

# **Catching up or drifting apart: Convergence of household and business credit in Europe**

Berrak Bahadir and Neven Valev

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## Abstract

We provide evidence for convergence in the levels of financial development across European countries. The process is particularly strong for the transition countries that have a low initial level of private credit and are catching up with Western Europe. However, the convergence is associated mostly with household credit, including mortgage and consumer credit, which may limit its benefits for the wider economy.

JEL Codes: G01, E22

Key Words: Household Credit, Business Credit, Convergence

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Bahadir, Özyeğin University (berrak.bahadir@ozyegin.edu.tr); Valev, Georgia State University (nvalev@gsu.edu).

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## **I. Introduction**

Despite the massive financial liberalization process that took place around the world in recent decades, there are still large differences in credit levels across countries. For example, Demirgüç-Kunt et al. (2014) report that 27 percent of adults in high-income OECD countries have a mortgage as opposed to less than 10 percent in developing countries. The levels of business credit also differ. For example, the ratio of business credit to GDP in Poland was 15 percent at the end of our sample period in 2013 whereas in Germany it was double that. The question we raise in this paper is whether these differences in household and business credit levels between more and less developed countries decline over time.

We are interested in the convergence of household and business credit as it has important implications for the real economy. Aghion et al. (2005) show that the convergence of income per capita is substantially faster in countries that have reached a certain level of financial development while countries with underdeveloped financial markets have lower long-term economic growth rates. When the private sector faces financial constraints, this slows down economic development and widens the income gap between developed and developing economies. Thus, catching up in terms of financial development can facilitate income convergence. However, this logic applies only to business credit as household credit seems to have no impact on economic growth (Beck et al., 2012) and may even have a negative effect on growth (Sassi and Gasmi, 2014). A recent working paper by Mian, Sufi and Verner (2015) finds that a rise in the household debt to GDP ratio predicts lower output growth and higher

unemployment over the medium-run. Also, rapid growth in household credit has been associated with a greater likelihood of financial crises (Jorda et al., 2014; Büyükkarabacak and Valev, 2010). Hence, whether less developed countries catch up in terms of household or business credit can have very different macroeconomic implications.

We study the convergence process for household and business credit using data from 30 European countries during the period from 1995 to 2013. The advantage of the data set is that it disaggregates the overall level of bank credit into business and household credit with a subsequent differentiation between mortgage and consumer credit. Also, the data cover countries from Western and Eastern Europe allowing us to observe interesting dynamics within a relatively short time frame during the processes of transition from socialism and European Union integration. Our findings show that:

- There is convergence of financial development across Europe.
- The convergence is substantially faster for household credit compared to business credit and especially rapid for consumer credit.
- Although it is not limited to the transition countries, the process of convergence is particularly strong in the former socialist countries that are catching up with Western Europe.

Our paper is related to two strands of the literature on financial development. First, we contribute to the literature on the determinants of financial development, e.g. La Porta et al. (1997, 1998), Djankov et al. (2007), and Beck et al. (2003) by providing evidence on the factors that explain the differences in financial development across countries. However, our particular focus is not on the magnitude of differences in financial development between countries but on the *changes* in these differences over time. We want to know if financially less developed

countries catch up with the financially more developed countries in terms of credit availability.<sup>1</sup> Second, we contribute to the literature on financial development convergence. Veysov and Stolbov (2011) and Bahadir and Valev (2015) report financial development convergence in broad samples of developed and developing countries and Bruno et al. (2012) find tentative evidence for convergence looking at household financial assets in the OECD countries. In these papers, the low initial level of credit across countries is associated with rapid subsequent growth of credit. Our contribution to these papers is twofold. First, we investigate separately household and business credit and find important differences between the two types of credit. Second, we focus on specific issues relevant to Europe such as the introduction of the euro and the transition of the former socialist countries.

In understanding the convergence in credit, we are particularly interested in the dynamics generated by the introduction of the European Monetary Union. Recent literature studies the effects of the European Monetary Union (EMU) on capital market integration by analyzing the stock and bond market convergence, e.g. Kim et al. (2005) and Mylonidis and Kollias (2010). We contribute to this literature by focusing on the convergence in credit markets rather than the stock market. While it is the large companies that mostly benefit from stock market integration, for small and medium enterprises credit markets play an important role. We ask the question whether the introduction of the EMU led countries with low credit levels to catch up with financially developed countries.

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<sup>1</sup> There is an important difference between studying the determinants of financial development and studying financial development convergence. Financial markets have evolved significantly in advanced economies during the last several decades reflecting improvements in financial sector know-how. The question for developing countries then is not only whether its citizens can access more financial services over time but whether they take full advantage of the available international finance know-how. To answer that question, we must look at the differences between countries over time and not only at the growth of financial services within one country over time.

We also build upon the literature on financial development in the transition economies that has received substantial research interest over the years as the transformation of the financial systems has been an important part of the overall transition of the former socialist countries. McNulty and Harper (2012) provide an extensive survey of the literature and Brown and de Haas (2012), Caporale et al. (2015), and Nguyen and Qian (2014) are recent examples. Again, despite the interest, the literature has not addressed the question whether the levels of financial development in the transition economies has been catching up with the levels of financial development in Western Europe. We provide such analysis using disaggregated data on business and household credit.

The rest of the paper is structured as follows. In section II we briefly discuss business and household credit. Then, we present the data in Section III and in Section IV we describe the empirical results. The paper concludes with final remarks in section V.

## **II. Convergence in business and household credit**

Although not perfect, the level of bank credit to the private sector as percent of GDP is the most widely used measure of financial development in the literature.<sup>2</sup> Low quality of institutions such as contract enforcement and property rights and an unstable macroeconomic environment constrain the availability of financing for businesses and households. Respectively, improvements in these factors reduce the constraint and allow the expansion of private credit. In most cases, the enhanced access to credit benefits the economy and is interpreted as financial development. From that perspective, comparing the levels of private credit to GDP across countries is an indicator of relative financial development.

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<sup>2</sup> See Beck, Degryse, and Kneer (2014) for a recent discussion of the intermediation vs. size effects of financial systems.

Less financially developed countries may catch up with the more financially developed countries if their institutional environment improves, if there is a transfer of know-how into the banking system, or if the initial level of financial development is so low that attracting new firms and households as bank customers can be done even if the institutions do not improve. Simply put, banks can reach more firms and households by opening new bank branches in localities that were previously unbanked. That seems to be the process captured by the earlier literature on financial development convergence (e.g. Bahadir and Valev, 2015). Countries that liberalized their banking systems and allowed investment in the financial sector experienced growth in private credit that cannot be explained solely by improved institutions, macroeconomic stabilization or other factors. Here, we take that analysis a step further and ask if the convergence process differs between business and household credit.

The literature, e.g. La Porta et al. (1997), shows that the strength of institutions is the most important long-term factor for financial development. Lenders are willing to extend credit only if they can obtain reliable information about the borrowers and can enforce payment. However, the importance of strong institutions might be stronger for business credit than for household credit. Beck et al. (2012) argue that for small consumer loans, credit to households might rely on the law of large numbers and less on the contractual system. Also, household loans for cars or housing might be better secured than firm credit and therefore might require less reliance on the formal contractual framework. Caporale et al. (2015) also argue that: “One of the reasons for the boom in consumer lending [in the transition countries] is the relative unattractiveness of wholesale lending owing to institutional weaknesses, above all the poor functioning of the legal system.” Hence, household credit could grow even in countries where

the institutional environment is not perfect. Business credit, in contrast, can expand significantly only when institutions improve, a process that is typically quite slow.

The growth of household credit is also supported on the demand side by the growth of incomes in less developed countries. The expanding middle class seeks to acquire housing and big-ticket items as well as to smooth its consumption over time. Moreover, consumer credit is a relatively new phenomenon in many countries and its initial level has been low compared to business credit. In that sense, the potential for growth is greater.

Hence, we could conjecture that convergence has been more rapid for household credit compared to business credit. A first look at the data supports that hypothesis. In Table 1 we show the levels of household and business credit for two groups of countries: those with a relatively low level of household or business credit in year 2000 and countries with a relatively high level of credit in 2000. The table also shows the levels of household and business credit of these two groups of countries in 2013. Clearly, there has been substantial growth in the level of household credit in both groups of countries but the growth has been much greater in the countries with a low initial level of credit: 186.1 percent compared to 58.8 percent in the countries with a high initial level of credit. In terms of business credit, the countries with an initially high level of credit did not experience subsequent growth. In the countries with a low level of initial credit, business credit grew by 23.1 percent, faster than in the other group of countries but much slower than the growth of household credit. We can use Croatia and Portugal as an additional example as the credit levels of these two countries are typical of the country group averages. The household credit to GDP ratio in Croatia was 13 percent of GDP in 2000 and it grew more than 180 percent to reach 39 percent of GDP in 2013. During the same period, in Portugal household credit increased from 54 to 77 percent. Business credit also increased in Croatia but the growth

rate was lower: credit to non-financial corporations increased from 18 percent to 33 percent in Croatia whereas in Portugal the same ratio increased from 48 percent to 60 percent of GDP.

### III. Data and methodology

We explore the convergence of different types of credit aggregates in 30 European countries during the period from 1995 to 2013 using the *European Credit Research Institute* database (ECRI). The ECRI data contain statistical observations on credit to non-financial enterprises and to households with a further breakdown into mortgage credit and consumer credit. The macroeconomic data were extracted from the WDI-World Bank database.<sup>3</sup>

We transformed the annual data into three-year periods: 1995-1997, 1998-2000, ..., 2011-2013 in order to preserve the time variation on the country level while smoothing out annual variations. The approach of converting annual data into multi-year averages has been used extensively in the literature (Beck et al., 2000). In our case, we use three-year averages as opposed to five-year averages to increase the number of observations per country as the time span of our data set is not very long. However, we also estimated the models with five-year averages and obtained very similar results. For completeness, in unreported regressions we also use the annual data panel. Again, we obtained similar results that can be provided on request.

We base our estimations on a standard empirical formulation for  $\beta$  convergence:

$$(1) \quad g_{it} = \alpha + \beta \text{Credit}_{it} + \gamma X_{it} + \mu_i + \tau_t + u_{it}$$

where  $g_{it}$  is the growth of the credit aggregate in country  $i$  during a three-year period  $t$  and  $\text{Credit}_{it}$  is the level of credit in the first year of that same time period. We estimate our regressions using country fixed effects  $\mu_i$  and time dummies  $\tau_t$  to capture country- and time-

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<sup>3</sup> Appendix A shows the levels of credit by country; Appendix B details the sources of all variables used in the paper; and Appendix C provides summary statistics.

specific effects. Moreover, all models use robust standard errors to reduce the influence of outliers. We study five different types of credit: total private credit, household credit, mortgage credit, consumer credit, and non-financial business credit. We are interested in the coefficient estimate for  $\beta$ :  $\beta < 0$  implies convergence of the credit type in the sense that credit grows more rapidly in countries and time periods with a lower initial level of credit;  $\beta = 0$  implies that differences in the credit level across countries persist over time; and  $\beta > 0$  provides evidence for divergence, i.e. finance expands more rapidly in countries that are already more financially developed.

The base control set includes a measure for the quality of institutions (ICRG), INFLATION, and real GDP PER CAPITA. According to the literature, e.g. La Porta et al. (1997, 1998), the strength of institutions is the primary long-term determinant of financial development. Hence, we include the International Country Risk Guide (ICRG) Index which is an average of the ICRG indexes for the rule of law, corruption, and bureaucratic efficiency. Low inflation has also been singled out as an important factor for financial development by Huybens and Smith (1999) and Boyd et al. (2001), among others. High inflation is associated with high nominal interest rates and also serves as a proxy for poor macroeconomic management. However, in our particular case, high inflation may also reflect the Balassa-Samuelson effect of productivity and price convergence in the transition economies. Similar to prices, GDP PER CAPITA has also been catching up allowing more households and firms in the transition countries to access credit through higher income and wealth levels. We opted for a parsimonious specification with a few key control variables but we also report the estimation results with a larger control set including trade openness and government spending, two variables that are routinely included in cross national studies. Trade openness could proxy for the demand for trade credit as well as the

pressure to modernize economies that are exposed to international trade by investment in new technology and greater production scale both of which may require external financing. The size of the government reflects the public sector participation in the economy and could be expected to reduce the level of private credit.

Although the model uses the level of financial development in the initial year to explain the subsequent growth of credit, we may still have reverse causality problems. By construction, changes in the last period explain the starting level for the next period which may violate the condition for lack of covariance between the credit level and the error term. Similarly, the level of credit measured at a certain point in time could be explained by the changes afterwards because these changes by construction include the level at the beginning of each period. Moreover, some of the control variables may also present reverse causality issues. Therefore, we also implement Generalized Method of Moments (GMM) dynamic panel techniques to address potential reverse causality problems. The methodology has been used widely in the finance and growth literature as, for example, in Beck, Levine, and Loayza (2000). For the GMM estimations we revert to annual data as the multi-year averages do not provide a sufficient number of observations over time for some of the countries in the sample.

Then, we estimate equation (1) with interactions of the initial credit levels with two dummy variables for TRANSITION countries and European Monetary Union (EMU) members. The TRANSITION variable equals 1 for the former socialist countries and 0 otherwise. EMU equals 1 in the years when a country is a member of the Eurozone and 0 otherwise. The question is whether any convergence effects are driven by the catching up process of the former socialist countries that started the transition process with low levels of private credit. We are also interested in whether membership in the Eurozone is associated with more rapid convergence of

credit levels as EMU membership tends to lower the risk of financial instability and to lower interest rates. We also experimented with an additional variable for the percent foreign banks in a country using data from Claessens and Horen (2014) but the data availability for our sample was too limited to allow systematic analysis.

#### **IV. Results**

Table 2 shows the results of estimating equation (1) using various credit aggregates. Looking across the five columns of results we see consistent evidence for convergence for all credit types. The size of the estimated coefficient on total private credit in the first column of results is -0.20 which means that a one standard deviation decline in total credit (29 percentage points) leads to a 5.8 percentage points decline in the growth rate of total credit. That is about a third of the standard deviation of the growth rate of total private credit in the sample (16.4 percent). Comparing household credit in column 2 and business credit in column 5 we see a much larger convergence effect for household credit in terms of the sizes of the coefficient estimates. The effect on consumer credit is particularly large. With an estimated coefficient of -2.22 in column 4, a one standard deviation increase in consumer credit (3 percentage points) leads to a 6.7 percentage points decline in its growth rate which is about half of the standard deviation of the growth in consumer credit in the sample (17.3 percent). Looking at a specific example can further illustrate the magnitude of results. Total private credit in Turkey increased from 19 to 62 percent of GDP during 2005 to 2013. According to our estimates, this rapid growth of 43 percentage points is associated with a 8.6 percent decline in the growth rate of credit. Indeed, credit growth in Turkey has declined substantially during that time. Consumer credit presents a similar pattern with stronger evidence for convergence. Consumer credit in

Turkey increased from 5 to 14 percent of GDP which is associated with a 20.1 percentage points decline in the growth of consumer credit.

Looking at the control variables, the ICRG measure for institutions is not statistically significant in any of the models while GDP per capita is positive and statistically significant for total credit and household credit. Inflation is generally not statistically significant except for mortgage credit where it has a positive sign that probably captures the rapid growth of mortgages in the transition countries that also tend to have higher inflation. For robustness, in Table 3 we add trade openness and government spending to the model. The key results are very similar to the benchmark estimates and the additional controls are not statistically significant except in column 3 where trade openness is marginally significant.

Then in Table 4 we apply generalized method of moments (GMM) dynamic panel techniques (Blundell and Bond, 1998; Beck, Levine, and Loayza, 2000) in order to deal with the possible simultaneity of the initial level of credit and the other independent variables. The GMM systems estimator combines: 1) a GMM *difference* estimator where lagged levels of the explanatory variables are used as instruments under the conditions that the error term is not serially correlated and that the lagged levels of the explanatory variables are weakly exogenous, i.e., they are uncorrelated with future error terms and 2) a GMM estimator in *levels* that uses the lagged differences of the explanatory variables as instruments under two conditions: first, the error term is not serially correlated and, second, although there may be correlation between the levels of the explanatory variables and the country-specific error term, there is no correlation between the difference in the explanatory variables and the error term. As standard in the literature, we use two specifications tests: the Hansen test for the validity of the instruments and a test that the error term is not second-order serially correlated. The estimations control for

country-specific effects and use robust standard errors. We are also careful in following Roodman's (2007) guidelines to avoid overfitting. Using GMM, the signs of the coefficients are the same as before but only household credit including consumer and mortgage credit are statistically significant at accepted significance levels. This provides further evidence that household credit and its components have experienced a more robust convergence process compared to business credit.

In Table 5 we test if the convergence process is limited to the transition countries by adding interaction variables of the TRANSITION dummy variable and the initial levels of credit. The same pattern seems to hold across various credit types: the initial level of credit is negative and statistically significant and all interactions are also negative and statistically significant. Moreover, the sizes of the interaction terms are substantially greater than the convergence estimates in Table 2. In other words, while there has been a process of convergence among the non-transition economies, the bulk of the convergence process can be attributed to the transition countries catching up with Western Europe. One exception is mortgage credit where only the interaction term is statistically significant which suggest that the entire convergence process can be accounted for by developments in the transition countries.

In Table 6 we perform the same estimations but this time we interact the initial levels of credit with the EMU dummy variable. Unlike the interaction terms in Table 5, here all interactions are positive and statistically significant with the exception of consumer credit. It seems that convergence has been faster for non-EMU countries. That result points to a more rapid convergence at the lower levels of financial development, mostly in the transition countries that were either outside of the EMU or joined later in the sample time period. In terms of consumer credit, on the other hand, we do not find a difference between EMU and non-EMU

economies. These findings are confirmed in Table 7 where we introduce squared terms of the initial levels of credit. Convergence is faster at lower levels of credit and slows down as credit expands. Consumer credit is again an exception as, within this sample of countries and years, the speed of convergence does not seem to decline with the rise in its levels.

## **V. Conclusion**

We present empirical evidence for convergence of the levels of private credit across European countries. The convergence of credit levels is stronger for household credit, including mortgage credit and consumer credit, compared to business credit. Moreover, the process is most prominent for the transition countries what have been catching up with the levels of financial development in Western Europe.

There are three broad implications of our findings. First, the process of financial convergence will slow down over time. The low initial level of credit seems to be the main driving force behind the convergence process as our regressions control for the quality of institutions, inflation, income levels, and other factors. Also, the catching up process is particularly evident for household credit as its initial levels were much lower in the transition countries. As the numbers of previously unbanked customers decline, especially among households, the financial convergence process will likely slow down and further improvements in credit access would require the improvement of institutions. Second, the benefits of financial convergence for the real economy are probably limited since much of the convergence process has occurred in terms of household credit. Rebalancing towards business credit in the future could lead to a more positive effect on economic growth but, as our results suggest, such a rebalancing will be slow. Third, Eurozone membership does not seem to foster more rapid

convergence in credit levels. Instead, Eurozone membership seems to reflect an already high level of development what, subsequently, is associated with slower credit growth.

In terms of future research, our results underline the importance of differentiating between household and business credit. Much of the credit growth in the developed countries in recent years has come from the expansion of mortgage credit and a similar pattern seems to exist in emerging markets. Clearly, the two types of credit have different dynamics and, as the literature shows, different impacts on economic development, external balances, financial crises, and other aspects of economic life. Hence, the deeper we go into its components, the better we will understand the behavior of credit and its role in the economy.

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**Table 1: Convergence of household and business credit**

	Country groups according to their 2000 levels of bank credit			
	Household Credit		Business Credit	
	Low	High	Low	High
2000	0.1298	0.5709	0.2037	0.4956
2013	0.3714	0.7027	0.3234	0.5270
Percent increase 2000-2013	186.13%	23.09%	58.76%	0.06%

Notes: Two groups with 15 countries each. High (low) household credit levels: countries with household credit to the private sector greater (lower) than 27.4 percent of GDP in 2000; for business credit high (low) group includes countries with business credit to GDP ratio greater (lower) than 35.2 percent of GDP in 2000.

**Table 2: Baseline regression results**

VARIABLES	(1)	(2)	(3)	(4)	(5)
Total Private Credit/GDP	-0.20*** (0.04)				
Household Credit/GDP		-0.46*** (0.13)			
Mortgage credit/GDP			-0.25* (0.13)		
Consumer Credit/GDP				-2.22*** (0.50)	
Business Credit/GDP					-0.24*** (0.05)
GDP per capita	0.44** (0.18)	0.43** (0.20)	0.60 (0.39)	0.11 (0.29)	0.20 (0.24)
Inflation	-1.39 (1.03)	1.33 (2.26)	2.57** (1.17)	1.45 (1.82)	-0.72 (0.91)
ICRG Index	0.17 (0.29)	0.04 (0.29)	-0.41 (0.45)	0.02 (0.54)	0.14 (0.33)
Constant	-6.22 (19.08)	9.68 (21.80)	25.06 (30.25)	7.03 (38.61)	-6.22 (21.16)
Observations	141	145	136	132	155
R-squared	0.41	0.33	0.32	0.44	0.28

Notes: Dependent variables are the 3-year averages of the annual growth rate of total bank credit to GDP, household credit to GDP, mortgage credit to GDP, consumer credit to GDP, and non-financial corporation credit to GDP. P-values are calculated from robust standard errors that are clustered on the country level. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively. All regressions are estimated using fixed effects regressions with dummies for the respective time periods.

**Table 3: Baseline regressions with additional control variables**

VARIABLES	(1)	(2)	(3)	(4)	(5)
Total Private Credit/GDP	-0.22*** (0.05)				
Household Credit/GDP		-0.51*** (0.17)			
Mortgage/GDP			-0.51*** (0.15)		
Consumer Credit/GDP				-2.24*** (0.48)	
Business Credit/GDP					-0.27*** (0.07)
GDP per capita	0.44 (0.34)	0.61 (0.52)	1.71** (0.77)	0.32 (0.43)	0.26 (0.29)
Inflation	-1.27 (1.01)	1.20 (2.21)	2.07* (1.17)	1.29 (1.85)	-0.67 (0.87)
ICRG Index	0.20 (0.30)	0.04 (0.29)	-0.39 (0.42)	0.00 (0.55)	0.15 (0.32)
Government	0.75 (1.00)	0.62 (1.38)	1.96 (1.19)	0.21 (1.00)	0.40 (0.73)
Trade	-0.01 (0.09)	-0.07 (0.11)	-0.31* (0.16)	-0.09 (0.10)	-0.03 (0.07)
Constant	-20.12 (30.87)	2.51 (32.77)	-4.71 (31.30)	8.51 (44.87)	-12.26 (25.57)
Observations	141	145	136	132	155
R-squared	0.42	0.34	0.37	0.44	0.29

Notes: Dependent variables are the 3-year averages of the annual growth rate of total bank credit to GDP, household credit to GDP, mortgage credit to GDP, consumer credit to GDP, and non-financial corporation credit to GDP. P-values are calculated from robust standard errors that are clustered on the country level. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively. All regressions are estimated using fixed effects regressions with dummies for the respective time periods.

**Table 4: Baseline regressions using GMM estimation**

VARIABLES	(1)	(2)	(3)	(4)	(5)
	1	1	1	1	1
Total Private Credit/GDP	-0.07** (0.03)				
Household/Credit/GDP		-0.29*** (0.09)			
Mortgage/GDP			-0.34** (0.16)		
Consumer Credit/GDP				-2.02*** (0.67)	
Business Credit/GDP					-0.07 (0.07)
GDP per capita	-0.07 (0.11)	0.10 (0.15)	-0.62** (0.28)	-0.02 (0.30)	-0.05 (0.12)
Inflation	4.36 (3.58)	7.55 (4.98)	12.04** (4.82)	8.42* (4.38)	4.17 (3.86)
ICRG Index	0.67* (0.36)	0.46 (0.47)	2.10*** (0.76)	-0.21 (0.65)	0.52 (0.40)
Constant	-46.43 (30.90)	-27.05 (41.37)	-142.47** (57.71)	29.76 (46.55)	-39.21 (33.61)
Hansen test	0.16	0.18	0.15	0.17	0.19
Serial Correlation test	0.15	0.70	0.98	0.40	0.16
Observations	408	413	382	374	444

Notes: P-values are calculated from robust standard errors that are clustered on the country level. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively. All regressions are estimated using generalized method of moments (GMM) dynamic panel dynamic estimation with dummies for the respective time periods.

**Table 5: Convergence of transition economies**

VARIABLES	(1)	(2)	(3)	(4)	(5)
Total Private Credit/GDP	-0.16*** (0.03)				
Trans*Total Cr/GDP	-0.25*** (0.06)				
Household Credit/GDP		-0.37*** (0.09)			
Trans*Household/GDP		-0.83*** (0.26)			
Mortgage/GDP			-0.18 (0.11)		
Trans*Mortgage			-1.73*** (0.57)		
Consumer Credit/GDP				-1.23*** (0.34)	
Trans*Consumer /GDP				-1.91** (0.75)	
Business Credit/GDP					-0.18*** (0.06)
Trans*Business /GDP					-0.31* (0.17)
GDP per capita	0.30 (0.20)	0.28* (0.16)	0.45 (0.29)	-0.04 (0.32)	0.08 (0.27)
Inflation	-2.03** (0.98)	-0.63 (1.87)	-0.46 (1.81)	1.16 (1.89)	-0.68 (0.90)
ICRG Index	0.26 (0.24)	0.19 (0.21)	-0.05 (0.45)	-0.02 (0.54)	0.18 (0.31)
Constant	-7.78 (15.85)	5.59 (16.64)	9.75 (29.18)	12.15 (38.61)	-5.90 (19.60)
Observations	141	145	136	132	155
R-squared	0.48	0.44	0.47	0.46	0.31

Notes: Dependent variables are the 3-year averages of the annual growth rate of total bank credit to GDP, household credit to GDP, mortgage credit to GDP, consumer credit to GDP, and non-financial corporation credit to GDP. P-values are calculated from robust standard errors that are clustered on the country level. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively. All regressions are estimated using fixed effects regressions with dummies for the respective time periods. Trans is the dummy variable for transition economies.

**Table 6: Convergence in the EMU**

VARIABLES	(1)	(2)	(3)	(4)	(5)
Total Private Credit/GDP	-0.25*** (0.05)				
EMU*Total Cr/GDP	0.09*** (0.03)				
Household Credit/GDP		-0.52*** (0.17)			
EMU*Household/GDP		0.17* (0.09)			
Mortgage/GDP			-0.37** (0.18)		
EMU*Mortgage			0.29* (0.17)		
Consumer Credit/GDP				-2.14*** (0.54)	
EMU*Consumer /GDP				-0.38 (0.82)	
Business Credit/GDP					-0.31*** (0.06)
EMU*Business /GDP					0.14** (0.05)
GDP per capita	0.71*** (0.16)	0.65*** (0.23)	0.78** (0.35)	-0.04 (0.35)	0.35 (0.25)
Inflation	-1.74* (1.01)	1.02 (2.29)	2.14* (1.26)	1.71 (1.88)	-0.77 (0.95)
ICRG Index	0.19 (0.29)	0.04 (0.28)	-0.40 (0.47)	-0.01 (0.55)	0.16 (0.33)
EMU	-11.28*** (3.16)	-11.79** (5.46)	-11.84* (5.97)	5.31 (6.54)	-7.12** (3.26)
Constant	-10.48 (18.49)	7.61 (20.59)	24.00 (32.78)	12.42 (40.06)	-9.67 (22.03)
Observations	141	145	136	132	155
R-squared	0.44	0.35	0.34	0.44	0.30

Notes: Dependent variables are the 3-year averages of the annual growth rate of total bank credit to GDP, household credit to GDP, mortgage credit to GDP, consumer credit to GDP, and non-financial corporation credit to GDP. P-values are calculated from robust standard errors that are clustered on the country level. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively. All regressions are estimated using fixed effects regressions with dummies for the respective time periods. EMU is the dummy for European Monetary Union membership.

**Table 7: Nonlinearity in convergence**

VARIABLES	(1)	(2)	(3)	(4)	(5)
Total Credit/GDP	-0.40*** (0.07)				
Total Credit/GDP Squared	0.01*** (0.00)				
Household Credit/GDP		-1.06*** (0.26)			
Household Credit/GDP Squared		0.01*** (0.00)			
Mortgage/GDP			-1.06*** (0.28)		
Mortgage/GDP Squared			0.01*** (0.00)		
Consumer Credit/GDP				-5.34** (2.60)	
Consumer Credit/GDP Squared				0.19 (0.15)	
Business Credit/GDP					-0.44*** (0.13)
Business Credit/GDP Squared					0.01* (0.00)
GDP PC	0.49*** (0.16)	0.48* (0.23)	0.56 (0.44)	0.03 (0.27)	0.21 (0.24)
Inflation	-1.98* (0.99)	-0.35 (1.93)	0.33 (1.04)	0.47 (1.97)	-0.82 (0.90)
Index	0.26 (0.27)	0.26 (0.26)	0.11 (0.44)	0.20 (0.47)	0.15 (0.31)
Constant	-4.42 (18.31)	6.14 (21.08)	0.92 (27.59)	5.66 (37.59)	-2.85 (21.14)
Observations	147	151	138	134	163
R-squared	0.43	0.42	0.36	0.39	0.28

Notes: Dependent variables are the 3-year averages of the annual growth rate of total bank credit to GDP, household credit to GDP, mortgage credit to GDP, consumer credit to GDP, and non-financial corporation credit to GDP. P-values are calculated from robust standard errors that are clustered on the country level. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5% and 1% level, respectively. All regressions are estimated using fixed effects regressions with dummies for the respective time periods.

## Appendix A: Credit Levels

Country	Total Private Credit/GDP	Household Credit/GDP	Consumer Credit/GDP	Mortgage Credit/GDP	Business Credit/GDP
Austria	92.52	37.75	9.57	19.59	54.76
Belgium	76.60	46.95	5.28	34.21	29.66
Bulgaria	38.10	11.09	6.13	4.18	26.99
Cyprus	231.49	116.73	19.59	56.64	114.75
Czech Republic	37.06	13.19	2.72	8.52	23.86
Germany	93.99	59.99	7.62	38.41	34.01
Denmark	145.07	98.82	6.96	94.82	46.25
Estonia	60.84	30.04	2.78	24.20	30.80
Greece	67.14	30.66	9.46	20.52	36.48
Spain	121.78	60.82	7.80	43.08	60.96
Finland	65.17	40.58	5.15	28.28	24.58
France	74.767	38.87	7.52	26.77	35.90
Hungary	45.35	19.07	7.42	10.12	26.27
Ireland	115.2	60.19	9.43	47.97	55.01
Italy	74.18	28.32	4.76	13.47	45.87
Lithuania	46.99	20.58	2.75	14.64	26.42
Luxembourg	73.20	42.16	3.73	32.98	31.03
Malta	91.13	32.27	3.71	21.96	58.86
Netherlands	114.71	67.61	3.99	59.2	47.11
Poland	31.37	16.76	6.33	7.01	14.61
Portugal	116.90	62.84	6.96	48.92	54.06
Romania	21.24	8.59	9.91	3.14	12.65
Sweden	107.07	58.84	4.02	44.73	48.23
Slovenia	66.23	19.45	7.56	8.09	46.78
Slovakia	33.33	15.23	2.62	10.45	18.10
United Kingdom	112.25	86.01	13.14	69.49	26.24
Croatia	55.23	29.42	0.05	11.65	25.82
Turkey	19.79	6.13	8.79	4.68	13.67
Switzerland	138.36	91.19	1.17	83.82	47.19
Iceland	94.92	31.23	-	29.77	63.69

Notes: Credit levels for each country for the data period used in the regressions.

## Appendix B: Data Sources

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
Total Private Credit to GDP	Credit to non-financial corporations and household as percentage of GDP	ECRI Statistical Package 2013
Credit to Households	Total credit to households as a percentage of GDP	ECRI Statistical Package 2013
Mortgage Credit	Total mortgage credit to GDP	ECRI Statistical Package 2013
Consumer Credit	Total consumer credit to GDP	ECRI Statistical Package 2013
Business Credit	Total credit to non-financial corporations	ECRI Statistical Package 2013
GDP per capita	Real GDP per capita (Constant 2000 US\$)	WDI
Inflation	Average log difference in the Consumer Price Index over the sample period	WDI
International Country Risk Guide Index (ICRG)	The average for rule of law, bureaucracy, and corruption	ICRG
Government consumption	Total government expenditures relative to GDP	WDI
Trade	Ratio of exports plus imports to GDP	WDI

## Appendix C: Summary Statistics

<b>Column1</b>	<b>Household Credit/GDP</b>	<b>Total Credit /GDP</b>	<b>Consumer Credit /GDP</b>	<b>Mortgage Credit /GDP</b>	<b>Business Credit /GDP</b>	<b>GDP per capita</b>	<b>Inflat ion</b>	<b>ICRG</b>	<b>Household Credit /GDP Growth</b>	<b>Mortgage /GDP Growth</b>	<b>Consumer Credit/GDP Growth</b>	<b>Total Credit/ GDP Growth</b>	<b>Business Credit /GDP Growth</b>
# obs	141	141	126	132	155	155	155	155	141	132	126	141	155
Mean	0.42	0.80	0.06	0.31	0.38	28722	5.57	81.04	9.71	12.38	7.14	5.35	3.65
Std	0.30	0.45	0.04	0.25	0.20	18910	12.55	8.09	13.77	17.62	15.05	8.46	8.22
Min	0.01	0.07	0.00	0.00	0.06	2597	0.02	53.00	-14.64	-29.12	-22.50	-11.92	-19.72
Max	1.31	2.63	0.20	1.16	1.32	86127	88.11	94.50	73.52	91.58	70.22	36.07	32.74
<i>Correlation</i>													
<i>Household Credit/GDP</i>	1.00												
<i>Total Credit/GDP</i>	0.94	1.00											
<i>Consumer Credit/GDP</i>	0.31	0.37	1.00										
<i>Mortgage/GDP</i>	0.96	0.86	0.13	1.00									
<i>Business Credit/GDP</i>	0.64	0.86	0.38	0.50	1.00								
<i>GDP per capita</i>	0.57	0.48	-0.06	0.62	0.22	1.00							
<i>Inflation</i>	-0.50	-0.48	0.02	-0.49	-0.33	-0.48	1.00						
<i>ICRG Index</i>	0.50	0.45	-0.14	0.53	0.26	0.73	-0.49	1.00					
<i>Household Credit/GDP Growth</i>	-0.54	-0.53	-0.30	-0.50	-0.38	-0.41	0.54	-0.26	1.00				
<i>Mort/GDP Growth</i>	-0.54	-0.52	-0.25	-0.51	-0.37	-0.43	0.59	-0.30	0.87	1.00			
<i>Consumer Credit/GDP Growth</i>	-0.45	-0.47	-0.32	-0.39	-0.40	-0.33	0.46	-0.20	0.80	0.64	1.00		
<i>Total Credit/GDP Growth</i>	-0.38	-0.39	-0.10	-0.37	-0.31	-0.28	0.47	-0.24	0.79	0.56	0.75	1.00	
<i>Business/GDP Growth</i>	-0.19	-0.19	0.07	-0.21	-0.15	-0.14	0.37	-0.18	0.52	0.31	0.54	0.91	1.00