87.94 |
| EC | 126 | 25.92651 | 20.18003 | 1.41 | 103.5 |
| IGDP | 126 | 10165.45 | 13202.28 | 223.8812 | 64021.39 |
| GOV | 126 | 16.19367 | 7.739287 | 4.483654 | 81.64147 |
| TRADE | 126 | 84.71338 | 41.79441 | 16.7497 | 262.0212 |
| INF | 126 | 5.196951 | 5.173127 | 0.091761 | 35.26612 |
| EDUC | 105 | 77.32187 | 32.06592 | 6.898655 | 145.1931 |

is not positively correlated with growth.

Figure A2 in the Appendix focuses on the distinction between developed and developing countries. I only report coefficients between total credit to GDP and growth. The red line presents coefficients for developed countries and the blue line those for developed countries. With the exception of 2009 and 2013-2014, credit seems less detrimental to growth in developing countries. Since the global financial crisis, growth and credit have not been correlated in developing countries. However, in developed countries, even before 2008, correlation between credit and growth was negative, albeit highly unstable. In the next section, I run an econometric model to provide more robust evidence on the impact of (total, household and enterprise) credit on growth of real GDP per capita.

Table 4: Correlations

*Panel A: Annual observations*

| | GROWTH | TC | HC | EC | IGDP | GOV | TRADE | INF | EDUC |
|---|---|---|---|---|---|---|---|---|---|
| GROWTH | 1 | | | | | | | | |
| TC | -0.2101 | 1 | | | | | | | |
| HC | -0.2015 | 0.9215 | 1 | | | | | | |
| EC | -0.1864 | 0.9239 | 0.7027 | 1 | | | | | |
| IGDP | -0.1691 | 0.6263 | 0.6694 | 0.4877 | 1 | | | | |
| GOV | -0.0666 | 0.1502 | 0.1663 | 0.1112 | 0.2092 | 1 | | | |
| TRADE | 0.0748 | 0.2513 | 0.2397 | 0.2242 | 0.2593 | 0.0419 | 1 | | |
| INF | 0.0718 | -0.2164 | -0.2148 | -0.1848 | -0.1792 | -0.0485 | -0.0498 | 1 | |
| EDUC | -0.0479 | 0.5017 | 0.5464 | 0.3864 | 0.5669 | 0.2372 | 0.1454 | -0.1364 | 1 |

*Panel B: 3-year period observations*

| | GROWTH | TC | HC | EC | IGDP | GOV | TRADE | INF | EDUC |
|---|---|---|---|---|---|---|---|---|---|
| GROWTH | 1 | | | | | | | | |
| TC | -0.2522 | 1 | | | | | | | |
| HC | -0.2429 | 0.9211 | 1 | | | | | | |
| EC | -0.2233 | 0.9263 | 0.7066 | 1 | | | | | |
| IGDP | -0.2052 | 0.6285 | 0.6731 | 0.4911 | 1 | | | | |
| GOV | -0.07 | 0.1496 | 0.1653 | 0.1121 | 0.2081 | 1 | | | |
| TRADE | 0.0817 | 0.2349 | 0.2366 | 0.1981 | 0.25 | 0.0492 | 1 | | |
| INF | 0.052 | -0.1934 | -0.1905 | -0.1671 | -0.1498 | -0.0356 | -0.0298 | 1 | |
| EDUC | -0.0407 | 0.5094 | 0.5487 | 0.3944 | 0.5727 | 0.2528 | 0.1594 | -0.1298 | 1 |

*Panel C: Cross-country observations*

| | GROWTH | TC | HC | EC | IGDP | GOV | TRADE | INF | EDUC |
|---|---|---|---|---|---|---|---|---|---|
| GROWTH | 1 | | | | | | | | |
| TC | -0.2453 | 1 | | | | | | | |
| HC | -0.2656 | 0.9129 | 1 | | | | | | |
| EC | -0.1945 | 0.9377 | 0.7143 | 1 | | | | | |
| IGDP | -0.3812 | 0.5742 | 0.6347 | 0.4444 | 1 | | | | |
| GOV | 0.0831 | 0.0375 | 0.0687 | 0.0058 | 0.1295 | 1 | | | |
| TRADE | 0.0672 | 0.2227 | 0.2615 | 0.1593 | 0.1653 | 0.0815 | 1 | | |
| INF | 0.3325 | -0.3784 | -0.3887 | -0.3179 | -0.3546 | -0.0523 | -0.1138 | 1 | |
| EDUC | -0.0092 | 0.4644 | 0.514 | 0.3579 | 0.617 | 0.3636 | 0.1842 | -0.1833 | 1 |

# 5 Total credit and growth

## 5.1 Baseline model

I first scrutinize the effect of total credit to growth. Results of cross-country regressions are reported in Table 5. I consider both the log and level of total credit over GDP. For both measures, the first column displays OLS results without the education variable (school enrollment). In the subsequent columns, I add the education variable. Despite a reduction of the number of observations (initial level of secondary enrollment is available only for a subset of 105 countries), the model with education is the preferred model (because it allows me to control for human capital). Finally, in spite of the use of the initial value of total credit, one might raise concerns about endogeneity. I therefore employ an IV approach using the same instruments as those employed by Beck et al. (2012): legal origin and religious composition.

Table 5: Total credit and growth, cross-country regressions

| | Log of total credit | | | Level of total credit | | |
|---|---|---|---|---|---|---|
| | OLS | OLS | IV | OLS | OLS | IV |
| | [1] | [2] | [3] | [4] | [5] | [6] |
| TC | 0.0530 | -0.1484 | -0.8896* | 0.0012 | -0.0023 | -0.0061 |
| | (0.19) | (-0.49) | (-1.90) | (0.18) | (-0.36) | (-0.55) |
| IGDP | -0.2387 | -1.0925*** | -0.8465*** | -0.2332 | -1.1156*** | -1.0779*** |
| | (-1.43) | (-4.81) | (-3.09) | (-1.44) | (-4.60) | (-4.18) |
| GOV | 0.3946 | 0.3904 | 0.3639 | 0.5087 | 0.3820 | 0.3830 |
| | (0.67) | (0.54) | (0.49) | (0.67) | (0.52) | (0.51) |
| TRADE | 0.5059 | -0.0296 | 0.0457 | 0.5087 | -0.0406 | -0.0395 |
| | (1.21) | (-0.08) | (0.12) | (1.24) | (-0.11) | (-0.11) |
| INF | 1.0196*** | 0.4231 | 0.2813 | 1.0221*** | 0.4301 | 0.3941 |
| | (3.65) | (1.45) | (0.84) | (3.64) | (1.48) | (1.24) |
| EDUC | | 2.3449*** | 2.4195*** | | 2.3353*** | 2.3445*** |
| | | (3.83) | (3.86) | | (3.88) | (3.99) |
| Constant | -0.5486 | 0.4704 | 0.5376 | -0.4949 | 0.3623 | 0.2057 |
| | (-0.18) | (0.16) | (0.18) | (-0.16) | (0.12) | (0.07) |
| $R^2$ | 0.21 | 0.40 | 0.35 | 0.21 | 0.40 | 0.40 |
| Obs | 126 | 105 | 102 | 126 | 105 | 102 |
| F-value | | | 6.61 | | | 6.818 |
| OID | | | 9.62 | | | 15.997 |
| (p-value) | | | (0.128) | | | (0.014) |

Dependent variables are the average real per capita GDP growth. For independent variables, initial values are used. All control variables are in log. The logarithm of total credit to GDP is used in columns [1] to [3] and the level of total credit to GDP in columns [4] to [6]. Instruments are the legal origin and religious composition in columns [3] and [6]. F-value is the F-statistic of the first stage equation for excluded instruments. OID is the Hansen over-identification test. P-values are calculated form robust standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

The main finding is the lack of statistical significance of the coefficient associated with total credit. The coefficient associated to total credit is statistically significant in only one of the six regressions. In the case where the total credit coefficient is statistically significant (column [3]), its sign is negative while one could expect a positive impact of credit to growth. These preliminary results tend to confirm the vanishing effect highlighted in works using panel estimations on recent data (Rousseau and Wachtel, 2011) or a meta-analysis (Valickova et al., 2015). Regarding control variables, the initial value of GDP per capita is negative and statistically significant, in line with the convergence hypothesis. In addition, education is positively correlated with growth.

Cross-sectional regressions help us to improve descriptive statistics but suffer from major limitations, in particular the difficulty to control for unobserved country-heterogeneity. I therefore turn to panel data that allows us to correct for this through the inclusion of country fixed effects. Table 6 presents the baseline results for panel regressions. Three-year periods are considered and country and period fixed effects are included. The table is

divided into two parts according to the measure of total credit considered (logs or levels). For each part, the first column reports the simple FE estimations without taking into account the dynamic nature of the panel. In the second column, I report the Blundell and Bond (1998)'s specification using only internal instruments (lagged values of independent variables). In the third column, I extend the previous Blundell-Bond specification by adding external instruments, namely legal origin and religious composition. The usual diagnostic tests associated to the GMM-system estimator are reported at the bottom of the table (Arellano tests for autocorrelation and Hansen over-identification test). In addition, Roodman (2009) underlines that too many instruments might bias the validity of the Hansen test. I therefore report the number of instruments used in each estimation. A simple rule of thumb is that the number of instruments should be lower than the number of cross-sectional observations (i.e., here the number of countries).

Table 6: Total credit and growth, panel regressions

| | Log of total credit | | | Level of total credit | | |
|---|---|---|---|---|---|---|
| | FE | GMM-S. | GMM-S. | FE | GMM-S. | GMM-S. |
| | [1] | [2] | [3] | [4] | [5] | [6] |
| TC | -0.4494 | -1.1765 | -0.7770 | -0.0372*** | -0.0273 | -0.0097 |
| | (-0.80) | (-0.93) | (-0.80) | (3.62) | (-0.77) | (-0.93) |
| IGDP | -8.9027*** | -2.7674*** | -1.6985* | -8.7397*** | -2.8284** | -1.7483** |
| | (-4.39) | (-3.00) | (-1.78) | (-5.17) | (-2.11) | (-2.39) |
| GOV | -2.6135* | -0.8426 | -4.1638** | -2.0565 | 1.2418 | -4.1353** |
| | (-1.80) | (-0.28) | (-1.98) | (-1.50) | (0.40) | (-2.23) |
| TRADE | 2.5596** | 5.5879** | -0.3405 | 2.2545* | 5.9633** | -0.0055 |
| | (2.15) | (2.17) | (-0.13) | (1.90) | (2.10) | (-0.00) |
| INF | -0.2086 | -0.2314 | -0.3590* | -0.1595 | -0.2041 | -0.3173* |
| | (-1.47) | (-1.03) | (-1.68) | (-1.16) | (-0.93) | (-1.68) |
| EDUC | 1.0180 | 7.2625*** | 7.4941*** | 0.3766 | 6.4083** | 7.0384*** |
| | (1.21) | (3.58) | (2.60) | (0.43) | (2.50) | (2.61) |
| Constant | 71.5710*** | -21.3976* | 1.3434 | 72.5790*** | -28.2187* | -0.0030 |
| | (4.42) | (-1.74) | (0.20) | (5.25) | (-1.93) | (-0.00) |
| $R^2$ | 0.36 | | | 0.40 | | |
| Obs | 512 | 512 | 497 | 512 | 512 | 497 |
| Country | 126 | 126 | 122 | 126 | 126 | 122 |
| # Instruments | | 44 | 51 | | 44 | 51 |
| AR(1) | | -2.75*** | -3.05*** | | -2.49** | -3.03*** |
| AR(2) | | -1.36 | -0.07 | | -1.03 | -0.17 |
| Hansen OID (p-value) | | 0.617 | 0.318 | | 0.350 | 0.331 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells. Models are estimated using fixed-effects (within) estimator (columns [1] and [4]), Blundell-Bond's GMM-system estimator with internal instruments only (columns [2] and [5]) and Blundell-Bond's GMM-system estimator with internal instruments and external instruments (legal origin and religion) in columns [3] and [6]. The logarithm of (initial) total credit to GDP is used in columns [1-3] and the level of (initial) total credit to GDP in columns [4-6]. All control variables are in log and initial values for each period are used. Period dummies are added but not reported in the table. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust standard errors (clustered robust errors for FE specification and robust errors using Windmeijer approach for correction in GMM-System regressions). *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Results from simple fixed-effect models provide a mixed picture (columns [1] and [4]). The model with the level of total credit to GDP shows that finance is detrimental for growth (column [4]); however, this result is not robust when considering the logarithm of total credit (column [1]). In other columns, I use a well-fitted dynamic model due to the inclusion of the initial GDP per capita. The common tests are in line with expectations (AR(1); AR(2); and the Hansen over-identification test). Coefficients associated with total credit are negative but insignificant at the usual thresholds in the different specifications (including or excluding external instruments). Turning to control variables, findings are close to those provided by cross-sectional regressions. The coefficients associated with the initial level of GDP per capita are negative and statistically significant, even if their effect is largely reduced when we consider the dynamic nature of the panel. This result indicates the presence of a convergence process. In addition, the initial level of education is a strong determinant of future growth. Two less robust results emerge: inflation seems detrimental to growth, while trade openness tends to stimulate growth.

Our results confirm findings from recent studies (Rousseau and Wachtel, 2011; Arcand et al., 2015; Valickova et al., 2015) indicating that private credit over GDP is no longer a determinant of economic growth. This result is known as the "vanishing effect" of finance to growth and has profound implications for policymakers. Several hypotheses have been advanced to explain this phenomenon. In Section 6, I focus my attention on credit structure. Before doing so, I investigate whether our main result is robust, especially when we consider alternative stories.

## 5.2 Robustness checks

I run a battery of sensitivity tests to be sure that our baseline findings are robust, adding control variables and testing alternative specifications. Firstly, I add the institutional level because the level of credit is higher in countries with better institutions (Chinn and Ito, 2006) and good institutions matter for growth (Acemoglu et al., 2005). The institutional

level is captured through the quality of government indicator provided by the ICRG.[10] Secondly, a large financial system can induce more risks that blur its positive effect on growth in normal times (Loayza and Ranciere, 2006). The absence of effect of finance on growth can be explained by its indirect effect on instability. Following Arcand et al. (2015), I consider two proxies of instability. I first add the number of banking crises as a control variable (data on banking crises is extracted from Laeven and Valencia (2013)'s database). I also consider an alternative measure of instability, namely the volatility of output. Finally, I add the development of the stock market. Stock market development can spur growth (Beck and Levine, 2004) and may reduce the positive effect of banking development due to a substitution effect. Results are reported in the Appendix (Table A3).[11] In a nutshell, the baseline finding is not altered: total credit does not spur growth even after controlling for institutions, instability or stock markets. In 6 out of 8 regressions coefficients associated with overall credit over GDP are not statistically different from zero. Coefficients associated with total credit are negative and statically significant when institutional development is included, indicating that finance limits growth instead of stimulating it as expected when I control for the institutional level.

I also consider alternative robustness checks focusing on econometric specification. First, to test the influence of outliers, I trim the top and bottom 5% of annual growth and the top and bottom 5% of total credit over GDP. Secondly, I employ data from the Financial Structure Database (Beck et al., 2010) in line with the existing literature. Finally, I change econometric specification in different ways. I use average values instead of initial values for control and credit variables as initial values are more likely to avoid simultaneous bias. However, some papers employ average values (e.g. Beck and Levine, 2004; Beck et al., 2012) and results can be sensitive to this choice. I also change the time period considered for panel data estimations to 3-year periods in the baseline. As

[10] The value is the mean of three sub-indicators (corruption, law and order and business quality) scaled from zero to one. Higher values indicate higher quality of government.

[11] To save space, I only report dynamic panel data using the log of total credit as interest variable. I run all robustness checks using the level of total credit instead of the log of total credit and cross-sectional regressions. Results are similar and available upon request.

a robustness check, I consider annual observations as in Sassi and Gasmi (2014) and the usual five-year periods. Both specifications suffer from limitations. Annual observations do not allow me to control for business cycle fluctuations and I have a limited number of five-year periods (a maximum of four per country). I display results for panel data in Table A4 in the Appendix. Coefficients associated with total credit remain negative, albeit not significant.

A final concern involves the non-linearity in the relationship between private credit and growth. Several papers (Law and Singh, 2014; Arcand et al., 2015) demonstrate that the finance-growth relationship takes the form of an inverted U-shape. The lack of significance of total credit can be driven by the linear specification employed here. One should note that this aspect is partially treated when we consider the log of total credit. However, I run a model using a quadratic form for total credit. Results for panel data are displayed in the Appendix (Table A5). Neither the coefficient associated with the level, nor that associated with the square are significantly different from zero. This finding is in line with Hasan et al. (2016) that fail to find a nonlinear effect of financial development on growth. I also test whether the relationship between private credit and growth differs between developing and developed countries. I use two different specifications. I add an interaction between a dummy for high-income countries and overall credit to GDP. I also consider two sub-samples: developed countries (defined as high-income countries) and developing countries (grouping together low- and middle-income countries). Econometric results reported in the same table fail to show a difference between high-income countries and developing countries.

# 6 Household vs. enterprise credit

## 6.1 Baseline model

Findings provided in the previous section confirm the vanishing effect of finance to growth observed in recent studies. Several explanations have been proposed (as discussed in

Section 1). Robustness checks in the previous section have highlighted that some explanations such as the substitution effect between banks and equity markets or an increase of financial fragility are not sufficient to explain the lack of effect of credit to growth. In this work, I focus on the structure of credit (distinction between household credit and enterprise credit). Exploration of our data documents that credit expansion in the past decade has been driven by an increase of household credit (see Section 2), a stylized fact also shown by Bezemer et al. (2016). Recent studies, especially Beck et al. (2012) and Sassi and Gasmi (2014), have pointed out that household credit is less subject to spur growth than firm credit. However, these findings are subject to caution due to the limited size of the samples considered. Using a new database covering a large range of countries, I revisit this issue. To do so, I remove total credit in the baseline model and include both household credit and enterprise credit (see Eq. 2).[12]

Table 7 displays the results from the cross-country regressions. I use the same specification presented in the previous section (distinction between credit in levels and logs; OLS without education, OLS with education, IV). With one exception, neither household credit nor enterprise credit is statistically significant at the usual thresholds. The exception is the IV model that considers variables in logarithm. In column [3], household credit is negative and statistically significant. However, the coefficient associated with enterprise credit is not statistically significant.

I now turn to the data panel to provide a few robustness checks. Results of the baseline model are displayed in Table 8. The simple FE estimations give opposing predictions about the effect of household credit. While the coefficient associated with the log of household credit is positive (column [1]), the coefficient associated with the level of household credit is negative (column [4]). I also report results using Blundell and Bond (1998)'s system GMM estimators without (columns [2] and [5]) and with external instruments (columns [3] and [6]). I focus my discussion on the (more robust) specification considering both internal and external instruments. Results show that household credit

[12]In all regressions (baseline and robustness checks), I include household credit and enterprise credit. I run all models including household credit and enterprise credit separately. Results are largely similar.

Table 7: Household and enterprise credit and growth, cross-country regressions

| | Log of household and enterprise credit | | | Level of household and enterprise credit | | |
|---|---|---|---|---|---|---|
| | OLS | OLS | IV | OLS | OLS | IV |
| HC | 0.2813 | 0.1130 | -1.0247** | -0.0126 | -0.0012 | -0.0585 |
| | (1.28) | (0.53) | (-2.02) | (-0.76) | (-0.08) | (-1.38) |
| EC | -0.1885 | -0.2325 | 0.5880 | 0.0102 | -0.0030 | 0.0258 |
| | (-0.56) | (-0.71) | (0.67) | (0.98) | (-0.33) | (0.83) |
| IGDP | -0.3681* | -1.1520*** | -0.6768** | -0.1958 | -1.1207*** | -0.8152** |
| | (-1.81) | (-4.82) | (2.12) | (-1.07) | (-4.18) | (-2.37) |
| GOV | 0.2946 | 0.3566 | 0.6759 | 0.4019 | 0.3839 | 0.2401 |
| | (0.49) | (0.49) | (0.88) | (0.67) | (0.52) | (0.32) |
| TRADE | 0.4064 | -0.0784 | 0.1761 | 0.5642 | -0.0464 | 0.2311 |
| | (0.95) | (-0.20) | (0.42) | (1.40) | (-0.13) | (0.46) |
| INF | 1.0331*** | 0.4435 | 0.3532 | 1.0165*** | 0.4292 | 0.4192 |
| | (3.68) | (1.52) | (1.08) | (3.76) | (1.46) | (1.31) |
| EDUC | | 2.2854*** | 2.8088*** | | 2.3391*** | 2.1548*** |
| | | (3.64) | (3.83) | | (3.84) | (3.54) |
| Constant | 1.4097 | 1.4654 | -6.8005 | -1.0612 | 0.4103 | -1.9746 |
| | (0.38) | (0.38) | (-1.20) | (-0.35) | (0.13) | (-0.50) |
| $R^2$ | 0.22 | 0.40 | 0.24 | 0.22 | 0.40 | 0.32 |
| Obs | 126 | 105 | 102 | 126 | 105 | 102 |
| F-value | | | 3.965 | | | 2.927 |
| OID | | | 8.75 | | | 11.453 |
| (p-value) | | | (0.119) | | | -0.0413 |

Dependent variables are the average real per capita GDP growth. For independent variables, initial values are used. All control variables are in log. The logarithm of household and business credit to GDP is used in columns [1] to [3] and the level of household and business credit to GDP in columns [4] to [6]. Instruments are the legal origin and religious composition in columns [3] and [6]. F-value is the F-statistic of the first stage equation for excluded instruments. OID is the Hansen over-identification test. P-values are calculated form robust standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

is detrimental for growth, while enterprise credit tends to have no impact on growth. Coefficients associated with household credit are negative and statistically significant at the 5% level. The economic impact is far from anecdotal: a one standard deviation increase of household credit decreases growth by more than 1.5 points. The effect of enterprise credit is less clear-cut: coefficients associated with firm credit are positive but not statistically different from zero at the usual thresholds.

The baseline results provide two main findings. First, household credit is detrimental for growth. This finding is in line with those from Sassi and Gasmi (2014) and Bezemer et al. (2016) on different samples (European and OECD countries, respectively) but does not support results from Beck et al. (2012) that document a positive, albeit moderate, impact of household credit. Second, while I could expect a positive effect of business credit, the data analysis does not give support for this view. Coefficients associated with firm credit are never statistically significant, in line with Bezemer et al. (2016)'s results.

Table 8: Household and enterprise credit and growth, panel regressions

| | Log of household and enterprise credit | | | Level of household and enterprise credit | | |
|---|---|---|---|---|---|---|
| | FE | GMM-S. | GMM-S. | FE | GMM-S. | GMM-S. |
| | [1] | [2] | [1] | [4] | [5] | [6] |
| LHC | 0.7982* | -0.0899 | -1.3426** | -0.0690*** | 0.0268 | -0.0751** |
| | (1.91) | (-0.07) | (2.12) | (-2.93) | (0.56) | (-2.47) |
| LEC | -1.0681** | -0.8152 | 0.9426 | -0.0185 | -0.0603 | 0.0372 |
| | (-1.98) | (-0.66) | (0.90) | (-1.35) | (-1.57) | (1.56) |
| IGDP | -9.9391*** | -2.5075*** | -1.3977 | -8.7606*** | -3.4562*** | -1.3758* |
| | (-4.55) | (-2.98) | (-1.50) | (5.26) | (-2.92) | (-1.91) |
| GOV | -2.6668* | -2.9615 | -3.6100* | -2.0598 | 1.6063 | -2.1557 |
| | (-1.76) | (-1.05) | (-1.74) | (-1.54) | (0.57) | (-1.26) |
| TRADE | 2.4463** | 5.5239** | -0.0556 | 2.1568* | 5.5237** | -0.2913 |
| | (2.32) | (2.12) | (-0.03) | (1.84) | (2.14) | (-0.15) |
| INF | -0.1695 | -0.3390* | -0.3941 | -0.1543 | -0.3236 | -0.2602 |
| | (-1.30) | (-1.68) | (-1.41) | (-1.13) | (-1.59) | (-1.30) |
| EDUC | 0.6339 | 6.6388*** | 7.9210*** | -0.0961 | 7.1604*** | 6.7521*** |
| | (0.76) | (2.85) | (3.43) | (-0.10) | (3.42) | (3.16) |
| Constant | 82.7691*** | -16.7438 | -8.3748 | 75.0658*** | -25.3281** | -6.4102 |
| | (4.47) | (-1.01) | (-1.15) | (5.60) | (-2.22) | (-0.91) |
| $R^2$ | 0.37 | | | 0.40 | | |
| Obs | 512 | 512 | 497 | 512 | 512 | 497 |
| Country | 126 | 126 | 122 | 126 | 126 | 122 |
| # Instruments | | 51 | 58 | | 51 | 58 |
| AR(1) | | -2.91*** | -3.14*** | | -2.56** | -2.98*** |
| AR(2) | | -1.53 | -0.77 | | -1.00 | -0.89 |
| Hansen OID (p-value) | | 0.481 | 0.498 | | 0.327 | 0.610 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells. Models are estimated using fixed-effects (within) estimator (columns [1] and [4]), Blundell-Bond's GMM-system estimator with internal instruments only (columns [2] and [5]) and Blundell-Bond's GMM-system estimator with internal instruments and external instruments (legal origin and religion) in columns [3] and [6]. The logarithm of (initial) household and enterprise credit to GDP is used in columns [1-3] and the level of (initial) household and enterprise credit to GDP in columns [4-6]. All control variables are in log and initial values for each period are used. Period dummies are added but not reported in the table. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust standard errors (clustered robust errors for FE specification and robust errors using Windmeijer approach for correction in GMM-System regressions). *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

## 6.2 Robustness checks

I use the same battery of robustness checks as those employed in the previous section. Results with additional control variables are reported in the Appendix (Tables A6). Coefficients associated with household credit are always negative. However, coefficients are not statistically significant when institutional development and stock market development are included as controls. One explanation is the reduction of the number of countries considered in both specifications. The effect of enterprise credit is more ambiguous insofar as its coefficient is almost never different from zero.[13]

Secondly, I change econometric specifications by excluding outliers, employing Financial Structure Database, using average values and considering two alternative period

[13]One exception is the model that considers the level of credit and includes volatility measure as a control.

definitions for panel data estimations (details are provided in Section 5.2.). When I use the Financial Structure Database instead of the Credit Structure Database, household credit is defined as a residual between total credit over GDP and enterprise credit (as in Beck et al. (2012)). Overall credit is reported in the Financial Structure Database and enterprise credit over GDP collected in the Credit Structure Database. Results from panel data are displayed in the Appendix (Table A7). In all specifications, coefficients associated with household credit enter negatively and are significantly different from zero in almost all specifications (9 out of 12). Household credit is not statistically different from zero when we compute household credit as a residual and when we consider average value and log of credit. Turning to enterprise credit, coefficients are positive in almost all specifications but firm credit is almost never statistically significant at the usual threshold.

An interesting question to study is whether developing countries (low- and middle income countries) differ from developed economies in terms of relationship between credit structure and economic growth. To do so, I first consider an interaction between household credit (resp. firm credit) and a dummy with the value of one for high-income countries. I then estimate the baseline model on the two sub-samples of countries. Results (for panel data) are displayed in the Appendix (Table A8). The main message is the fact that results do not seem driven by one group of countries. However, these results should be treated with caution because some of the interest variables are not significant.

To sum up, robustness checks confirm our baseline results. Household credit is detrimental for economic growth, while we cannot give support for the positive effect of enterprise credit.

# 7 Conclusion

While many works have documented the positive effect of financial depth for growth, recent contributions in the finance-growth nexus has shed light on the vanishing effect of credit to growth in recent years. Indeed, since the 1990s most financially developed

countries have not experienced higher growth spells. Several explanations, from financial instability to substitution between banks and markets, have been proposed to explain this shift. This paper focuses on a recent view that has emerged in the literature stating that credit structure matters. For the past two decades, the structure of credit has dramatically changed with an increase in the share of household credit to the detriment of firm credit. Only a handful of papers (Beck et al., 2012; Sassi and Gasmi, 2014; Bezemer et al., 2016) have investigated the implications of credit structure on growth, and with ambiguous results. In addition, these works cover only a handful of countries and differ in the samples considered (and methodology employed).

This paper attempts to distinguish the effects of household and enterprise credit on economic growth using a large range of countries. To do so, I manually created a new database covering 143 countries over the period 1995-2014 (126 countries are included in the regressions). To compare findings with other papers, I replicate the methodology employed in previous papers using both cross-country and panel data. In a first step, I assess the effect of total credit on growth. In a second step, I focus on credit structure by dividing total credit between firm and household credit.

Results support three significant conclusions. First, I confirm the vanishing effect established by previous studies (Rousseau and Wachtel, 2011; Arcand et al., 2015; Valickova et al., 2015). Overall credit has not been related to growth in the past two decades and this finding is very robust. Second, household credit tends to be negatively related with growth. This finding is in line with previous studies documenting that household credit has a weak link to growth (Beck et al., 2012) or a negative effect on growth (Sassi and Gasmi, 2014; Bezemer et al., 2016). Third, I fail to provide support for a positive effect of business credit, in line with Bezemer et al. (2016) but contradicting Beck et al. (2012) and Sassi and Gasmi (2014).

From a policy perspective, this work raises doubts about policies that stimulate household credit to sustain growth. Household credit is not only not effective to spur growth but it is even detrimental for it.

From a research perspective, this work can be seen as a first step. Channels through which household credit affect growth remain largely unknown. These channels include impact of household loans on instability (Büyükkarabacak and Valev, 2010). However, this channel is not sufficient to explain why household credit is detrimental for growth. Even after controlling for banking crisis, the effect of household credit remains negative. Other explanations, such as the impact of household credit on saving behaviors (Jappelli and Pagano, 1994), should be considered. Data presented here offer us an opportunity to investigate these potential explanations. In addition, future works should investigate the vanishing effect, insofar as decomposition between firm and household credit cannot explain this paradox. Put differently, the black box of the vanishing effect still remains closed and deserves additional research.

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# Appendix A Sample and variables

Table A1: List of countries

| Country | Income† | Region | Period | Sample | |
|---|---|---|---|---|---|
| | | | | Regression | Evolution |
| Albania | MIC (upper) | Europe | 2007-2014 | X | |
| Antigua and Barbuda | HIC | Latin America and Caribbean | 2000-2014 | X | X |
| Argentina | HIC | Latin America and Caribbean | 2003-2014 | X | |
| Armenia | MIC (lower) | Europe | 1998-2014 | X | X |
| Aruba | HIC | Latin America and Caribbean | 1998-2011 | X | |
| Australia | HIC | East Asia and Pacific | 2000-2014 | X | X |
| Austria | HIC | Europe | 1999-2014 | X | X |
| Azerbaijan | MIC (upper) | Central Asia | 2005-2014 | X | |
| Bahamas | HIC | Latin America and Caribbean | 1998-2014 | X | X |
| Bahrain | HIC | MENA | 2007-2012 | X | |
| Barbados | HIC | Latin America and Caribbean | 1995-2014 | X | X |
| Belarus | MIC (upper) | Europe | 1999-2014 | X | X |
| Belgium | HIC | Europe | 1999-2014 | X | X |
| Belize | MIC (upper) | Latin America and Caribbean | 1995-2014 | X | X |
| Benin | LIC | Sub-Saharan Africa | 1998-2014 | X | X |

continued on next page

| Country | Income† | Region | Period | Sample | |
|---|---|---|---|---|---|
| | | | | Regression | Evolution |
| Bhutan | MIC (lower) | South Asia | 2001-2014 | X | X |
| Bosnia Herzegovina | MIC (upper) | Europe | 2000-2014 | | X |
| Botswana | MIC (upper) | Sub-Saharan Africa | 1995-2014 | X | X |
| Brazil | MIC (upper) | Latin America and Caribbean | 2007-2014 | X | |
| Brunei Darussalam | HIC | East Asia and Pacific | 2011-2014 | X | |
| Bulgaria | MIC (upper) | Europe | 2004-2014 | X | |
| Burkina Faso | LIC | Sub-Saharan Africa | 1998-2014 | X | X |
| Cambodia | LIC | East Asia and Pacific | 2004-2014 | X | |
| Cameroon | MIC (lower) | Sub-Saharan Africa | 2008-2010 | X | |
| Canada | HIC | North America | 2007-2014 | X | |
| Central African Rep. | LIC | Sub-Saharan Africa | 2008-2010 | X | |
| Chad | LIC | Sub-Saharan Africa | 2008-2010 | X | |
| Chile | HIC | Latin America and Caribbean | 1995-2014 | X | X |
| Colombia | MIC (upper) | Latin America and Caribbean | 2002-2014 | X | X |
| Comores | LIC | Sub-Saharan Africa | 2008-2014 | X | |
| Congo, Rep. | MIC (lower) | Sub-Saharan Africa | 2008-2010 | | |
| Cote d'Ivoire | MIC (lower) | Sub-Saharan Africa | 1998-2014 | X | X |
| Croatia | HIC | Europe | 1995-2014 | | X |
| Cyprus | HIC | Europe | 2005-2014 | X | |
| Czech Rep | HIC | Europe | 2000-2014 | X | X |
| Denmark | HIC | Europe | 2000-2014 | X | X |
| Djibouti | MIC (lower) | MENA | 2006-2014 | X | |
| Dominica | MIC (upper) | Latin America and Caribbean | 2000-2014 | X | X |
| Dominican Republic | MIC (upper) | Latin America and Caribbean | 2006-2014 | X | |
| Egypt | MIC (lower) | MENA | 2002-2014 | X | X |
| El Salvador | MIC (lower) | Latin America and Caribbean | 2002-2014 | X | X |
| Equatorial Guinea | HIC | Sub-Saharan Africa | 2008-2010 | | |
| Estonia | HIC | Europe | 1997-2014 | X | X |
| Ethiopia | LIC | Sub-Saharan Africa | 1998-2014 | | X |
| Fiji | MIC (upper) | East Asia and Pacific | 1995-2014 | X | X |
| Finland | HIC | Europe | 1997-2014 | X | X |
| France | HIC | Europe | 1995-2014 | X | X |
| Gabon | MIC (upper) | Sub-Saharan Africa | 2008-2010 | | |
| Gambia | LIC | Sub-Saharan Africa | 1998-2013 | X | X |
| Georgia | MIC (lower) | Europe | 2002-2014 | X | X |
| Germany | HIC | Europe | 1995-2014 | X | X |
| Greece | HIC | Europe | 1998-2014 | X | X |
| Grenada | MIC (upper) | Latin America and Caribbean | 2000-2014 | X | X |
| Guatemala | MIC (lower) | Latin America and Caribbean | 2009-2014 | X | |
| Guinea | LIC | Sub-Saharan Africa | 2006-2008 | X | |
| Guinee-Bissau | LIC | Sub-Saharan Africa | 1999-2014 | X | X |
| Guyana | MIC (lower) | Latin America and Caribbean | 2005-2014 | X | |
| Haiti | LIC | Latin America and Caribbean | 2010-2013 | | |
| Honduras | MIC (lower) | Latin America and Caribbean | 2001-2014 | X | X |
| Hong-Kong | HIC | East Asia and Pacific | 1997-2014 | X | X |
| Hungary | HIC | Europe | 2000-2014 | X | X |
| Iceland | HIC | Europe | 1995-2014 | X | X |
| India | MIC (lower) | South Asia | 2005-2014 | X | |
| Indonesia | MIC (lower) | East Asia and Pacific | 2006-2014 | X | |
| Ireland | HIC | Europe | 2003-2014 | X | |

continued on next page

| Country | Income† | Region | Period | Sample | |
|---|---|---|---|---|---|
| | | | | Regression | Evolution |
| Israel | HIC | MENA | 1997-2014 | X | X |
| Italy | HIC | Europe | 2005-2014 | X | |
| Jamaica | MIC (upper) | Latin America and Caribbean | 1995-2014 | X | X |
| Japan | HIC | East Asia and Pacific | 1995-2014 | X | X |
| Kazakhstan | MIC (upper) | Central Asia | 1996-2014 | X | X |
| Kenya | MIC (lower) | Sub-Saharan Africa | 1997-2014 | X | X |
| Korea | HIC | East Asia and Pacific | 2008-2014 | X | |
| Kosovo | MIC (lower) | Europe | 2001-2014 | | X |
| Kuwait | HIC | MENA | 2008-2014 | X | |
| Kyrgyc Republic | MIC (lower) | Central Asia | 1996-2014 | X | X |
| Latvia | HIC | Europe | 2003-2014 | X | |
| Lebanon | MIC (upper) | MENA | 2010-2014 | X | |
| Lithuania | HIC | Europe | 2004-2014 | X | |
| Luxembourg | HIC | Europe | 1999-2014 | X | X |
| Macao | HIC | East Asia and Pacific | 1995-2014 | X | X |
| Macedonia | MIC (upper) | Europe | 1995-2014 | X | X |
| Madagascar | LIC | Sub-Saharan Africa | 1996-2013 | X | X |
| Malawi | LIC | Sub-Saharan Africa | 2002-2014 | X | X |
| Malaysia | MIC (upper) | East Asia and Pacific | 2006-2014 | X | |
| Maldives | MIC (upper) | South Asia | 1998-2008 | | |
| Mali | LIC | Sub-Saharan Africa | 1998-2014 | X | X |
| Malta | HIC | Europe | 2003-2013 | X | |
| Mauritius | MIC (upper) | Sub-Saharan Africa | 2006-2014 | X | |
| Mexico | MIC (upper) | Latin America and Caribbean | 1995-2014 | X | X |
| Mongolia | MIC (upper) | East Asia and Pacific | 2007-2014 | X | |
| Montenegro | MIC (upper) | Europe | 2006-2014 | X | |
| Morocco | MIC (lower) | MENA | 2006-2014 | X | |
| Mozambique | LIC | Sub-Saharan Africa | 2007-2014 | X | |
| Namibia | MIC (upper) | Sub-Saharan Africa | 2005-2014 | X | |
| Nepal | LIC | South Asia | 2003-2014 | X | |
| Netherlands, The | HIC | Europe | 1998-2014 | X | X |
| New Zeland | HIC | East Asia and Pacific | 2004-2014 | X | |
| Nicaragua | MIC (lower) | Latin America and Caribbean | 1995-2014 | X | X |
| Niger | LIC | Sub-Saharan Africa | 1998-2014 | X | X |
| Oman | HIC | MENA | 2000-2014 | X | X |
| Pakistan | MIC (lower) | South Asia | 1999-2014 | X | X |
| Panama | MIC (upper) | Latin America and Caribbean | 2002-2014 | X | X |
| Papua New Guinea | MIC (lower) | East Asia and Pacific | 2012-2014 | | |
| Peru | MIC (upper) | Latin America and Caribbean | 2002-2014 | X | X |
| Philippines | MIC (lower) | East Asia and Pacific | 2008-2014 | X | |
| Poland | HIC | Europe | 1996-2014 | X | X |
| Portugal | HIC | Europe | 1996-2014 | X | X |
| Puerto Rico | HIC | Latin America and Caribbean | 2004-2014 | | |
| Romania | MIC (upper) | Europe | 2001-2014 | X | X |
| Russia | HIC | Europe | 2001-2014 | X | X |
| Saudi Arabia | HIC | MENA | 2008-2014 | X | |
| Senegal | LIC | Sub-Saharan Africa | 1998-2014 | X | X |
| Serbia | MIC (upper) | Europe | 1999-2014 | X | X |
| Singapore | HIC | East Asia and Pacific | 2004-2014 | | |
| Slovak, Rep. | HIC | Europe | 2003-2014 | X | |

continued on next page

| Country | Income† | Region | Period | Sample | |
|---|---|---|---|---|---|
| | | | | Regression | Evolution |
| Slovenia | HIC | Europe | 1995-2014 | X | X |
| Solomon Islands | MIC (lower) | East Asia and Pacific | 1995-2014 | | X |
| South Africa | MIC (upper) | Sub-Saharan Africa | 2008-2013 | X | |
| Spain | HIC | Europe | 1999-2014 | X | X |
| Sri Lanka | MIC (lower) | South Asia | 2010-2014 | X | |
| St. Kitts and Nevis | HIC | Latin America and Caribbean | 2000-2014 | X | X |
| St. Lucia | MIC (upper) | Latin America and Caribbean | 2000-2014 | X | X |
| St. Vincent and Grenadines | MIC (upper) | Latin America and Caribbean | 2000-2014 | X | X |
| Swaziland | MIC (lower) | Sub-Saharan Africa | 2005-2014 | X | |
| Sweden | HIC | Europe | 1996-2014 | X | X |
| Switzerland | HIC | Europe | 1995-2014 | X | X |
| Tajikistan | MIC (lower) | Central Asia | 2005-2014 | X | |
| Thailand | MIC (upper) | East Asia and Pacific | 1995-2014 | X | X |
| Timor Leste | MIC (lower) | East Asia and Pacific | 2006-2014 | X | |
| Togo | LIC | Sub-Saharan Africa | 1998-2014 | X | X |
| Tonga | MIC (upper) | East Asia and Pacific | 2010-2014 | X | |
| Trinidad and Tobago | HIC | Latin America and Caribbean | 1996-2014 | X | X |
| Tunisia | MIC (upper) | MENA | 2002-2014 | X | X |
| Turkey | MIC (upper) | Europe | 1995-2014 | X | X |
| Uganda | LIC | Sub-Saharan Africa | 2010-2014 | X | |
| Ukraine | MIC (lower) | Europe | 2002-2014 | X | X |
| United Arab Emirates | HIC | MENA | 2000-2014 | | X |
| United Kingdom | HIC | Europe | 1997-2014 | X | X |
| United States of America | HIC | North America | 1995-2014 | X | X |
| Uruguay | HIC | Latin America and Caribbean | 2005-2014 | X | |
| Vanuatu | MIC (lower) | East Asia and Pacific | 2002-2014 | X | X |
| Zambia | MIC (lower) | Sub-Saharan Africa | 1998-2014 | | X |
| Zimbabwe | LIC | Sub-Saharan Africa | 2009-2014 | | |

† HIC: High-income countries; LIC: Low-income countries; MIC: Middle-income countries

## Table A2: Definition of variables

| Variable | Definition | Source |
|---|---|---|
| Growth | Annual growth of GDP per capita | WDI |
| TC | Total credit to GDP (sum of household and enterprise credit) | Credit Structure Database |
| HC | Household credit to GDP | Credit Structure Database |
| EC | Enterprise credit to GDP | Credit Structure Database |
| IGDP | Initial GDP per capita (constant 200 US$) | WDI |
| GOV | Government final expenditure over GDP | WDI |
| TRADE | Total amount of exports plus imports over GDP | WDI |
| EDUC | Share of the respective age cohort enrolled in secondary schools | WDI |
| INF | Annual growth of consumer price index | WDI |
| VOLATILITY | SD of annual growth | WDI (author's computation) |
| INSTITUTION | ICRG index of quality of Government | ICRG |
| CRISIS | Banking crisis dummy | Laeven and Valencia (2013) |
| STOCK MARKET | Total capitalization over GDP | Global Financial Development |
| PC | Private credit over GDP | Beck et al. (2010) |
| Legal origin | Dummies origin for each country's legal system | La Porta et al. (1999) |
| Religion | Share of catholic, protestant and muslim population in total population | La Porta et al. (1999) |

# Appendix B Additional tables (robustness checks)

Table A3: Total credit and growth, robustness checks (additional control variables)

| | Log | Level | Log | Level | Log | Level | Log | Level |
|---|---|---|---|---|---|---|---|---|
| TC | -2.1594*** | -0.0305** | -0.5908 | -0.0077 | -0.2644 | -0.0093 | -1.0097 | -0.0131 |
| | (-3.08) | (-2.01) | (-0.68) | (-0.78) | (-0.27) | (-0.74) | (-1.02) | (-1.39) |
| IGDP | -1.9144** | -2.1696*** | -1.6356** | -1.8283*** | -1.6844* | -1.6792** | -1.8422** | -1.7952*** |
| | (-1.98) | (-2.59) | (-2.23) | (-2.98) | (-1.91) | (-2.02) | (-2.46) | (-2.82) |
| GOV | -1.3875 | -0.4722 | -3.3436** | -3.3210** | -4.4658** | -4.2545** | -2.9821 | -2.6032 |
| | (-0.68) | (-0.19) | (-2.04) | (-2.01) | (-2.51) | (-2.34) | (-1.08) | (-1.32) |
| TRADE | -0.9142 | -1.4924 | -0.6238 | -0.5146 | -0.8208 | -0.7315 | 1.8130 | 1.6029 |
| | (-0.45) | (-0.68) | (-0.35) | (-0.26) | (-0.31) | (-0.27) | (0.03) | (0.81) |
| INF | -0.1734 | -0.0975 | -0.3019 | -0.3297 | -0.3374* | -0.3316* | -0.3658* | *0.3308* |
| | (-1.24) | (-0.63) | (-1.22) | (-1.58) | (-1.78) | (-1.93) | (-1.69) | (-1.83) |
| EDUC | 7.4995*** | 7.0937*** | 7.4662*** | 7.2947*** | 7.1543** | 6.8161** | 8.7810*** | 7.3151*** |
| | (4.89) | (4.25) | (3.61) | (3.40) | (2.54) | (2.17) | (2.89) | (2.70) |
| INSTITUTION | 1.7721 | 1.8152 | | | | | | |
| | (0.59) | (0.62) | | | | | | |
| CRISIS | | | -0.3481 | -0.2577 | | | | |
| | | | (-1.43) | (-1.04) | | | | |
| VOLATILITY | | | | | 0.0560 | 0.0558 | | |
| | | | | | (0.33) | (0.28) | | |
| STOCK MARKET | | | | | | | 0.3780 | 0.2212 |
| | | | | | | | (0.64) | (0.42) |
| Constant | 4.3697 | 1.3002 | -0.7541 | -0.8005 | 3.5852 | 3.2484 | -15.0699 | -12.2851 |
| | (0.57) | (0.18) | (-0.10) | (-0.11) | (0.61) | (0.59) | (-1.27) | (-1.34) |
| Obs | 391 | 391 | 497 | 497 | 497 | 497 | 364 | 364 |
| Country | 94 | 94 | 122 | 122 | 122 | 122 | 84 | 84 |
| # Instr | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 |
| AR(1) | -2.21** | -2.25** | -3.27*** | -3.16*** | -3.15*** | -3.04*** | -2.74*** | -2.67*** |
| AR(2) | -1.33 | -0.71 | 0.14 | 0.26 | 0.32 | 0.14 | -0.61 | -0.68 |
| Hansen OID (p-value) | 0.537 | 0.347 | 0.593 | 0.464 | 0.528 | 0.373 | 0.176 | 0.274 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells and are estimated using Blundell-Bond's GMM-system estimator with internal and external instruments (legal origin and religion). The logarithm of (initial) total credit to GDP is used (columns log) and the level of (initial) total credit to GDP (columns level). All control variables are in log and initial values for each period are used. Period dummies are added but not reported in the table. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust (Windmeijer) standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Table A4: Total credit and growth, robustness checks (specification)

| | Log of total credit | | | | | |
|---|---|---|---|---|---|---|
| | Outliers | | Fin Str. | One-year | Five-year | Average |
| | Growth | FD | Data | Obs. | Obs. | (lagged) |
| TC | 0.0532 | -1.2121 | -1.1179 | -0.1471 | -0.6670 | -1.2754* |
| | (0.08) | (-1.06) | (-0.79) | (-0.14) | (-1.50) | (-1.92) |
| Control | Incl. | Incl. | Incl. | Incl. | Incl. | Incl. |
| Obs | 457 | 451 | 439 | 1,196 | 218 | 330 |
| Country | 120 | 119 | 117 | 122 | 113 | 113 |
| # instruments | 51 | 51 | 51 | 111 | 28 | 46 |
| AR(1) | -2.59*** | -2.99*** | -3.14*** | -1.56 | -0.60 | -3.23*** |
| AR(2) | -1.60 | -0.38 | 0.13 | -1.06 | . | 0.61 |
| Hansen OID (p-value) | 0.316 | 0.197 | 0.286 | 0.390 | 0.499 | 0.135 |
| | Level of total credit | | | | | |
| | Outliers | | Fin Str. | One-year | Five-year | Average |
| | Growth | FD | Data | Obs. | Obs. | (lagged) |
| TC | -0.0112 | -0.0239 | -0.0087 | -0.0144 | -0.0148 | -0.0170* |
| | (-0.84) | (-0.89) | (-0.72) | (-1.36) | (-1.27) | (-1.66) |
| Control | Incl. | Incl. | Incl. | Incl. | Incl. | Incl. |
| Obs | 457 | 451 | 439 | 1,196 | 218 | 325 |
| Country | 120 | 119 | 117 | 122 | 113 | 113 |
| # instruments | 51 | 51 | 51 | 111 | 26 | 45 |
| AR(1) | -2.67*** | -2.96*** | -3.11*** | -1.63 | -0.89 | -2.84*** |
| AR(2) | -1.30 | -0.21 | -0.08 | -1.19 | . | -0.06 |
| Hansen OID (p-value) | 0.208 | 0.168 | 0.225 | 0.464 | 0.290 | 0.214 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells and are estimated using Blundell-Bond's GMM-system estimator with internal and external instruments (legal origin and religion). The logarithm of (initial) total credit to GDP is used (columns log) and the level of (initial) total credit to GDP (columns level). The list of control variables included the initial level of GDP, the government final consumption over GDP, the trade openness (imports plus exports divided by GDP), the inflation rate, and the level of education (secondary school enrolment). Period dummies are added but not reported in the table. All control variables are in log and initial values for each period are used. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust (Windmeijer) standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Table A5: Total credit and growth, robustness checks (non-linearities)

| | All countries | | Sub-sample | |
|---|---|---|---|---|
| | | | HIC=1 | HIC=0 |
| | [1] | [2] | [3] | [4] |
| TC | -0.0217 | -0.0145 | -0.0082 | 0.0018 |
| | (-0.85) | (-0.70) | (-0.67) | (0.05) |
| $TC^2$ | 0.00001 | | | |
| | (0.24) | | | |
| TC*HIC | | 0.0114 | | |
| | | (0.19) | | |
| HIC | | -4.4898 | | |
| | | (-0.65) | | |
| Control | Incl. | Incl. | Incl. | Incl. |
| Obs | 497 | 497 | 230 | 267 |
| Country | 122 | 122 | 50 | 72 |
| # Instr | 58 | 64 | 51 | 49 |
| AR(1) | -3.06*** | -2.93*** | -2.03** | -1.74* |
| AR(2) | 0.09 | -0.34 | -1.64 | -0.55 |
| Hansen OID (p-value) | 0.473 | 0.358 | 0.362 | 0.512 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells and are estimated using Blundell-Bond's GMM-system estimator with internal and external instruments (legal origin and religion). The list of control variables included the initial level of GDP, the government final consumption over GDP, the trade openness (imports plus exports divided by GDP), the inflation rate, and the level of education (secondary school enrolment). Period dummies are added but not reported in the table. All control variables are in log and initial values for each period are used. Initial value of total credit is employed. HIC is a dummy for high-income countries. OLS estimates are used. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust (Windmeijer) standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Table A6: Credit structure and growth, robustness checks (additional control variables)

| | Log | Level | Log | Level | Log | Level | Log | Level |
|---|---|---|---|---|---|---|---|---|
| HC | -1.1228 | -0.0418 | -1.8195*** | -0.0658** | -1.4825** | -0.0739** | -1.1877 | -0.0139 |
| | (-1.44) | (-1.51) | (-2.70) | (-2.39) | (-2.08) | (-2.37) | (-1.36) | (-0.57) |
| EC | -0.7486 | 0.0143 | 1.2360 | 0.0310 | 0.9293 | 0.037* | 0.0577 | -0.0080 |
| | (-0.84) | (-0.59) | (1.14) | (1.24) | (0.91) | (1.64) | (0.05) | (-0.31) |
| IGDP | -1.5094* | -2.1210** | -0.9345 | -1.2836** | -1.0652 | -1.169 | -1.4708* | -1.7144*** |
| | (-1.88) | (-2.05) | (-1.18) | (-2.23) | (-1.13) | (-1.41) | (-1.79) | (-2.71) |
| GOV | -2.3854 | -0.3717 | -3.7710** | -1.9748 | -3.9822** | -2.5043 | -4.1014 | -2.0504 |
| | (-1.22) | (-0.15) | (-1.15) | (-1.31) | (-2.04) | (-1.57) | (-1.37) | (-1.07) |
| TRADE | -0.6225 | -1.1974 | 0.0909 | -0.2726 | 0.3359 | -0.4023 | 2.7854 | 0.8735 |
| | (-0.51) | (-0.52) | (0.04) | (-0.15) | (0.11) | (-0.19) | (1.39) | (0.41) |
| INF | -0.1695 | -0.0830 | -0.3371 | -0.1766 | -0.3512 | -0.2589 | -0.3970* | -0.4014** |
| | (-0.96) | (-0.46) | (-1.15) | (-0.74) | (-1.55) | (-1.38) | (-1.80) | (-2.22) |
| EDUC | 7.4858*** | 6.8580*** | 7.7316*** | 6.4965*** | 7.0956*** | 5.6868** | 9.7001*** | 6.8378*** |
| | (4.56) | (3.68) | (3.65) | (3.55) | (2.63) | (2.53) | (2.63) | (2.57) |
| INSTITUTION | 1.6871 | 2.0261 | | | | | | |
| | (0.63) | (0.63) | | | | | | |
| CRISIS | | | -0.5712** | -0.3194 | | | | |
| | | | (-2.49) | (-1.31) | | | | |
| VOLATILITY | | | | | 0.0349 | 0.1053 | | |
| | | | | | (0.19) | (0.59) | | |
| STOCK MARKET | | | | | | | 0.5074 | 0.0395 |
| | | | | | | | (1.16) | (0.07) |
| Constant | -0.6406 | 0.3650 | -11.5807 | -6.9787 | -8.3249 | -2.6165 | -24.7018* | -8.5879 |
| | (-0.08) | (0.05) | (-1.60) | (-1.00) | (-1.22) | (-0.44) | (-1.68) | (-0.88) |
| Obs | 391 | 391 | 497 | 497 | 497 | 497 | 364 | 364 |
| Country | 94 | 94 | 122 | 122 | 122 | 122 | 84 | 84 |
| # Instr | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| AR(1) | -2.40** | -2.34** | -3.02*** | -2.92*** | -3.09*** | -3.17*** | -2.62*** | -2.89*** |
| AR(2) | -0.10 | -0.81 | -0.26 | -0.80 | -0.65 | -0.55 | -1.00 | -0.20 |
| Hansen OID (p-value) | 0.464 | 0.487 | 0.744 | 0.768 | 0.606 | 0.594 | 0.255 | 0.163 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells and are estimated using Blundell-Bond's GMM-system estimator with internal and external instruments (legal origin and religion). The logarithm of (initial) household and business credit to GDP is used (columns log) and the level of (initial) total credit to GDP (columns level). All control variables are in log and initial values for each period are used. Period dummies are added but not reported in the table. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust (Windmeijer) standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Table A7: Credit structure and growth, robustness checks (specification)

| | Log of total credit | | | | | |
|---|---|---|---|---|---|---|
| | Outliers | | Fin Str. | One-year | Five-year | Average |
| | Growth | FD | Data | Obs. | Obs. | (lagged) |
| HC | -1.3916*** | -1.4117** | -1.1955 | -2.4636** | -1.0245* | -1.2428 |
| | (-3.05) | (-2.05) | (-1.63) | (-2.29) | (-1.77) | (-1.36) |
| EC | 1.3487** | 0.4567 | 0.5466 | 1.4187 | 0.4376 | 0.4116 |
| | (2.31) | (0.40) | (0.43) | (1.32) | (0.54) | (0.36) |
| Control | Incl. | Incl. | Incl. | Incl. | Incl. | Incl. |
| Obs | 457 | 451 | 439 | 1,195 | 217 | 370 |
| Country | 120 | 119 | 117 | 122 | 112 | 116 |
| # instruments | 58 | 58 | 58 | 128 | 32 | 52 |
| AR(1) | -2.73*** | -2.71*** | -2.76*** | -1.42 | -0.70 | -2.12** |
| AR(2) | -1.47 | -1.39 | -0.67 | -1.88* | . | 1.14 |
| Hansen OID (p-value) | 0.373 | 0.247 | 0.174 | 0.701 | 0.464 | 0.45 |

| | Level of total credit | | | | | |
|---|---|---|---|---|---|---|
| | Outliers | | Fin Str. | One-year | Five-year | Average |
| | Growth | FD | Data | Obs. | Obs. | (lagged) |
| HC | -0.0690** | -0.0801* | -0.0120 | -0.0975*** | -0.0493** | -0.0606** |
| | (-2.16) | (-1.66) | (-1.11) | (-2.71) | (-2.16) | (-2.20) |
| EC | .0284 | 0.0163 | -0.0030 | 0.0292 | 0.0071 | 0.0032 |
| | (1.30) | (0.55) | (-0.16) | (1.21) | (0.40) | (0.14) |
| Control | Incl. | Incl. | Incl. | Incl. | Incl. | Incl. |
| Obs | 457 | 451 | 479 | 1,196 | 218 | 364 |
| Country | 120 | 119 | 122 | 122 | 113 | 117 |
| # instruments | 58 | 58 | 58 | 128 | 32 | 51 |
| AR(1) | -2.48** | -2.46** | -3.14*** | -2.23** | -1.03 | -2.58*** |
| AR(2) | -1.40 | -1.71 | -0.28 | -2.21** | . | 0.21 |
| Hansen OID (p-value) | 0.289 | 0.329 | 0.296 | 0.680 | 0.457 | 0.271 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells and are estimated using Blundell-Bond's GMM-system estimator with internal and external instruments (legal origin and religion). The logarithm of (initial) household and enterprise credit to GDP is used (columns log) and the level of (initial) household and enterprise credit to GDP (columns level). The list of control variables included the initial level of GDP, the government final consumption over GDP, the trade openness (imports plus exports divided by GDP), the inflation rate, and the level of education (secondary school enrolment). Period dummies are added but not reported in the table. All control variables are in log and initial values for each period are used. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust (Windmeijer) standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Table A8: Credit structure and growth, robustness checks (non-linearities)

| | All countries | | Sub-sample | | | |
|---|---|---|---|---|---|---|
| | | | HIC=1 | | HIC=0 | |
| | Log | Levels | Log | Levels | Log | Levels |
| | [1] | [2] | [3] | [4] | [5] | [6] |
| HC | -2.4272* | -0.0532 | -1.3043 | -0.0274 | -0.0680 | -0.1609 |
| | (-1.89) | (-1.29) | (-1.55) | (-1.04) | (-0.06) | (-0.95) |
| EC | 0.9493 | 0.0081 | 0.3355 | -0.0007 | 0.4537 | 0.0607 |
| | (0.70) | (0.32) | (0.29) | (-0.03) | (0.33) | (0.72) |
| HC*HIC | 1.4533 | -0.0904 | | | | |
| | (0.98) | (-0.79) | | | | |
| EC*HIC | 0.4136 | 0.0638 | | | | |
| | (0.23) | (0.85) | | | | |
| HIC | -6.3935 | -2.6009 | | | | |
| | (-1.52) | (-0.54) | | | | |
| Control | Incl. | Incl. | Incl. | Incl. | Incl. | Incl. |
| Obs | 497 | 497 | 230 | 230 | 267 | 267 |
| Country | 122 | 122 | 50 | 50 | 72 | 72 |
| # instruments | 78 | 78 | 58 | 58 | 56 | 56 |
| AR(1) | -2.77*** | -2.52** | -2.09** | -2.04** | -1.72* | -1.86* |
| AR(2) | -1.06 | -0.85 | -1.34 | -1.24 | 0.39 | -0.06 |
| Hansen OID (p-value) | 0.398 | 0.635 | 0.618 | 0.734 | 0.428 | 0.477 |

Dependent variables are the average real per capita GDP growth. All regressions consist of 3-year non-overlapping growth spells and are estimated using Blundell-Bond's GMM-system estimator with internal and external instruments (legal origin and religion). The list of control variables included the initial level of GDP, the government final consumption over GDP, the trade openness (imports plus exports divided by GDP), the inflation rate, and the level of education (secondary school enrolment). Period dummies are added but not reported in the table. All control variables are in log and initial values for each period are used. Initial value of total credit is employed. HIC is a dummy for high-income countries. OLS estimates are used. AR(1/2) are the usual Arellano tests for autocorrelation and Hansen OID is the Hansen test of over-identification. P-values are calculated form robust (Windmeijer) standard errors. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

# Appendix C Additional figures

Figure A1: Correlation coefficient between growth and credit, by year and type of credit

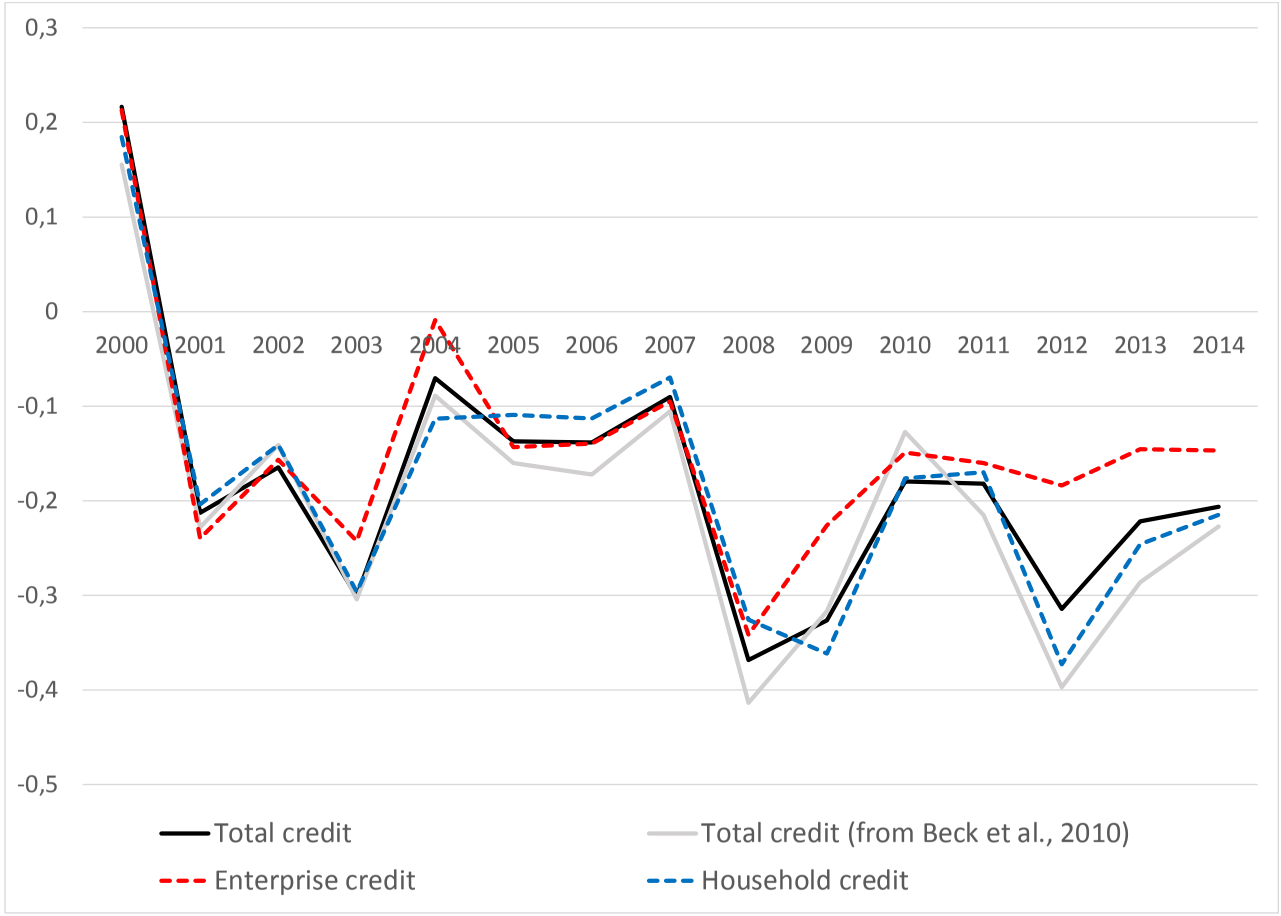

Figure A2: Correlation coefficient between growth and credit, by year and group of country