CREDIT, BANKING FRAGILITY AND ECONOMIC PERFORMANCE

Jérôme Creel
Paul Hubert
Fabien Labondance

ABOUT THE AUTHORS

Jérôme Creel, Sciences Po-OFCE, ESCP Europe,
Email Address: jerome.creel@sciencespo.fr
Paul Hubert, Sciences Po-OFCE,
Email Address: paul.hubert@sciencespo.fr
Fabien Labondance, Université de Bourgogne Franche-Comté - CRESE - Sciences Po-OFCE,
Email Address: fabien.labondance@univ-fcomte.fr

ABSTRACT

Drawing on European Union data, this paper investigates the hypothesis that private credit and banking sector fragility may affect economic growth. We capture banking sector fragility both with the ratio of bank capital to assets and non-performing loans. We assess the effect of these three variables on the growth rate of GDP per capita, using the Solow growth model as a guiding framework. We observe that credit has no effect on economic performance in the EU when banking fragilities are high. However, the potential fragility of the banking sector measured by the non-performing loans decreases GDP per capita.

KEY WORDS

Private credit, Capital to assets ratio, Non-performing loans.

JEL

G10, G21, O40.

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Jérôme Creel
Sciences Po - OFCE
ESCP Europe

Paul Hubert
Sciences Po - OFCE

Fabien Labondance [*]
CRESE – Université de Franche-Comté
Sciences Po - OFCE

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Abstract

Drawing on European Union data, this paper investigates the hypothesis that private credit and banking sector fragility may affect economic growth. We capture banking sector fragility both with the ratio of bank capital to assets and non-performing loans. We assess the effect of these three variables on the growth rate of GDP per capita, using the Solow growth model as a guiding framework. We observe that credit has no effect on economic performance in the EU when banking fragilities are high. However, the potential fragility of the banking sector measured by the non-performing loans decreases GDP per capita.

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JEL Classification: G10; G21; O40.

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1. Introduction

The paper aims to investigate the contribution of private credit and bank sector fragility to economic growth in the European Union (EU). The literature on the links between finance and economic performance has been abundant and it has given rise to numerous and, often, opposing views.[1] Advocates of the positive role of finance on economic performance highlight that financial development induces a better allocation of resources, mobilizes savings, can reduce risks and facilitates transactions via lower transaction costs.[2] Consequently, the financial sector is viewed as a lubricant for the economy, ensuring the emergence of innovative firms (King and Levine, 1993). In this literature, Beck and Levine (2004) have been very influential. They find that financial development impacts positively GDP growth. The turnover ratio and bank credit to the private sector are both significant suggesting that they complement each other. In contrast, many studies raised doubts on the causal link between finance and economic growth before and since the Global Financial Crisis.[3] Arcand et al. (2015) and Cecchetti and Kharroubi (2012) show that the positive link between financial development and economic performance reported in Beck and Levine (2004) is non-linear: above thresholds, the relationship changes sign. Loayza and Ranciere (2006) highlights that financial development has contrasting effects. It influences growth positively in the long run but negatively in the short run and the latter effect can be attributed to financial fragility. Moreover, the literature suggests that rapid domestic credit expansion is a robust indicator of financial crises (Gourinchas and Obstfeld, 2012; Schularick and Taylor, 2012). Finally, Demetriades et al. (2017) show, on a panel of 124 countries between 1998 and 2012, that both financial fragility and private credit have had negative effects on GDP growth. Our objective in this paper is to re-assess the respective effects of credit and banking fragility on economic performance in the EU only.

Empirical papers on these effects are mainly based on panel approaches with highly heterogeneous countries. In contrast, we restrict our attention to the EU countries because, despite their differences, they share a common financial and regulatory framework. This framework has assigned new tasks to the European Central Bank (ECB) like overall supervision and control of commercial banks in the EU Banking Union. Furthermore, the literature suggests parsimony in the width of the panel. Fink et al. (2009) show that the finance-growth nexus depends on the country's stage of development and on the segment (credit, stocks, bonds) of the financial market. Prochniak and Wasiak (2017) also show mixed results when one adopts a subsample of EU countries: the *growth* of bank credit drives economic growth, but the *level* of bank credit has a negative impact.

We address the relationship between credit, banking fragility and economic growth in the EU since 1991. The global financial crisis has challenged the view expressed e.g. in Levine (2005) that financial development and economic growth are positively linked. While the

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[1] The main arguments are exposed in Levine (2005), Ang (2008), Cournède and Denk (2015) and Creel et al. (2015).

[2] According to Bumann et al. (2013)'s meta-analysis, a positive relationship between financial development and economic growth emerges from the empirical literature divided between cross-country, time series or panel studies. Among the studies that conclude that financial development has a positive effect on economic performance, see e.g.: Beck et al. (2000), Rajan and Zingales (1998), Rioja and Valev (2004), and Rousseau and Wachtel (2000).

[3] Among the papers sceptical about a positive relationship between finance and economic performance, see e.g.: Arestis and Demetriades (1997); De Gregorio and Guidotti(1995); Stiglitz (2000) before the crisis and Andrianova and Demetriades (2018); Beck (2013); Rodrik and Subramanian (2009) since the Global Financial Crisis.

relationship has been shown to be at work before the crisis, we test for its validity after 2008 given that structural breaks in GDP impact growth dynamics (Caggiano and Leonida, 2009).

More specifically, we estimate the respective impacts of credit and indicators of banking sector fragility on economic performance, measured by the growth rate of GDP per capita. We measure credit with the ratio of private credit to GDP and introduce two measures of banking fragility: the ratio of non-performing loans to total gross loans and the ratio of bank capital to assets – i.e. the inverse of the leverage ratio. These two variables of banking fragility capture two complementary features of banks' balance sheets. The former sheds light on a measure of banking risk on the assets' side whereas the latter sheds light on the ability of banks to absorb potential losses with their liabilities. Following the empirical framework of Beck and Levine (2004) based on a Solow model representation of the growth process, we estimate the impact of the three above-mentioned variables using a dynamic generalized method of moments (GMM) panel estimator.

Our main findings are that in most cases, credit has no effect on economic performance in the EU whereas non-performing loans have contributed negatively. The positive effect of credit on growth appears only when the banking fragilities are low or before 2008. The (inverse of the) leverage ratio has no impact. These findings are robust to alternative measures of credit, to most subsamples and to a battery of robustness checks. As part of discussions on EU regulatory framework for banks, it appears from our results that the limitation of non-performing loans may not only play a prudential role: non-performing loans have an impact on the management of banking risk and they also weigh on economic performance.

The rest of the paper is organised as follows. Section 2 presents the empirical method and the data. Section 3 presents the results and discusses alternative specifications. Section 4 concludes.

2. The empirical strategy

2.1. Methodology

Following Beck and Levine (2004), we estimate the relationship between finance and GDP growth using the GMM estimator developed by Arellano and Bond (1991). The regression equation can be described in the following form:

$$y_{i,t} = \beta y_{i,t-1} + \gamma X_{i,t} + \delta Z_{i,t} + \varepsilon_{i,t} \tag{1}$$

where subscripts i and t represent respectively the country and time period, $y_{i,t}$ is the dependent variable of economic performance, $y_{i,t-1}$ represents its lagged value. $X_{i,t}$ is a set of control variables. As our framework follows an augmented version of the Solow model, we control for the usual determinants in this framework. We introduce the initial real GDP per capita to control for convergence and the investment growth rate to control for capital accumulation. We also include the ratio of government consumption to GDP (capturing a potential crowding-out effect), the inflation rate (price effect), the long-term interest rate (cost of capital effect) and the share of exports and imports to GDP (trade openness effect). $Z_{i,t}$ includes explanatory variables directly related to financial development (private credit) and banking fragility (capital to assets ratio and non-performing loans) and $\varepsilon_{i,t}$ is the error term that includes country-specific and time-specific effects.

Econometric issues may arise from this specification. First, variables included in $X_{i,t}$ and $Z_{i,t}$ may not be fully exogenous, and causality may run in both directions. Second, the country fixed-effects contained in the error term can be correlated with the explanatory variables. Third, the panel dataset has a relatively short time dimension and a large country dimension. These three issues can be addressed with the two-step GMM estimator proposed by Arellano and Bond (1991) in which the set of instrumental variables is constituted by the lagged values of all explanatory variables, including $y_{i,t-1}$. In addition, we include as instruments the lagged values of both the ratio of bank credit to bank deposits and the ratio of the overall deposits of the financial system to GDP. These two variables are likely to affect bank business without affecting directly economic performance. Arellano and Bond (1991) rewrite equation (1) in first difference:

$$\Delta y_{i,t} = \beta \Delta y_{i,t-1} + \gamma \Delta X_{i,t} + \delta \Delta Z_{i,t} + \Delta \varepsilon_{i,t} \tag{2}$$

By transforming the regressors in first difference, the country fixed-effect is removed, but a new bias is potentially introduced: the new error term can be correlated with the lagged dependent variable. Under the assumption that the error term is not serially correlated and that the explanatory variables are weakly exogenous, Arellano and Bond (1991) define the following procedure. In the first step of their GMM estimator, error terms are assumed to be homoskedastic and independent over time and across countries. Then, in the second step residuals obtained in the first step are used to build a consistent estimate of the variance-covariance matrix. Assumptions of independence and homoskedasticity are then relaxed, making the two-step estimator asymptotically more efficient than the first-step one. We obtain robust standard errors using the Windmeijer (2005) finite sample correction. The assumption of no serial correlation in the error terms is crucial for the consistency of the GMM estimator.[4]

2.2. Data

The main indicator of economic performance is the real GDP per capita growth rate which is commonly used in the literature dedicated to the real impact of finance. To quantify credit, in the baseline, we depart from Beck and Levine (2004) who use bank credit, i.e. bank claims on the private sector by deposit money banks divided by GDP. Instead, we use private credit by deposit banks *and* other financial institutions divided by GDP.[5] Other financial institutions have played a significant role in the process of financial development since the early 1990s that deserves to be investigated. Figure 1 presents the evolution of private credit in the EU since 1991. We observe that the growth of private credit has stopped since the crisis. However its level is relatively high in 2014 at levels similar to its pre-crisis level. Figure 2 shows a scatter plot of the real GDP per capita growth rate and credit to GDP. Though the plot cannot give any indication on the causality between both variables, it shows that their relationship is unclear.

In the regressions, we also use proxies of the potential fragility of the banking system which give some indication on risks taken by banks. The ratio of non-performing loans and the ratio of capital to assets provide complementary information on the structure of the banking

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[4] The use of a large number of instruments may lead to over-identification. In order to avoid this, we only use up to three lags as instruments. Using Sargan tests, we do not reject the hypothesis that our instruments are valid.

[5] Bank credit is also tested later on.

sector and its resilience to negative shocks.[6] Both ratios are indicative of the sensitiveness of banks to balance sheet risks: the non-performing loans ratio informs about the likelihood of bank losses whereas the capital to assets ratio informs about the ability of banks to absorb losses.

Our estimation strategy differs from earlier ones in that we do not use average data in our baseline dynamic panel estimations.[7] Beck and Levine (2004) and Arcand et al. (2015) use average data in order to quantify the long-term relationship between finance and economic performance. Their data are averaged over 5-year periods to remove cycle fluctuations. We prefer to use annual data for three reasons. First, business cycles measured by the National Bureau of Economic research (NBER) in the United States and by the Center for Economic Policy Research (CEPR) in Europe are longer than five years. Measures of financial cycles (Drehmann et al., 2012) show that financial cycles have a much lower frequency than traditional business cycles. Their average duration has increased since the 1980s and is now around 20 years, making 5-year average data unable to fit the duration of these cycles. Second, we think that it is worth investigating not only the long-term effects of finance on economic performance but also its short-term effects. Third, because our sample starts in 1991, using 5-year growth rates leaves us with 5 observations per country.

We use annual data between 1991 and 2014 for all EU countries. These data come from the World Bank, precisely from the Global Financial Development Database (GFDD) and the World Development Indicators (WDI). Data on interest rates come from Datastream whereas additional data on credit used for robustness check come from the Bank of International Settlements (BIS). Governement Debt data are from Eurostat. Table A in the appendix presents a full description of the data and Table B their descriptive statistics.

3. Empirical results

3.1. Baseline

We assess the relationship between credit and banking fragility, on the one hand, and economic performance, on the other hand. Ratios of credit to GDP, non-performing loans and capital to assets capture different complementary information about banks (financial development, assets-side and liabilities-side balance sheet risks). Table 1 reports the baseline results of our regressions, including a few subsamples specifications related to the crisis, the level of GDP per capita and banking fragility measured by the level of non-performing loans.

Results from full-sample estimations (column 1) are based on 268 observations. They show that private credit has had no significant effect on economic performance in the EU since 1991, so as capital to assets. However, non-performing loans affect negatively GDP growth. Interestingly, when splitting our sample, we find that credit had a significant and positive effect on GDP growth before the crisis but this effect has no longer been significant since (columns 2 and 3). If we separate the sample between above-median and below-median values of the ratio of non-performing loans, we show that the private credit to GDP ratio has a significant and positive impact on economic performance when the ratios of non-

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[6] Capital includes tier 1 capital (paid-up shares and common stock), which is a common feature in all countries' banking systems, and total regulatory capital, which includes subordinated debt instruments that need not be repaid if the funds are required to maintain minimum capital levels (comprising tier 2 and tier 3 capital).

[7] In the robustness section, we provide results obtained with average data.

performing loans are below their median. There is no such effect when the ratios of non-performing loans are above their median. These results suggest that credit has a positive effect on economic performance as long as banking fragility - measured with non-performing loans - is low.

This latter explanation seems to be confirmed when we complete the interpretation of the results with the analysis of the impact of banking fragility indicators on economic performance. The fragility of the banking sector is estimated with two different measures. If the ratio of non-performing loans has a negative impact on economic performance in many cases, such is not the case of the capital to assets ratio. After we split the sample between values below and above the median of GDP per capita, the capital to assets is barely significant (and with a negative sign) for the subsample of below-median GDP per capita. It is never significant in other specifications. In contrast, the ratio of non–performing loans deteriorates the real growth rate of GDP per capita on the whole sample, after 2008 (but not before)[8], and for below-median GDP per capita. The importance of banking fragility on the assets' side of bank balance sheets as an indicator of economic slowdown is therefore confirmed by the data, whereas the regulatory indicator (capital to assets ratio) appears at best of second-order importance for economic performance.

This kind of interrelationship between private credit and non-performing loans on economic performance extends the intertwining effects evidenced in Creel et al. (2019). There, we show that higher private credit generates higher ratios of non-performing loans – a vulnerability effect – and that higher ratios of non-performing loans generate a decline in private credit – a trauma effect -. The former effect confirms the importance of increases in private credit as an indicator of banking crisis (Gourinchas and Obstfeld, 2012; Schularick and Taylor, 2012). The latter effect confirms that periods of banking fragility are followed by deleveraging (Adrian and Shin, 2010). In the present paper, we find that the trauma effect can worsen economic performance: increases in the ratios of non-performing loans when their level is already high deteriorate the real growth rate of GDP per capita. Conversely, when the level of ratios of NPL is below the median, the positive effect of private credit in stimulating economic performance is not affected by the low vulnerability of the banking sector.

Finally, in all the regressions, control variables give either the usual significant impact (initial GDP per capita and investment show some convergence process, government consumption generates some crowding-out and trade openness shows a positive effect on growth) or no impact at all (inflation and interest rates).

3.2. Different categories of credit

We dig into our results in order to examine whether specific categories of credit may exhibit alternative results regarding the effect of credit on economic performance. Nevertheless, due to data availability, the results presented in this section are based on a smaller sample: only 16 countries and 183 observations. The data for *total* credit to households and to non-financial corporations come from the BIS whereas the World Bank provides data for *private* credit specifically.

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[8] The respective positive and nil impacts on economic performance of private credit and the ratio of non-performing loans before 2008 and respective nil and negative impacts of the same variables after 2008 mirror the results discussed before when the sample was split between above and below median levels of the ratio of non-performing loans. The rise in bank vulnerability until 2008, with the rise in private credit, was growth-enhancing until banking fragility became so high as to generate deleveraging and economic slowdown.

Table 2 reports the same regression as in the baseline where we substitute bank credit for private credit (column 1)[9]. While the point estimate of bank credit is larger than in the baseline, it is not statistically significant. We then pay attention to the distinction between credit to non-financial corporations and credit to households. The usual argument for a positive impact of financial development on economic performance relies on the better allocation of resources to firms (banks viewed as a lubricant) whereas financial development leading to an increase in household leverage is viewed as an indicator of deeper recession (Mian and Sufi, 2018). Table 2 reports the results of regressions where total credit (column 2) is split between the two categories (columns 3 and 4). Results do not support the view expressed by Beck et al. (2012) who insist on the fact that finance growth effects stem from firms rather than households. In our sample of EU countries, neither credit to non-financial corporations (column 3) nor credit to households (column 4) affects economic performance. But it is worth noticing that these estimates may suffer from the data constraint. Finally, the point estimates of the effect of non-performing loans is similar to the baseline case, although less or not significant, a potential consequence again of the data constraint.

3.3. Geographical and country-specific characteristics subsamples

We also examine whether geographical and country-specific characteristics affect our results. In Table 3, we present estimates regarding potential non-linearities in the relationships between credit, banking fragility and economic performance. First, we distinguish Eurozone from non-Eurozone countries. Although all EU countries benefit from full capital mobility, the creation of the euro in 1999 has erased exchange rate risk for cross-border financial transactions and investment for countries that have adopted it. Moreover, it has led, at least until the sovereign debt crisis erupted in 2009 in Greece, to convergence in long-term interest rates, hence to convergence on financial credit conditions. This may have led to differentiated impacts of financial development and banking fragility between countries that are in and those that are out of the Eurozone. Table 3 reports though that Euro membership does not make a difference. Overall, private credit and banking fragility have no significant impact on economic performance. The baseline results require a mix of Eurozone and non-Eurozone members. This is not surprising considering the importance of the level of non-performing loans in driving the impact of private credit and banking fragility on economic performance. Indeed, high ratios of non-performing loans are not the exclusive feature of Eurozone or non-Eurozone countries: in the group of high non-performing loans ratios, one finds Cyprus, Greece on the one hand, and Bulgaria and Hungary on the other hand.

Second, splitting the sample according to low or high level of public debt (columns 3 and 4) shows that non-performing loans have a negative effect and credit remains non-significant regardless the level of public debt. It appears then that the relationships between banking fragility and economic performance in the EU cannot be directly attributed to the level of sovereign debt. Two reasons may explain this finding. First, banks hold public debts issued by different governments, some with a high debt to GDP ratio, some with a low one. Second, if fragmentation in the EU prevails, the high interconnectedness between banks would make the entire sector vulnerable to crises without clear determinacy through the amount of public debt (see e.g. Demirer et al., 2018; Peltonen et al., 2019).

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[9] So far, we have used private credit by deposit money banks and other financial institutions and therefore departed from Beck and Levine (2004) who restricted their study to bank credit only.

Third, we split the sample according to the amount of domestic private debt securities (columns 5 and 6). Thus, we control for market-related financial development via the issuances of bonds, commercial paper and short-term notes. In both subsamples, private credit has no positive impact on economic performance whereas the ratio of non-performing loans has a significant negative impact when market-related financial development is high. The intuition behind this result may be that the rise in financial instability (indicated by larger amounts of domestic debt securities) makes banking fragility detrimental to economic growth. This would be consistent with the argument that there can exist a risk of contagion across banks and markets (e.g. Aharony and Swary, 1983, and Acharya and Yorulmazer, 2008).

Fourth, we check whether the relationship between credit and banking fragility on the one hand and economic performance on the other hand depends on income inequality. Many have argued that income inequality was at the roots of financial crisis (Fitoussi and Saraceno, 2010; Kirschenmann et al., 2016; Kumhof et al., 2012; Stockhammer, 2015). It may well be that the higher income inequality, the higher the risk for banks to face default on their loans. Consequently, it is possible to argue that income inequality relates indirectly to economic growth, via banking fragility[10]. Results reported in columns 7 and 8 support this argument. When income inequality is high, the ratio of non-performing loans has a negative effect on economic performance while its impact is not significant otherwise.

3.4. Robustness tests

Finally, we propose in Table 4 several robustness tests in order to control whether our empirical strategy affect our results. First, we ran the baseline estimations without the outliers (column 1). Outliers are identifying as extreme values of credit, capital to assets and non-performing loans, i.e. below the 5th percentile or above the 95th percentile of their respective distribution. Observations then drop to 172. Second, we include time period and country fixed effects to better control for general macro shocks (column 2). Third, we use another estimator: the Least-Squares Dummy Variable estimator (LSDV) (following e.g. Kiviet, 1995; Bruno, 2005; Leonida et al. 2013) (columns 3, 4 and 5). Fourth, as in Beck and Levine (2004), we use average data over 5-year periods rather than annual data (column 6). All these alternative estimations show that private credit does not have an impact on economic performance whereas banking fragility, through the ratio of non-performing loans, does.

4. Conclusion

This paper assesses the respective impacts of credit and indicators of banking sector fragility on EU economic performance. Our main findings show that in most cases, credit has had no effect on economic performance in the most recent period whereas non-performing loans have contributed negatively. Credit had a positive effect only when banking fragilities are low, especially before the crisis. These findings are robust to alternative measures of credit, to most subsamples and to various robustness checks.

Our results point toward the need to supervise banking activities as the fragility of the sector may be detrimental to aggregate growth. This paper suggests that macroprudential policies

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[10] See Scholl and Klasen (2019) for a recent analysis of the relationship between inequality and growth on a large panel of countries.

may have a role to play, especially in monitoring the rise of such fragilities and in imposing regulations to limit their expansion.

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Figure 1: Private credit (in % of GDP) in the European Union
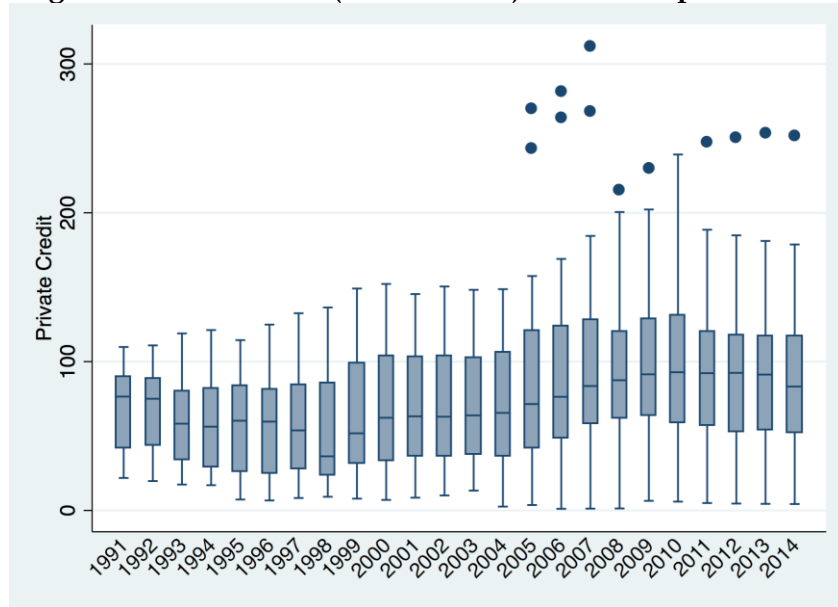
Note: This figure presents a box plot of the Private credit variable distributional characteristics each year from 1991 to 2014. The "box" represents the inter-quartile range. The median marks the mid-point of the data and is shown by the line that divides the box into two parts. The upper and lower whiskers show the upper and the lower adjacent values. Outsides values are also represented. Source: GFDD.

Figure 2: Private credit (in % of GDP) and GDP per capita growth rate (in %)
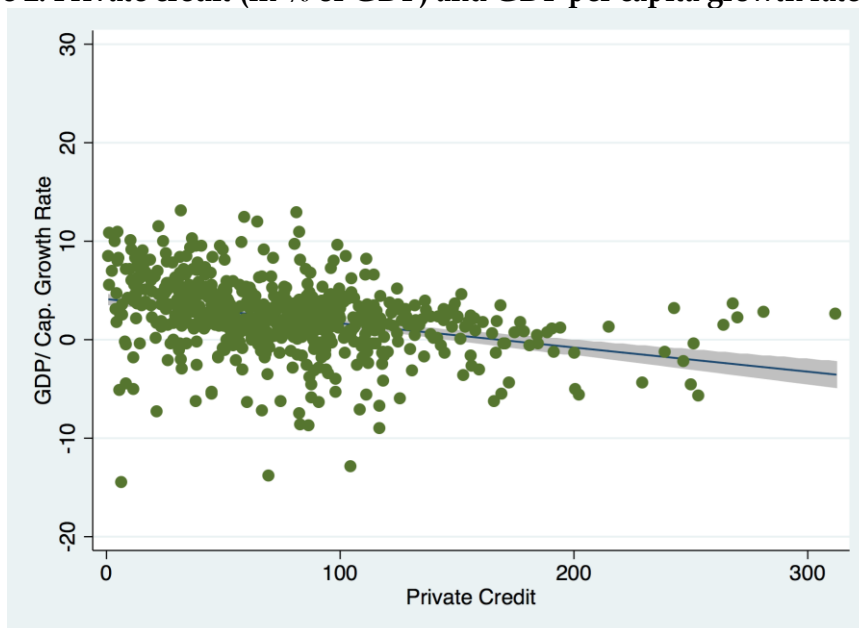
Note: This figure presents a scatter plot. Each point represents for a country the GDP growth rate per capita and the level of private credit for a specific year. Sources: GFDD and WDI.

Table 1: Baseline

GDP/Cap. growth rate	(1) All	(2) Before 2008	(3) Since 2008	(4) Above median GDP/Cap.	(5) Below median GDP/Cap.	(6) Above median NPL	(7) Below median NPL
Credit to GDP	0.018	0.061***	0.020	0.025	0.045	0.024	0.050***
	[0.02]	[0.02]	[0.02]	[0.23]	[0.03]	[0.02]	[0.01]
Capital to Assets	-0.591	0.048	-0.432	0.264	-1.962*	0.132	-0.604
	[0.59]	[0.54]	[0.61]	[3.40]	[1.00]	[0.62]	[0.40]
Non Perf. Loans	-0.397***	-0.287	-0.389***	-0.583	-0.688**	-0.461***	-0.923
	[0.11]	[0.27]	[0.10]	[1.22]	[0.28]	[0.17]	[0.66]
Initial GDP	-0.001***	-0.001***	-0.002***	-0.001	-0.002***	-0.002***	-0.001***
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Investment	0.187***	0.090**	0.136***	0.298	0.059	0.156***	0.149***
	[0.02]	[0.04]	[0.04]	[0.32]	[0.07]	[0.02]	[0.04]
Gov. Consumption	-0.842**	-1.398*	-1.278***	-0.519	-1.994*	-0.518	-1.535**
	[0.35]	[0.75]	[0.35]	[2.92]	[1.03]	[0.40]	[0.71]
Inflation	-0.114	-0.090	0.064	-0.551	-0.343	0.102	-0.124
	[0.27]	[0.17]	[0.12]	[1.50]	[0.28]	[0.22]	[0.19]
Interest Rate	-0.047	-0.159	-0.165*	0.442	-0.455*	-0.092	-0.08
	[0.11]	[0.16]	[0.09]	[2.86]	[0.24]	[0.11]	[0.31]
Trade	0.114***	0.028	0.104***	0.179	0.258***	0.111***	0.054**
	[0.02]	[0.06]	[0.04]	[0.27]	[0.09]	[0.03]	[0.03]
Sargan test *p-val*	0.99	0.98	0.95	0.99	0.99	0.99	0.99
AR3	0.70	0.12	0.70	0.20	0.96	0.50	0.20
Countries	27	23	27	14	14	22	21
N	268	99	169	147	121	142	126

*Note: This table reports the results of a set of dynamic panel estimations aimed to estimate the effect of specific categories of credit on the GDP growth rate per capita. All regressions are estimated with annual data from 1991 to 2014 using the first-differenced GMM estimator. Control variables are: the initial level of economic performance, investment growth rate, inflation, nominal interest rate, trade openness and government consumption. Robust (Windmeijer) standard errors are in brackets. * p<0.1, ** p<0.05, *** p < 0.01. Data sources: GFDD, Datastream and WDI.*

Table 2: Different categories of credit

GDP/Cap. growth rate	(1)	(2)	(3)	(4)
Bank Credit	0.068			
	[0.05]			
Total Credit		0.007		
		[0.03]		
Credit to NFC			0.004	
			[0.01]	
Credit to Households				0.110
				[0.07]
Capital to Assets	-0.285	-0.636	-0.490	-0.031
	[0.92]	[0.73]	[0.37]	[0.47]
Non Perf. Loans	-0.313*	-0.317	-0.170	-0.426
	[0.16]	[0.31]	[0.21]	[0.35]
Controls	Yes	Yes	Yes	Yes
Sargan test *p-val*	0.99	0.99	0.99	0.99
AR3	0.75	0.85	0.94	0.83
Countries	16	16	17	16
N	183	182	189	182

*Note: This table reports the results of a set of dynamic panel estimations aimed to estimate the effect of specific categories of credit on the GDP growth rate per capita. All regressions are estimated with annual data from 1991 to 2014 using the first-differenced GMM estimator. Control variables are: the initial level of economic performance, investment growth rate, inflation, nominal interest rate, trade openness and government consumption. Robust (Windmeijer) standard errors are in brackets. * p<0.1, ** p<0.05, *** p < 0.01. Data sources: GFDD, Datastream, BIS and WDI.*

Table 3: Geographical and country-specific characteristics subsamples

GDP/Cap. growth rate	(1) Eurozone	(2) Non EZ	(3) Low Gov. Debt	(4) High Gov. Debt	(5) Low Sec.	(6) High Sec.	(7) Low Gini	(8) High Gini
Credit to GDP	-0.174	0.031	0.079	-0.006	-0.394**	-0.021	0.05	0.095
	[0.48]	[0.23]	[0.04]	[0.09]	[0.16]	[0.03]	[0.14]	[0.06]
Capital to Assets	-1.078	-0.485	-0.975	-0.184	1.047	2.325	-0.393	-0.481
	[2.99]	[3.05]	[1.34]	[0.94]	[1.36]	[1.38]	[1.13]	[0.94]
Non Perf. Loans	-0.366	-0.243	-1.084**	-0.473**	0.672	-2.532***	-0.198	-0.586***
	[1.08]	[0.87]	[0.51]	[0.23]	[0.89]	[0.86]	[0.63]	[0.16]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sargan test *p-val*	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
AR3	0.55	0.99	0.98	0.95	0.52	0.53	0.35	0.68
Countries	12	15	12	13	10	10	16	15
N	143	125	62	81	37	47	77	93

*Note: This table reports the results of a set of dynamic panel estimations aimed to estimate the effect of specific categories of credit on the GDP growth rate per capita. All regressions are estimated with annual data from 1991 to 2014 using the first-differenced GMM estimator. In specification (1), the Eurozone is constituted by the 12 first members of the Eurozone (Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal). In specification (2) New Europe is constituted by the 13 latest member of the EU (Bulgaria, Cyprus, Czech Republic, Estonia, Croatia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovenia, Slovakia). Low (resp. high) levels of government debt and securities are determined when data are below the 1st Quartile (resp. above the 3rd Quartile). Low Gini (resp. high) is when Gini is below (resp. above) the median. Control variables are: the initial level of economic performance, investment growth rate, inflation, trade openness and government consumption. Robust (Windmeijer) standard errors are in brackets. * p<0.1, ** p<0.05, *** p < 0.01. Data sources: GFDD, WDI, Datastream and Eurostat.*

Table 4: Robustness

GDP/Cap. Growth rate	(1) Baseline without outliers	(2) Time and Country FE	(3) Bias-corrected LSDV estimator Arellano-Bond	(4) Bias-corrected LSDV estimator Anderson-	(5) Bias-corrected LSDV estimator Blundell-Bond	(6) 5-year average
Credit to GDP	0.059	-0.008	0	0.001	0	-0.044
	[0.12]	[0.01]	[0.01]	[0.01]	[0.01]	[0.03]
Capital to Assets	-0.625	0.083	-0.071	-0.073	-0.078	0.288
	[5.00]	[0.09]	[0.14]	[0.20]	[0.17]	[0.66]
Non Perf. Loans	-0.453*	-0.083**	-0.125**	-0.121*	-0.124**	-0.182**
	[0.23]	[0.03]	[0.05]	[0.07]	[0.06]	[0.08]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	172	322	322	322	322	52

Note: This table reports the results of a set of estimations aimed to assess the robustness of our baseline estimates. All regressions are estimated with annual data from 1991 to 2014. GMM estimator is used in columns (1), (2) and (6) and LSDV estimator in columns (3), (4) and (5). Control variables are: the initial level of economic performance, investment growth rate, inflation, trade openness and government consumption. Standard errors are in brackets. * p<0.1, ** p<0.05, *** p < 0.01. Data sources: GFDD and WDI.

APPENDIX

Table A: Data description and sources

Data	Definition	Source	Frequency
	Economic Performance		
GDP/Cap. growth rate	Annual percentage growth rate of GDP per capita based on constant local currency. Aggregates are based on constant 2010 U.S. dollars.	WDI	Annual
	Banking variables		
Private Credit	Private credit by deposit money banks and other financial institutions (% of GDP).	GFDD	Annual
Bank capital to assets ratio	Ratio of bank capital and reserves to total assets. Capital and reserves include funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments. Total assets include all nonfinancial and financial assets.	GFDD	Annual
Non Perf. Loans	Ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans (total value of loan portfolio). The loan amount recorded as nonperforming includes the gross value of the loan as recorded on the balance sheet, not just the amount that is overdue.	GFDD	Annual
Bank Credit	Bank credit to the private non-financial sector (% of GDP).	BIS	Annual
Total Credit	Sum of credit to non-financial corporations and credit to households (% of GDP).	BIS	Annual
Credit to NFC	Total credit to non-financial corporations (% of GDP).	BIS	Annual
Credit to Households	Total credit to households (% of GDP).	BIS	Annual
Bank credit to bank deposit	The financial resources provided to the private sector by domestic money banks as a share of total deposits.	GFDD	Annual
Financial system deposits to GDP	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP.	GFDD	Annual
	Additional variables		
Initial GDP	GDP per capita	WDI	Annual
Investment growth rate	Annual percentage growth of gross capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	WDI	Annual
Gov. Consumption	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees).	WDI	Annual
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals.	WDI	Annual
Interest Rate	Long-term nominal sovereign interest rates.	Datastream	Annual
Trade	Trade in services is the sum of service exports and imports divided by the value of GDP, all in current U.S. dollars.	WDI	Annual
Gov. Debt	Central government debt. It includes domestic and foreign liabilities. Gross amount of government liabilities reduced by the amount of equity and financial derivatives held by the government. (% of GDP)	Eurostat	Annual
Securities	Total amount of domestic private debt securities (outstanding) issued in domestic markets (% of GDP). It covers data on long-term bonds and notes, commercial paper and other short-term notes.	GFDD	Annual
Inequality	Gini index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	WDI	Annual

Table B: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Median	Max
GDP/Cap. growth rate	322	1.49	3.86	-14.56	1.59	12.92
Credit to GDP	322	89.53	49.15	1.13	86.99	268.05
Capital to Assets	322	6.98	2.37	2.70	6.50	14.22
Non Perf. Loans	322	5.59	6.29	0.10	3.60	44.90
Investment	322	0.98	10.11	-38.90	1.37	50.51
Gov. Cons.	322	19.91	2.81	14.08	19.50	28.06
Inflation	322	2.70	2.31	-4.48	2.41	15.43
Interest Rate	322	5.03	2.82	0.55	4.44	33.97
Trade	322	111.2	63.4	45.6	89.1	357.5

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