



Securitization and economic activity: The credit composition channel[☆]



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ABSTRACT

Using an international panel of 104 countries over the period 1995–2012, we analyze the relationship between country-level securitization and economic activity. Our findings suggest that securitization is negatively related to various proxies of economic activity – even prior to the crisis of 2007–2009. We explain this finding as the results of securitization spurring consumption at the expense of investment and capital formation. Consistent with this, we find that securitization of household loans is negatively associated with economic activity, whereas business securitization displays a weak positive association with it, and that household securitization increases an economy's consumption–investment ratio. Our results inform recent initiatives aimed at reviving securitization markets, as they indicate that the impact of securitization crucially depends on the underlying collateral.

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1. Introduction

Securitization is an important feature of modern financial systems. Starting in the early 60s, securitization of mortgage loans first

became common in the U.S. Securitization steadily became more widespread until the 2000s, when it reached around 50% of outstanding mortgage and consumer loans in the U.S. The years prior to the crisis of 2007–2009 were characterized by a boom in worldwide securitization markets. Between 2000 and 2006, issuance of securitization products more than tripled, from less than \$700 billion to about \$2800 billion.¹ The crisis then caused an effective breakdown of securitization markets. Securitization activities retreated to levels only seen before the 2000s and have stabilized at a low level since then.

Amid the carnage, a discussion has emerged about the future of securitization. Several policy-makers have spoken out against, others in favor of securitization markets. Recently, the [European Central Bank and the Bank of England \(2013\)](#) have issued a paper stating their intention to revive securitization markets, focusing on the high quality segment of the ABS market.

Clearly, there are economic benefits and costs to securitization. First and foremost, securitization allows banks to shift risk off their

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¹ Sources: Flow of Funds database, AB Alert and CM Alert databases.

balance sheet and frees up capital for new lending. Securitization is also an important risk management tool, allowing banks to achieve a more diversified pool of exposures. This should lower their cost of taking on risks, the benefit of which should, at least partially, be passed on to borrowers in the form of more favorable lending conditions and higher credit availability. Securitization also allows banks to better insulate themselves from funding shocks, potentially stabilizing credit extension.

On the downside, securitization has demonstrated the potential to reduce the efficiency of financial intermediation. The main reason is the presence of informational problems. In particular, banks, which tend to securitize, become less exposed to borrower risk, which undermines their incentives to screen and monitor. This may result in lower quality lending, and erodes the benefits of intermediation – relative to market-financing. High complexity has also been identified as a potential cost to securitization, as it reduces the ease with which outsiders can evaluate securitization products, potentially resulting in inefficient investment decisions.

There is significant body of evidence supporting the idea that securitization affects intermediation. The literature has typically focused on the impact of securitization on banks themselves (such as their lending behavior or their risk-taking), the impact on loan conditions (e.g., the pricing of loans) and the impact on borrowers (such as their likelihood of default). This focus on the micro-level has clear advantages in providing good settings for identification.

In this paper, we consider the relationship between securitization and *aggregate* outcomes, in particular economic activity. While identification is more challenging at the aggregate level, this focus offers distinct advantages. Securitization is likely to be associated with important externalities that cannot be captured by micro-studies. For example, while securitization may very well increase profits and lower risk for the bank that is shedding the risk, it may be detrimental to the buyers of securitization products. In addition, securitization may also affect the efficiency of capital allocation in the economy (it can either increase or decrease it), which has implications that will not be visible at the immediate bank-firm nexus.

Specifically, in this paper we exploit country-level variations in securitization activities to analyze the relationship between securitization and economic aggregates. Based on a large international sample of securitization issuances from 1995 to 2012, we find securitization activities to be negatively correlated with proxies for economic activity, such as GDP per capita growth, capital formation and changes in the number of new firms established. The effect is economically significant and is not driven by the period of the Global Financial Crisis, suggesting that it is a structural property of securitization.

What can explain this finding? Our results indicate that the effect is neither driven by the amount nor the quality of credit in the economy, which rules out most of the common channels through which securitization affects macroeconomic outcomes. We put forward a new channel, based on the idea that securitization affects the aggregate *composition* of credit in the economy. Securitization of residential mortgage and consumer loans (which are more homogenous and less information sensitive) is easier than for business loans. The development of securitization is thus expected to broadly favor loans to households, as opposed to loans to business. As both types of borrowers are competing for an economy's scarce resources, this may result in an aggregate reduction in investment and lower economic activity.²

² Consistent with the different implication for economic activity, Beck et al. (2012) show that, for a sample of developed and developing economies, enterprise credit facilitates economic growth, whereas household credit has no impact on growth. Sassi and Gasmì (2014), studying 27 European countries, find that enterprise credit

The data is broadly consistent with the *credit composition channel*. We show that only securitization of loans to households is negatively related to economic activity. Securitization of business loans instead displays a positive association with economic activity, albeit a weak one. In addition, we find that securitization increases an economy's consumption-investment ratio. Furthermore, securitization has a more pronounced (negative) impact on proxies of the supply side of the economy than on economic growth. This is consistent with a shift from investment to consumption constraining the supply side of the economy, while potentially boosting demand (and hence leading to a more muted impact on GDP).

The remainder of this paper is organized as follows. The following section discusses various channels that have been emphasized in the literature and through which securitization may affect economic activity. We relate them to the *credit composition channel* and form hypotheses. Section 3 describes the data and the empirical methodology. Section 4 contains the empirical results. The final section concludes and discusses implications for policy.

2. Securitization and economic activity: channels and hypotheses

Before turning to a discussion of the impact of securitization on banks and the wider economy, one should first understand the rationale behind securitization. In particular, why are banks and other financial institutions (and also some non-financial institutions) securitizing? In an early contribution, Greenbaum and Thakor (1987) theoretically show that in a frictionless environment (with full information and no regulation) securitization funding and deposit funding are identical, but they also show how public policy, regulation and information asymmetry change this. The literature proposes regulatory capital arbitrage, gaining extra liquidity, better bank performance and more efficient risk sharing (risk transfer) as driving factors behind securitization (see Cardone-Riportella et al. (2010) for a summary of the empirical literature). The empirical findings, however, are rather mixed. On one hand, Panetta and Pozzolo (2010), for instance, find that the results of securitization are ex-post in line with the expectations (securitizing banks increased their capital ratios and reduced their riskiness) in a cross-country bank level analysis. Again, using individual bank data, Affinito and Tagliaferri (2010) find that, once they securitize, banks have higher profits and lower bad loans. On the other hand, in their study with U.S. bank data and a propensity score matching technique, Casu et al. (2013) conclude that first-time securitizing banks would have comparable costs of funding, credit risk and profitability if they chose not to securitize. A crucial point is the complexity of these financial instruments. Creating a high fixed cost to originate securities, this complexity is a barrier to entering the securitization market (Panetta and Pozzolo, 2010), but there are no effective barriers to buying these highly sophisticated securities and participating in the market as a buyer rather than originator.

The literature on the dynamics of securitization almost exclusively focuses on bank level securitization.³ Many papers touch upon the factors explaining country level securitization. The importance of a legal framework for securitization is raised both in Maddaloni and Peydro (2011) and Altunbas et al. (2009). Altunbas et al. (2009) emphasize the importance of legal origin (common vs. civil law – with common law not requiring any legal background for securitization). Maddaloni and Peydro (2011) use legal obstacles to

is positively related to economic growth, whereas household credit has a negative effect.

³ An exception is Peersman and Wagner (2015). Using structural identification of different types of financial shocks based on sign restrictions, they find that innovations in securitization markets have important effects for U.S. business cycles.

securitization in European countries as time invariant instruments (similar to legal origin). The other main factors mentioned in the literature are demand from investors (including foreign investors), banks' transition to market-based funding from deposit funding, financial innovation and the role of government in some specific cases like the U.S. (Panetta and Pozzolo, 2010; Altunbas et al., 2009; ECB, 2011).

The decision to securitize at the bank (or firm) level may affect the real economy beyond the securitizing institution through different channels. The channels emphasized by previous literature can be broadly categorized into two groups, depending on how they may potentially affect economic output.

First, there are channels suggesting that securitization changes *credit volume* in the economy. This may, in turn, lead to more economic activity if it alleviates the financing constraints of firms. On the other hand, it may also reduce economic activity if it causes excessive debt burdens and defaults. There are various reasons why securitization activities are expected to affect the amount of credit in the economy, or more broadly, lending conditions. Securitization lowers the risks on banks' balance sheets and allows them to release economic and/or regulatory capital.⁴ This should encourage banks to increase their lending activities and charge lower rates to borrowers. Nadauld and Weisbach (2012) provide micro-evidence for this, showing that securitization in the form of CLOs lowers the price of corporate debt. Moreover, securitization techniques allow banks to improve their risk management, which should reduce the cost of taking on risk. Loutskina and Strahan (2009) find that, in the U.S., securitization lowers the impact of funding shocks to loan supply. Carbo-Valverde et al. (2015) show reduced credit constraints for Spanish firms working with banks involved in ABS securitization before the recent financial crisis. More broadly, there is evidence that banks pass on risk management benefits from credit risk transfer techniques to borrowers (Cebenoyan and Strahan, 2004; Franke and Krahn, 2007; Hirtle, 2009; Norden et al., 2014).

Second, there are channels suggesting that securitization has a macroeconomic impact by affecting *credit quality*. By reducing constraints on the side of banks, securitization should lead to a more efficient allocation of capital in the economy (that is, capital flows to the most productive firms and risk is efficiently spread among a diverse group of investors). Stein (2010), in particular, argues that securitization enhances the allocation of risks by transferring them from banks to outside investors. On the downside, there is evidence that securitization reduces credit quality by undermining monitoring and screening incentives of banks.⁵ Marsh (2006) finds that the announcement effect of a new bank loan is weakened when a bank actively uses securitization techniques, consistent with informational problems. Keys et al. (2010) show that securitization has negative effects on the screening incentives of lenders. However, Agarwal et al. (2012) find no evidence of adverse selection in default risk in mortgage securitizations, whereas Benmelech et al. (2012) find that adverse selection problems in corporate loan securitizations are less severe than is commonly believed.

The *credit volume* and *credit quality channel* of securitization are also echoed in the literature on financial development (starting from King and Levine (1993) and surveyed in Levine (2005)). While we focus here on a specific type of financial innovation, this literature studies financial development more broadly. It emphasizes that financial development can have a positive impact on economic

growth by reducing financing constraints (akin to the *credit volume channel*, see for example Levine and Zervos (1998) and Beck et al. (2000)) and by affecting the efficiency of intermediation and the allocation of capital in the economy (the *credit quality channel*, see Jayaratne and Strahan (1996) for the U.S. case). The importance of financial development on the ability to obtain external financial is documented both at level of firms (Love, 2003; Demirgüç-Kunt and Maksimovic, 1998) and the level of industries (Rajan and Zingales, 1998). More recently, specifically after the recent global financial crisis, some studies suggest that too much finance may actually hurt economic performance (see Arcand et al. (2015) among others).

In this paper we emphasize a new channel, which we term the *credit composition channel* of securitization. Household loans, especially mortgages, are more homogenous and can hence more readily be used as collateral in securitization pools (Loutskina, 2011). This is in contrast to business loans, which typically are also more relationship-based. Business loans require more monitoring and screening and are less easily securitized without causing efficiency losses. We would thus expect that general developments in securitization techniques should have a bigger impact on household loans than on business loans. Financial development is thus expected to reduce the cost of household credit relative to business loans and increase relative credit availability. In equilibrium, this should lead to a greater share of national output being used for consumption, instead of investment, which may depress growth by reducing capital accumulation.⁶

We thus hypothesize that

H1. *Countries with more securitization have lower economic growth as securitization favors consumption in the economy at the expense of investment.*

From this follow two more hypotheses, relating to securitization of household and business loans separately:

H2. *Countries with more securitization of household loans have lower economic growth.*

H3. *Countries with more securitization of business loans have higher economic growth.*

3. Data and methodology

We conduct our empirical analysis using panel data analysis for a large set of countries. Our data comes from a number of sources, namely, the AB Alert and CM Alert databases, World Development Indicators (WDI), Penn World Table 8, the banking crisis database from Laeven and Valencia (2013), the World Bank regulation and supervision database, the Global Financial Development Database (GFDD), World Government Indicators and Macroprudential index from Cerutti et al. (2015).⁷

⁴ Securitization may also be driven by regulatory capital arbitrage where there remains implicit recourse on securitizers (Acharya et al., 2013), or when it leads to asset substitution (Jones, 2000; Agostino and Mazzuca, 2011).

⁵ The reason is that post-securitization, the bank is no longer exposed to borrower risk, and hence has less interest in ensuring borrowers are of good quality (Pennacchi, 1988).

⁶ This of course does not preclude that household loans by themselves could spur economic activity (for example, they may lead to higher demand for housing). It is only that if that comes at the expense of financing business activities, growth may suffer. Mills (1987) shows that the social return to housing capital is about half that to non-housing capital using U.S. data. Furthermore, the *credit composition channel* is not orthogonal to the other two channels in that it relies on securitization affecting the volume (or other characteristics) of either lending type. Rather, it is a general equilibrium consequence of the two micro channels.

⁷ We use the World Bank's WDI database as our base dataset and merge other databases – starting with our securitization database – to the WDI data. Our final sample is determined by data availability, but not any other filters which may cause sample selection problems.

Specifically, for our empirical analysis we employ the following country fixed effects panel data model⁸:

$$Growth_{i,t} = \alpha_i + \beta * Securitization_{i,t-1} + \delta' * X_{i,t} + \theta_t + \varepsilon_{i,t}$$

where the dependent variable $Growth_{i,t}$ denotes economic growth. The subindices i and t refer to country and time, respectively. $X_{i,t}$ is a set of control variables at country level.⁹ We use GDP per capita growth as the main proxy for economic growth. Alternatively, we consider growth rates of gross capital formation and growth rates of new firm density.¹⁰ The three measures come from the WDI. In our analysis of the tradeoff between consumption and investment, we proxy the importance of consumption relative to investment with the consumption share, which is defined as the ratio of consumption to the sum of consumption and investment, constructed from Penn World Table 8. We model the relationship between the consumption share and various securitization variables similar to the growth regressions:

$$ConsumptionShare_{i,t} = \alpha_i + \beta * Securitization_{i,t-1} + \delta' * X_{i,t} + \theta_t + \varepsilon_{i,t}$$

Our variable of interest $Securitization_{i,t-1}$ represents total securitization issued in country i in year $t-1$. For our baseline analysis, summing up the amount of each securitization issue in a given country of a given year, we obtain a yearly aggregate amount of securitization, divided by the size of the economy, as the primary proxy for securitization intensity. In addition, we also consider the number of securitization deals normalized by the GDP as an alternative. The rationale behind this proxy is that undertaking a securitization requires a bank to adopt a new technology. Once in use, this technology is expected to be used in future circumstances. Thus it is not so much a question of the amount of funds in a specific securitization, but the mere fact that the bank has undertaken a securitization.

We collect the data on securitization issuance from the AB Alert and CM Alert databases.¹¹ The two databases include all securitizations in the world that are rated by at least one major rating agency. The database distinguishes securitization issuances according to the underlying collateral. The main types are public and private asset-backed securities (ABS), mortgage-backed securities (MBS) and collateralized debt obligations (CDO), sponsored both by financial and non-financial firms. The databases, however, do not cover government-sponsored securitizations, Fannie Mae and Freddie Mac, and asset-backed commercial papers (ABCP).

The two databases contain essential information on the location of collateral, types of underlying collateral, the amount of assets securitized, and the identity of the issuer. For our purpose, we classify securitizations into two groups, depending on whether the underlying collateral is a household loan or not.¹² Some choices had to be made since the distinction between household and other credits is not always clear-cut. Next, following Maddaloni and Peydró (2011), we create our securitization variables according to the

⁸ When the Hausman test is employed, fixed effects specification is selected over a random effects model – confirming the importance of unobserved heterogeneity.

⁹ We adopt Fisher-type panel unit root tests (specifically for an unbalanced panel) with two lags in the ADF regressions with drift. The tests for securitization variables and dependent variables strongly reject the null hypothesis that all the panels contain unit roots.

¹⁰ Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Firm density refers to new firm registration per 1000 people aged 15–64. The data on new firm density growth is available for a smaller panel since 2004 and hence we only use it in our main regressions.

¹¹ See Table A1 for securitization issuances by collateral countries since 1995.

¹² See Table A3 for the final classification.

nationality of the securitized collateral.¹³ All securitization variables are lagged by one period to mitigate the concern of reverse causality. To capture possibly different effects of these two types of securitization, in some regressions we replace the total securitization measure with household and business securitization.

In order to further reduce endogeneity problems and deal with possible business cycle effects, we also employ dynamic panel regressions as a robustness check. Following the literature, we use system GMM estimation based on five-year or three-year non-overlapping averages of all variables. System GMM estimation has various advantages (Arellano and Bover, 1995; Blundell and Bond, 1998). Among others, it allows us to control for both initial GDP of countries and lagged dependent variables. Moreover, it can instrument all independent variables, including securitization measures, using their lagged levels and first-differences (the internal instruments). The validity of instruments is tested through the Hansen test for overidentifying restrictions and AR(2) tests.¹⁴

We include a set of country-level control variables, which are commonly used in the financial development literature (see, for example, Beck et al. (2014)). First, we include indicators controlling for domestic credit and stock market development, measured by domestic credit over GDP and stock traded over GDP, respectively. The credit variable controls for any direct effect of securitization on economic growth, coming through a general expansion in credit (but not taking into account changes in composition). In addition, we include trade over GDP to measure the openness of the economy and inflation to control for macroeconomic stability. Furthermore, we control for government expenditure defined as the share of government final consumption in GDP, urbanization and education level of the country. All these macroeconomic controls come from WDI. Since securitization activities may also affect output through increasing the likelihood of a crisis, we include dummies for banking crises from Laeven and Valencia (2013) to see whether or not we capture this indirect effect. We also employ regulatory variables as additional controls (from the World Bank regulation and supervision database (Barth et al., 2013)) as a robustness check to ensure that the results are not driven by a general deregulation trend in bank activities and capital stringency accompanied by lax supervision and private monitoring. In addition, we include the country-level nonperforming loans to gross loans taken from the GFDD to capture, at least partially, the presence of the *credit quality channel*. In some robustness checks, we also control for bank competition measured by Boone indicator, bank soundness measured by bank Z-score at the aggregate level, and bank credit to deposits, also collected from the GFDD. Moreover, we include institutional quality collected from the World Government Indicators (Kaufmann et al., 2011), and the macroprudential policies index borrowed from Cerutti et al. (2015) in some sensitivity tests as extra controls. For details of data sources and variable definitions, please refer to Table A2.

Finally, we include year dummies, θ_t , to control for year specific effects. For most specifications, we estimate panel fixed effects models with standard errors clustered at the country level, relying on within country variations to show the relationship between securitization and economic growth.

Fig. 1 shows the trends of household and business securitization over the past two decades. Household securitization is clearly the predominant form of securitization, at least until the global

¹³ We drop the deals that involve collateral from more than one country. Securitization measures are matched to variables on economic growth according to the country and the year of issuance.

¹⁴ In the specifications with five-year averages, an AR(2) test cannot be run due to the short length of the panel. When three-year averages are used instead of five-years, the tests are carried out and suggest that the instrumentation is valid.

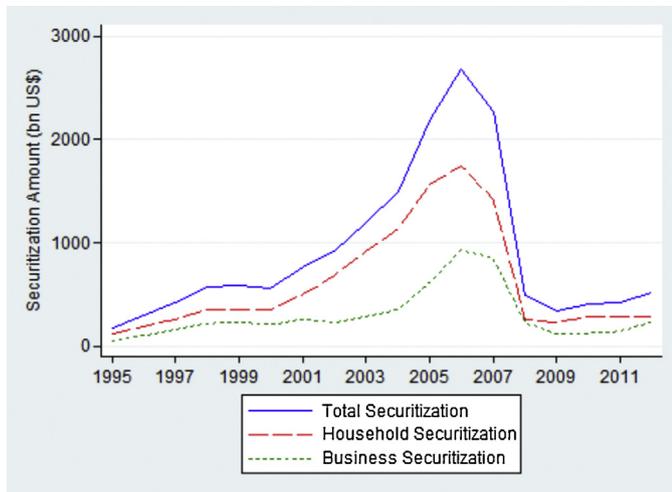


Fig. 1. Composition of securitization: Household related and business related securitization.

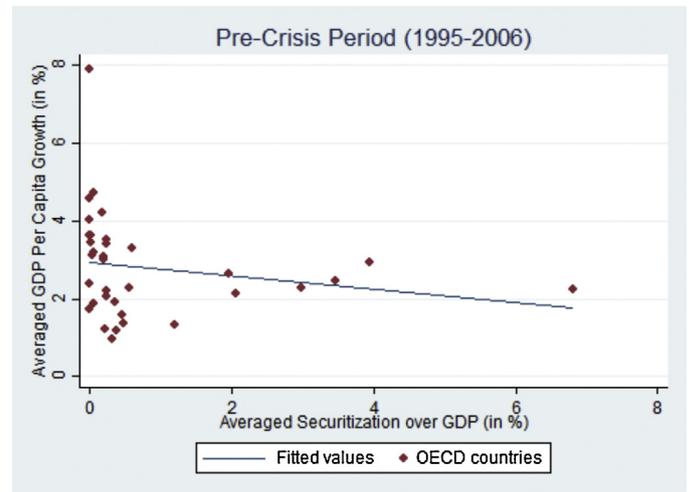


Fig. 2. Economic growth and securitization intensity before the global financial crisis.

The data is averaged over the period of 1995–2006 for the OECD countries. Graphs without outliers of the full period (1995–2012) look very similar.

financial crisis. During 2007 and 2008, both types of securitization collapsed and the large difference in issuances between both securitization types by and large disappeared.

Table 1 presents the summary statistics of our sample. The sample consists of 104 countries. More than half of these countries used securitizations at least once over the period 1995–2012. *Securitization over GDP* has a sample mean of 0.378% and a maximum of 14.381%. In terms of types of collateral, household securitization is the primary market segment. In particular, its sample mean, 0.242%, accounts for two-thirds of average securitization over GDP.

Table 2 presents the pairwise correlation matrix between main variables. First, the three measures of economic growth are positively correlated with each other, as expected. Second, *Securitization over GDP* is negatively correlated with GDP per capita growth at the 10% significance level. Both types of securitization are negatively related to the three measures of economic growth, though the correlation is not statistically significant. Furthermore, the correlation between household and business securitization is rather limited, at around 0.677.¹⁵ It is also important to note that securitization measures and consumption share are negatively correlated, albeit not significantly so. Finally, the measure of the relative importance of consumption is strongly negatively correlated with GDP, hinting at the potential importance of the composition channel.

While in our empirical analysis we exploit within country variation in securitization, it is interesting to see whether there is also a relationship between securitization and economic activity across countries. Fig. 2 plots the pre-crisis average of country-level securitization and growth rates for the OECD countries, as a rather homogenous group. We obtain a negative relationship, which is robust to the exclusion of outliers in the securitization variable.

4. Empirical results

Table 3 presents our baseline results with the variables of interest on securitization and the baseline set of control variables including domestic credit to the private sector, stocks traded over GDP, trade over GDP, inflation, government expenditure,

urbanization, education and banking crisis.¹⁶ In column 1, we use GDP per capita growth as a dependent variable and securitization over GDP as our variable of interest. The estimated coefficient for securitization over GDP is negative and significant at the 10% significance level. The economic effect of the negative association is considerable. More specifically, a one standard deviation increase in securitization over GDP (1.357) is associated with a 0.18% decrease in GDP per capita growth, which is 7% of the mean ($1.357 * 0.136/2.671$) and 4.5% of the standard deviation. While not a very large effect, the power of compounding implies an important impact on output in the medium to long run.

Most of the significant control variables have the expected sign.¹⁷ Higher trade and urbanization increase economic growth, whereas higher inflation and government expenditure and banking crisis are negatively correlated with GDP per capita growth. Interestingly, domestic credit is negatively correlated with economic growth. This finding is parallel to some recent evidence analyzing similar periods on possible negative associations between the macroeconomy and financial developments (measured by credit supply or the importance of bank financing). Arcand et al. (2015) document non-linear and possibly negative effects of credit to GDP as the dark side of financial development and Beck et al. (2014) estimate negative coefficients, though insignificant, for their financial intermediation variable for the 1995–2007 period. In a more recent article, Langfield and Pagano (2014) show that bank bias (which they measured by total bank assets over market capitalization) may have negative effects on the growth performances of economies. Our analysis indicates that, for a fixed level of stock market development, higher credit is associated with negative growth, which is effectively higher relative credit to stock market. So our negative coefficient may also be related to bank bias. Cecchetti and Kharroubi (2015) provide evidence presenting a negative relationship between the growth of the financial sector and the total factor productivity (output per person employed).

¹⁵ By means of comparison, in Sassi and Gasmì (2014) the correlation between household credit and enterprise credit is around 0.76.

¹⁶ The baseline set of variables is included in all regressions unless stated otherwise in the table descriptions. They are not reported, however, in most of the upcoming regressions, to avoid repetition.

¹⁷ In our baseline regressions, we did not include GDP per capita levels, as we employ country fixed effects. When we include this variable as a control variable (unreported), the results are virtually the same as in our baseline regressions. The GDP per capita variable is highly insignificant – suggesting country fixed-effects are capturing most of the variation there.

Table 1

Cross-country summary statistics.

GDP per capita growth is the rate of real per capita GDP growth. *New firm density growth* is the growth rate of new business entry density, which is the number of newly registered limited liability corporations per calendar year, normalized by working age population. *Gross capital formation* consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. *Ln(Securitization deals)* is the log of the number of securitization issuances plus one. *Ln(Household [Business] Securitization deals)* is the log of the number of household [business] related securitization issuances plus one. *Domestic credit to private sector* refers to financial resources provided to the private sector by financial corporations. *Stocks traded over GDP* refers to the total value of shares traded during the period over GDP. *Trade over GDP* is total trade over GDP. *Inflation* is the rate of change in consumer price indices. *Government expenditure* is the general government final consumption expenditure (% of GDP). *Urbanization* is the urban population (% of total population). *Education* is the gross secondary education enrollment ratio. *Banking crisis* is a dummy variable that equals 1 if the country is in a banking crisis. *Activity restriction* captures overall restrictions on banking activities and *Initial capital stringency* shows how stringent capital rules are when a bank is initially capitalized. *Supervisory powers* indicates how strong the supervisory authorities are and *Private monitoring* captures the effectiveness of private monitoring of firms. *Population growth* (annual %) is the exponential rate of growth of midyear population from year $t-1$ to t , expressed as a percentage. *Real interest rate* is lending interest rate adjusted for inflation as measured by the GDP deflator. *Institutional quality* is an aggregate governance indicator proxying institutional quality in a country. *Macroprudential index* is an index measuring different macroprudential policies in a country. *Bank credit to deposits* is bank credit to bank deposits (%). *Bank competition* is measured by the Boone indicator which is a measure of degree of competition based on profit-efficiency in the banking market. It is calculated as the elasticity of profits to marginal costs. An increase in the Boone indicator implies a deterioration of the competitive conduct of financial intermediaries. *Bank soundness* is measured by bank Z-score which captures the probability of default of a country's commercial banking system. *Business securitization net of CDO [CLO] over GDP* is the total amount of business securitization net of collateralized debt [loan] obligations over GDP. *Securitization by [non-]financial firms* is the total amount of securitization issued by [non-]financial firms over GDP. *NPL to gross loans* is aggregate bank non-performing loans to gross loans in percentages.

	# of Obs.	Mean	Std. Dev.	Min	Max
GDP per capita growth	1238	2.671	4.080	-17.545	38.057
Gross capital formation growth	1126	5.218	15.144	-57.713	106.350
New firm density growth	440	6.266	19.303	-45.455	133.333
Consumption share	1218	77.338	9.007	27.262	97.672
Securitization over GDP	1238	0.378	1.357	0.000	14.381
Household securitization over GDP	1238	0.242	0.992	0.000	9.956
Business securitization over GDP	1238	0.136	0.467	0.000	5.173
Ln(Securitization deals)	1238	0.654	1.312	0	8.005
Ln(Household securitization deals)	1238	0.460	1.128	0	7.394
Ln(Business securitization deals)	1238	0.476	1.067	0	7.231
Domestic credit to private sector	1238	70.362	53.804	3.829	319.461
Stocks traded over GDP	1238	36.043	68.969	0.000	741.584
Trade over GDP	1238	90.427	52.235	18.756	448.306
Inflation	1238	7.519	33.838	-4.863	1058.374
Government expenditure	1238	16.650	5.001	4.506	30.504
Urbanization	1238	64.340	20.010	10.072	100
Education	1238	87.191	23.702	16.477	160.619
Banking crisis	1238	0.124	0.330	0	1
Activity restrictions	1043	7.136	2.052	3	12
Initial capital stringency	1060	2.136	0.794	0	3
Supervisory powers	870	11.040	2.408	4	16
Private monitoring	993	8.182	1.393	4	11
Population growth	1233	1.072	1.504	-3.821	17.483
Real interest rate	1028	7.013	10.559	-71.205	97.474
Institutional quality	676	0.374	0.850	-1.177	1.986
Macroprudential index	676	1.720	1.599	0	8
Bank credit to deposits	676	108.618	47.056	30.630	364.670
Bank competition	1070	-0.059	0.403	-4.840	4.380
Bank soundness	1082	15.072	10.780	-7.310	65.360
Business securitization net of CDO over GDP	1238	0.095	0.313	0	3.442
Business securitization net of CLO over GDP	1238	0.122	0.428	0	4.740
Securitization by financial firms	1238	0.348	1.308	0	14.238
Securitization by nonfinancial firms	1238	0.040	0.164	0	2.513
NPL to gross loans	870	7.106	7.812	0.100	48.600

Perhaps more interestingly, this negative relationship becomes weaker once they control for the share of the credit going to firms. Finally, one other explanation regarding the negative coefficient on domestic credit variable is provided by [Loayza and Ranciere \(2006\)](#), who differentiate between short- and long-term effects of financial intermediation and document that the short-term effects are negative and mainly caused by financial crisis and volatility.

Columns 2 and 3 turn to the relationship between securitization and the supply side of the economy, measured by the growth rates of gross capital formation and new firm density. In each case we find a strong negative relationship. Specifically, a one standard deviation increase in securitization reduces the growth rates of gross capital formation and new firm formation by 0.74% and 2.23%. The effects are now significant at the 5% and 1% levels, respectively. This

relatively stronger impact on the supply side may indicate that our composition channel is at work.

In columns 4–6, we turn to the separate analysis of household and business securitization. We find that household securitization is consistently negatively related to all measures of economic growth. The coefficients for household securitization are in all cases more negative than that of total securitization. For GDP per capita growth, for example, the coefficient (significant at the 1% level) implies that a one standard deviation increase in household securitization over GDP is associated with a 0.46% decrease in GDP per capita growth, which is 17% of the mean. The coefficients for business securitization are all positive except in regression 5. The significance is only marginal in regression 4, whereas there is no significance in the regressions for gross capital formation growth and new firm density growth. This evidence thus suggests that

Table 2

Pairwise correlations.

GDP per capita growth is the rate of real per capita GDP growth. *New firm density growth* is the growth rate of new business entry density, which is the number of newly registered limited liability corporations per calendar year, normalized by working age population. *Gross capital formation* consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. *Consumption share* is total consumption over the sum of investment and consumption. *Securitization over GDP* is the total securitization amount over GDP.

	GDP per capita growth	Gross capital formation growth	New firm density growth	Securitization over GDP	Household securitization over GDP	Business securitization over GDP	Consumption share
GDP per capita growth	1						
Gross capital formation growth	0.598***	1					
New firm density growth	0.368***	0.365***	1				
Securitization over GDP	-0.048*	-0.025	-0.028	1			
Household securitization over GDP	-0.046	-0.026	-0.015	0.967***	1		
Business securitization over GDP	-0.041	-0.019	-0.047	0.843***	0.677***	1	
Consumption share	-0.078***	-0.109***	-0.047	-0.030	-0.022	-0.042	1

*** $p < 0.01$.** $p < 0.05$.* $p < 0.1$.**Table 3**

Securitization and the real economy.

GDP per capita growth is the rate of real per capita GDP growth. *New firm density growth* is the growth rate of new business entry density, which is the number of newly registered limited liability corporations per calendar year, normalized by working age population. *Gross capital formation* consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. *Domestic credit to private sector* refers to financial resources provided to the private sector by financial corporations. *Stocks traded over GDP* refers to the total value of shares traded during the period over GDP. *Trade over GDP* is total trade over GDP. *Inflation* is the rate of change in consumer price indices. *Government expenditure* is the general government final consumption expenditure (% of GDP). *Urbanization* is the urban population (% of total population). *Education* is the gross secondary education enrollment ratio. *Banking crisis* is a dummy variable that equals 1 if the country is in a banking crisis. All securitization related variables are lagged by one period. Country and year fixed effects are included in each specification. Standard errors are clustered at the country-level. Robust p -values are reported in parentheses.

	(1) GDP per capita growth	(2) Gross capital formation growth	(3) New firm density growth	(4) GDP per capita growth	(5) Gross capital formation growth	(6) New firm density growth
Securitization over GDP	-0.136* (0.062)	-0.542** (0.045)	-1.642*** (0.006)			
Household securitization over GDP				-0.344*** (0.000)	-0.653** (0.039)	-2.410*** (0.000)
Business securitization over GDP				0.371* (0.086)	-0.250 (0.815)	0.165 (0.911)
Domestic credit to private sector	-0.027*** (0.003)	-0.083** (0.026)	0.002 (0.964)	-0.027*** (0.002)	-0.083** (0.026)	-0.001 (0.986)
Stocks traded over GDP	0.002 (0.661)	0.010 (0.325)	0.039 (0.060)	0.001 (0.705)	0.010 (0.341)	0.038 (0.063)
Trade over GDP	0.032*** (0.006)	0.130** (0.015)	0.090 (0.424)	0.031*** (0.006)	0.130** (0.015)	0.091 (0.412)
Inflation	-0.013* (0.073)	-0.004 (0.572)	-0.728* (0.067)	-0.013* (0.074)	-0.004 (0.574)	-0.728* (0.067)
Government expenditure	-0.257*** (0.000)	-0.155 (0.778)	-2.600*** (0.001)	-0.258*** (0.000)	-0.156 (0.777)	-2.587*** (0.001)
Urbanization	0.236*** (0.005)	0.925*** (0.006)	1.453 (0.322)	0.239*** (0.005)	0.926*** (0.006)	1.471 (0.318)
Education	-0.000 (0.980)	-0.108** (0.027)	-0.389 (0.201)	-0.001 (0.928)	-0.108** (0.027)	-0.387 (0.205)
Banking crisis	-1.610*** (0.002)	-4.116*** (0.019)	3.681 (0.200)	-1.635*** (0.002)	-4.130*** (0.018)	3.679 (0.206)
Number of observations	1238	1131	442	1238	1131	442
R^2	0.333	0.228	0.274	0.335	0.228	0.275
Number of countries	104	96	78	104	96	78

*** $p < 0.01$.** $p < 0.05$.* $p < 0.1$.

household and business loan securitizations have different implications for the macroeconomy.¹⁸

In Table 4, we investigate through which channel(s) securitization may affect economic growth. The *credit composition channel*

predicts that the growth effect of securitization comes through changing the relative importance of consumption to investment in the economy. In columns 1 and 2, we use as a dependent variable the share of consumption over the sum of consumption and investment in national accounting. We find the coefficient of securitization is positive, though only marginally significant at 10%. The effect is stronger for household securitization, which has a positive and significant correlation with the consumption share, suggesting that household securitization increases the share of consumption.

¹⁸ The results are similar when we include household securitization (business securitization) on its own without controlling for the business securitization (household securitization).

Table 4
Securitization channels.
Consumption share is total consumption over the sum of investment and consumption. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. *NPL to gross loans* is aggregate bank non-performing loans to gross loans in percentages. *Domestic credit to private sector* refers to financial resources provided to the private sector by financial corporations. *Stocks traded over GDP* refers to the total value of shares traded during the period over GDP. *Trade over GDP* is total trade over GDP. *Inflation* is the rate of change in consumer price indices. *Government expenditure* is the general government final consumption expenditure (% of GDP). *Urbanization* is the urban population (% of total population). *Education* is the gross secondary education enrollment ratio. *Banking crisis* is a dummy variable that equals 1 if the country is in a banking crisis. Described control variables are included in the regressions but not reported in the table. Government expenditure is not included in regressions 1 and 2. All securitization related variables are lagged by one period. Country and year fixed effects are included in each specification. Standard errors are clustered at the country-level and *p*-values are reported in parentheses.

	Credit composition channel		Credit quality channel		Credit volume channel	
	(1) Consumption share	(2) Consumption share	(3) GDP per capita growth	(4) GDP per capita growth	(5) GDP per capita growth	(6) GDP per capita growth
Securitization over GDP	0.204* (0.062)		-0.118 (0.125)		-0.215*** (0.002)	
Household securitization over GDP		0.336** (0.027)		-0.328*** (0.001)		-0.408*** (0.000)
Business securitization over GDP		-0.120 (0.714)		0.428** (0.030)		0.253 (0.202)
NPL to gross loans			-0.121*** (0.002)	-0.120*** (0.002)		
Domestic credit to private sector	-0.025** (0.038)	-0.025** (0.041)	-0.030*** (0.003)	-0.030*** (0.003)		
Number of observations	1231	1231	870	870	1261	1261
R-sq	0.293	0.293	0.429	0.431	0.319	0.321
Number of countries	103	103	85	85	104	104

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

The effect for business securitization is negative but insignificant. Together with the negative relationship between consumption and growth, this provides further evidence in favor of the *credit composition channel*.

Securitization may affect economic growth through the *credit quality channel*, for example because adverse selection and moral hazard results in financing of undesirable high-risk projects. This may lower productivity, and lead to more defaults and less growth. We proxy the *credit quality channel* through the ratio of nonperforming loans to total loans at the country level, as a measure of increased bank risk and misallocation of capital, possibly due to informational problems. Columns 3 and 4 show a negative relationship between loan performance and growth. The results regarding securitization remain similar, suggesting that the composition channel operates in addition to any *credit quality channel*.

In our baseline regression, we include domestic credit as a control variable. Thus, our results are net of any effects that may come through a change in the total amount of credit in response to securitization. Consistent with this, we find in columns 5 and 6 that when domestic credit is excluded from the set of controls, the impact of securitization on growth becomes larger (in absolute terms). The securitization variable now obtains a more negative coefficient of -0.215 and is significant at the 1% level. The securitization split shows that through a more negative impact of household securitization, the impact of business securitization weakens and is insignificant.

4.1. Robustness

In this section we consider several alternative specifications of the benchmark growth regressions of Table 3.

Table 5 contains various robustness checks of our results to specifications with additional control variables. In columns 1 and 2, we add extra regulatory variables to control for cross-country

differences in bank regulation and supervision, which may affect securitization as well as economic growth. The motivation is that the negative association between securitization and economic growth may be driven by a general trend toward deregulation and lax supervision. Specifically, we include variables for Activity restrictions, Initial capital stringency, Supervisory powers and Private Monitoring from the bank regulation and supervision database compiled by Barth et al. (2013). The database is based on World Bank surveys on bank regulation and supervision over the period 1999–2012. The results are qualitatively unchanged. In particular, we find aggregate securitization to be negatively related to economic growth. Moreover, household securitization is negatively and significantly related to GDP per capita growth, whereas business securitization is positively related to economic growth, though the effect is not statistically significant. As for the regulatory variables, only activity restrictions have significant and positive impacts on economic growth. The other regulatory variables are not significant. For brevity, we omit the estimates for the standard set of controls. In columns 3 and 4, we add population growth and the real interest rate – accounting for demographic changes and the stance of monetary policy. The results are very similar to the first two regressions in the table. Both population growth and the real interest rate are negatively associated with economic growth, as expected.

We control for a number of extra, country specific covariates. First, we include indicators of institutional quality, as a well-functioning legal system and institutional system is a pre-requisite for financial innovation. In addition, we consider the usage of macroprudential policies which affect the market environment and banks' incentive to undertake securitization. Following Han et al. (2015) and Gong et al. (2015), we include bank credit to deposits as the model in Han et al. (2015) suggests that banks are more likely to securitize when constrained on the funding side (indicated by a high loan to deposit ratio in Gong et al. (2015)). The results are virtually the same as our baseline regressions. Finally, in columns 7 and

Table 5

Additional control variables.

GDP per capita growth is the rate of real per capita GDP growth. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. *ln(Securitization deals)* is the log of the number of securitization issuances plus one. *ln(Household [Business] Securitization deals)* is the log of the number of household [business] related securitization issuances plus one. *Activity restriction* captures overall restrictions on banking activities and *Initial capital stringency* shows how stringent capital rules are when a bank is initially capitalized. *Supervisory powers* indicates how strong the supervisory authorities are and *Private monitoring* captures the effectiveness of private monitoring of firms. *Population growth* (annual %) is the exponential rate of growth of midyear population from year $t-1$ to t , expressed as a percentage. *Real interest rate* is the lending interest rate adjusted for inflation as measured by the GDP deflator. *Institutional quality* is an aggregate governance indicator proxying institutional quality in a country. *Macroprudential index* is an index measuring different macroprudential policies in a country. *Bank credit to deposits* is bank credit to bank deposits (%). *Bank competition* is measured by the Boone indicator which is a measure of the degree of competition based on profit-efficiency in the banking market. It is calculated as the elasticity of profits to marginal costs. An increase in the Boone indicator implies a deterioration of the competitive conduct of financial intermediaries. *Bank soundness* is measured by bank Z-score, which captures the probability of default of a country's commercial banking system. We also include the following control variables: *Domestic credit to private sector* refers to the financial resources provided to the private sector by financial corporations. *Stocks traded over GDP* refers to the total value of shares traded during the period over GDP. *Trade over GDP* is total trade over GDP. *Inflation* is the rate of change in consumer price indices. *Government expenditure* is the general government final consumption expenditure (% of GDP). *Urbanization* is the urban population (% of total population). *Education* is the gross secondary education enrollment ratio. *Banking crisis* is a dummy variable that equals 1 if the country is in a banking crisis. Described control variables are included in the regressions but not reported in the table. In the rest of the regressions, country and year fixed effects are included in each specification, all securitization related variables are lagged by one period and standard errors are clustered at the country-level. *p*-values are reported in parentheses.

	Regulation		Population and interest rate		Institutions, macroprudential policies and credit to deposits		Bank structure	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita growth								
Securitization over GDP	-0.156*		-0.152*		-0.138**		-0.151*	
	(0.054)		(0.052)		(0.040)		(0.051)	
Household securitization over GDP		-0.358***		-0.347**		-0.205**		-0.326***
		(0.003)		(0.014)		(0.039)		(0.001)
Business securitization over GDP		0.285		0.258		0.043		0.283
		(0.232)		(0.365)		(0.824)		(0.205)
Activity restrictions	0.225*	0.219*						
	(0.074)	(0.082)						
Initial capital stringency	0.415	0.388						
	(0.101)	(0.124)						
Supervisory powers	0.099	0.102						
	(0.132)	(0.122)						
Private monitoring	0.101	0.102						
	(0.478)	(0.467)						
Population growth			-0.963***	-0.963***				
			(0.000)	(0.000)				
Real interest rate			-0.055*	-0.055*				
			(0.072)	(0.072)				
Institutional quality					1.982	1.974		
					(0.159)	(0.161)		
Macroprudential index					-0.263	-0.260		
					(0.383)	(0.389)		
Bank credit to deposits					-0.058**	-0.058**		
					(0.000)	(0.000)		
Bank competition							-0.131	-0.124
							(0.865)	(0.870)
Bank soundness							-0.012	-0.012
							(0.617)	(0.631)
Number of observations	828	828	1024	1024	676	676	1009	1009
R-sq	0.340	0.341	0.358	0.359	0.472	0.472	0.389	0.390
Number of countries	90	90	98	98	82	82	100	100

*** $p < 0.01$.** $p < 0.05$.* $p < 0.1$.

8, we measure the structure of the banking system. In particular, we consider the Boone-indicator as a measure of bank competition, and the Z-score as a measure of the soundness of the financial system. None of the new control variables are significant, and the main results are robust.

Table 6 considers robustness of the main results by using alternative samples and securitization measures. In columns 1 to 4 of panel A, we split the sample into two groups according to median values of the domestic credit to GDP variable in a given year, creating developed and less developed country groups. Our results suggest that the relationship between securitization and economic growth is driven by financially developed countries, as the results in columns 1 and 2 mimic our baseline findings, whereas for less

developed countries, the securitization variables are insignificant. This is unsurprising as most securitization is done in financially developed countries. Indeed, about half of the countries in our sample did not securitize over the sample period. Pooling securitizing and non-securitizing countries together may hence bias the estimation of the growth effect of securitization.

In columns 5 and 6, we re-estimate our baseline model, including only countries with at least one securitization deal in the sample period. We find that securitization is negatively correlated with GDP per capita growth, though the effect is not statistically significant. When decomposing the two types of securitization, we find economic growth is negatively related to household securitization and positively related to business securitization. These results

Table 6
Alternative samples and securitization measures.
GDP per capita growth is the rate of real per capita GDP growth. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. *ln(Household [Business] Securitization deals)* is the log of the number of household [business] related securitization issuances plus one. *Securitization by [non-]financial firms* is securitization issued by [non-]financial firms. We also include the following control variables: *Domestic credit to private sector* refers to financial resources provided to the private sector by financial corporations. *Stocks traded over GDP* refers to the total value of shares traded during the period over GDP. *Trade over GDP* is total trade over GDP. *Inflation* is the rate of change in consumer price indices. *Government expenditure* is the general government final consumption expenditure (% of GDP). *Urbanization* is the urban population (% of total population). *Education* is the gross secondary education enrollment ratio. *Banking crisis* is a dummy variable that equals 1 if the country is in a banking crisis. Described control variables are included in the regressions but not reported in the table. In Panel A, regressions 1 to 4, the sample is split by the yearly median value of domestic credit as developed and less developed countries. In regressions 5 and 6, only countries with any securitization activity are included, and in regressions 7 and 8, the U.S. is excluded. In Panel B, in regressions 2 and 3, CDO and CLO are excluded from the business securitization, respectively. Country and year fixed effects are included in each specification, all securitization related variables are lagged by one period and standard errors are clustered at the country-level. *p*-values are reported in parentheses.

	Financially developed		Less financially developed		Only securitizing countries		Excluding the U.S.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita growth								
Panel A: Alternative samples								
Securitization over GDP	-0.131*		-0.205		-0.051		-0.130	
	(0.063)		(0.764)		(0.412)		(0.146)	
Household securitization over GDP		-0.314***		-14.085		-0.235***		-0.360***
		(0.000)		(0.110)		(0.002)		(0.001)
Business securitization over GDP		0.355**		0.077		0.406**		0.417*
		(0.049)		(0.918)		(0.048)		(0.068)
Number of observations	619	619	619	619	690	690	1223	1223
R-sq	0.482	0.485	0.284	0.291	0.469	0.472	0.332	0.334
Number of countries	65	65	70	70	54	54	103	103
		Ln(Number of issuances)		Non-CDO		Non-CLO		Non-financials
		(1)		(2)		(3)		(4)
Panel B: Alternative measures of securitization								
Household securitization over GDP		-0.655***		-0.351***		-0.315***		
		(0.002)		(0.000)		(0.001)		
Business securitization over GDP		0.164		0.674**				
		(0.377)		(0.006)		(0.260)		
Securitization by financial firms								-0.158**
								(0.034)
Securitization by non-financial firms								0.442
								(0.302)
Number of observations		1238		1238		1238		1238
R-sq		0.337		0.336		0.335		0.334
Number of countries		104		104		104		104

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

reinforce our emphasis on the importance of the distinction between household and business securitization. Finally, the U.S. has been by far the largest user of securitization in the world. To see whether this drives our results, we estimate the baseline model excluding the U.S. in columns 7 and 8, and we find results similar to the baseline analysis.¹⁹

Panel B of Table 6 contains regressions with alternative securitization variables. In column 1, we use the log of the number of securitization deals as alternative measures of securitization intensity. The results are similar, although business securitization loses its statistical significance. In columns 2 and 3, we exclude particular types of securitization from the business securitization – CDOs and CLOs respectively. Column 2 shows that business loan securitization becomes much more significant once CDOs are excluded. This can be explained by the fact that CDOs are often based on synthetic transactions (that is, no actual collateral is sold). While synthetic transactions allow banks to shed risk, they do not generate funds that can be used for additional lending. Hence, we would expect a weaker impact on bank lending, and ultimately growth. Excluding

CLOs (column 3), however, leads to a loss of significance for business securitization. A weaker relationship is consistent with our priors since CLOs have the ability to remove assets from the balance sheet that were previously very difficult to sell (i.e., corporate loans). Hence, they should have a large effect on the behavior of banks.

In column 4, we distinguish between securitization issued by non-financial firms and financial institutions. We find that the significant results come from securitization of financial institutions only, consistent with our argument that securitization has an effect on economic growth by affecting the behavior of financial institutions. In addition, the coefficient of securitization by non-financial firms is positive and insignificant, indicating that the impact of securitization is largely coming through the credit composition channel. The insignificant effect of securitization originated from the non-financial firms is also in line with Lemmon et al. (2014), who document no evidence that firms increase investment after securitization but that funds from securitization are used to pay down debt.

In Table 7, to mitigate endogeneity concerns arising in our baseline regressions, we employ dynamic panel regressions. Specifically, we use a two-step system GMM estimator, which instruments some or all independent variables or securitization

¹⁹ The results are also similar when we exclude the top five securitizing countries (U.S., Netherlands, UK, Australia and Spain).

Table 7

Dynamic panel regressions.

GDP per capita growth is the rate of real per capita GDP growth. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. We also include the following control variables: *Domestic credit to private sector* refers to financial resources provided to the private sector by financial corporations. *Stocks traded over GDP* refers to the total value of shares traded during the period over GDP. *Trade over GDP* is total trade over GDP. *Inflation* is the rate of change in consumer price indices. *Government expenditure* is the general government final consumption expenditure (% of GDP). *Urbanization* is the urban population (% of total population). *Education* is the gross secondary education enrollment ratio. *Banking crisis* is a dummy variable that equals 1 if the country is in a banking crisis. *Initial GDP per capita* is the GDP per capita in 1995. Described control variables are included in the regressions but not reported in the table. In dynamic panel regressions 1 to 6 [7 to 10] – two-step system GMM estimation – 5-year [3-year] non-overlapping averages for all variables are used, together with period fixed effects. In regression 1 to 4, all independent variables are instrumented. In all other regressions, only securitization variables and domestic credit variable are instrumented. *p*-values are reported in parentheses.

	5 year averages				3 year averages					
	All variables instrumented				Only securitization and domestic credit instrumented					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	GDP per capita growth									
Securitization over GDP	0.026 (0.862)		–0.096 (0.594)		–0.098 (0.495)		–0.015 (0.907)		–0.021 (0.877)	
Household securitization over GDP		–0.608** (0.011)		–0.612** (0.042)		–0.758** (0.019)		–0.416** (0.033)		–0.483* (0.054)
Business securitization over GDP		1.882*** (0.007)		1.624** (0.050)		1.676** (0.029)		1.118** (0.030)		1.216* (0.058)
Lagged GDP per capita growth	0.147 (0.159)	0.173* (0.062)	0.077 (0.451)	0.094 (0.399)	0.307** (0.042)	0.286** (0.019)	0.206** (0.042)	0.218** (0.011)	0.234** (0.025)	0.223** (0.013)
Initial GDP per capita	–0.152 (0.585)	–0.288 (0.190)	–0.079 (0.663)	–0.121 (0.675)	–0.113 (0.631)	–0.154 (0.501)	0.076 (0.667)	0.101 (0.591)	0.070 (0.729)	0.050 (0.787)
Number of observations	118	118	118	118	118	118	313	313	313	313
Number of countries	77	77	77	77	77	77	92	92	92	92
Number of instruments	54	58	47	51	28	31	58	72	45	55
Lags used for instrumentation	2	2	1	1			2	2	1	1
AR2 test <i>p</i> -values							0.452	0.514	0.655	0.573
Hansen <i>J</i> -test (<i>p</i> -value)	0.379	0.493	0.539	0.458	0.112	0.301	0.470	0.544	0.220	0.260

*** *p* < 0.01.** *p* < 0.05.* *p* < 0.1.

variables and the domestic credit variable, as discussed in the previous subsection. These regressions also control for business cycle effects, as five-year or three-year non-overlapping averages of all variables are used. The system GMM regressions show that aggregate securitization has no significant effect on economic growth (in odd numbered regressions). However, in column 2, where we instrument all independent variables with the first two lags, the effect of the two types of securitization individually is stronger than that in the baseline regression. The coefficient for household securitization is now –0.608, about twice (in absolute terms) the value of the baseline regression. The coefficient for corporate securitization is 1.882, more than twice its previous size, and is now significant at the 1% level. These findings confirm our hypotheses that household securitization lowers economic growth but business securitization spurs real activity.

This result is robust to alternative instrumentations of the independent variables and specification of the lags used as internal instruments. In columns 3 and 4, we use only the first lag of instrumented variables to make sure that we do not overfit. The results are very similar and Hansen *J* statistics do not change much, reconfirming the validity of instruments. The results remain the same in columns 5 and 6 when we reduce number of instruments even further by only instrumenting securitization variables and the domestic credit variable – and taking other independent variables as predetermined.

In regressions 7 to 10, we use 3-year averaged variables to increase the number of observations and countries. Owing to the longer time-dimension in these regressions, AR(2) can now also be reported – on top of the Hansen *J* test – confirming the validity of internal instruments. We further vary the number of instruments used by using the first two lags in columns 7 and 8 and only the first lags in columns 9 and 10. In those regressions, the results in terms of significance and direction of relationship are in line with

earlier results, but the absolute size of the coefficients is smaller (though still larger in the baseline regressions). All in all, the system GMM results confirm that it is important to distinguish the type of underlying collateral when studying the impact of securitization on growth.

The analysis so far indicates a negative relationship between securitization and economic growth. Moreover, the relationship varies depending on the type of securitization. The fact that household securitization is negatively related to growth but business related securitization is positively or not correlated with economic growth suggests differences in the macroeconomic response to securitizations. Previous research suggests that corporate credit is more productive compared to household credit, which is mostly used for consumption purposes (Beck et al., 2012). Moreover, Maddaloni and Peydró (2011) show that securitization affects banks' lending behavior differentially, so that they favor consumption-related credit provision (mortgages or consumer credit), which does not directly turn into investment.

Countries with highly developed securitization markets, such as the U.S. and U.K., fell into recessions when the securitization market collapsed in 2008. It is thus interesting to examine whether the negative effects of securitization are due to the crisis period or whether they were already present before. In Table 8, we split the sample into two subsamples: the period before the crisis (1995–2006) and the crisis period (2007–2012). Column 1 shows that securitization had a negative impact on economic growth in the pre-crisis period; the effect is even stronger. The sample split, in column 2, shows that the impact of household securitization is again more pronounced, and business securitization is insignificant. The result for the crisis period in column 3 shows a weak impact of aggregate securitization during the crisis. While the coefficients are not very different from the baseline analysis, the significance drops. When we split securitization as business and household securitization in column 4, only

Table 8
Securitization before and after the global financial crisis.
GDP per capita growth is the rate of real per capita GDP growth. *Securitization over GDP* is the total securitization amount over GDP. *Household securitization over GDP* is the total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP. *Business securitization over GDP* is the total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP. We also include the following control variables: *Domestic credit to private sector* refers to financial resources provided to the private sector by financial corporations. *Stocks traded over GDP* refers to the total value of shares traded during the period over GDP. *Trade over GDP* is total trade over GDP. *Inflation* is the rate of change in consumer price indices. *Government expenditure* is the general government final consumption expenditure (% of GDP). *Urbanization* is the urban population (% of total population). *Education* is the gross secondary education enrollment ratio. *Banking crisis* is a dummy variable that equals 1 if the country is in a banking crisis. Described control variables are included in the regressions but not reported in the table. In regressions 1 and 2, observations from the years before 2007 and in regressions 3 and 4, from the years after 2006 are used. All securitization related variables are lagged by one period. Country and year fixed effects are included in each specification. Standard errors are clustered at the country-level and *p*-values are reported in parentheses.

	1995–2006		2007–2012	
	(1)	(2)	(3)	(4)
	GDP per capita growth			
Securitization over GDP	–0.312** (0.012)		–0.126 (0.170)	
Household securitization over GDP		–0.411** (0.017)		–0.328** (0.024)
Business securitization over GDP		–0.049 (0.893)		0.387 (0.154)
Number of observations	837	837	361	361
R-sq	0.245	0.245	0.110	0.466
Number of countries	98	98	89	87

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

household securitization is negatively correlated to GDP per capita growth in statistically significant terms. Business securitization, on the other hand, has a positive coefficient, though insignificant, with a low *p*-value of 0.154. An explanation for the weaker results may be that the amount of securitization was much smaller in almost all of the countries during the crisis period, as well as the shorter sample period reducing the time variance. In addition, during the crisis, securitization markets did not function in an orderly fashion, making it difficult to predict how they should (or should not) affect growth.

To conclude the section, it is important to acknowledge some limitations of our analysis. Our baseline methodology is panel fixed effects regressions, which relies on strong exogeneity assumptions. Without an explicit identification strategy, the results should be interpreted as correlations rather than causal relationships. Moreover, as our data covers the period of 1995–2012, our panel regressions capture more medium-term correlations between macro variables.²⁰ Yet, relying only on within country variation, we avoid cross-country comparisons, which should reduce issues arising from unobserved heterogeneity. Moreover, the use of lagged securitization variables should alleviate the concern of reverse causality. The similarity of the results obtained in the dynamic panel regressions, where securitization is internally instrumented and five-year and three-year averaged variables are used, should provide additional assurance regarding endogeneity of the securitization variables and the long-term relevance of our findings.

5. Conclusion

This paper has analyzed the relationship between countries' use of securitization technologies and their economic outcomes. We

show that securitization is associated with lower economic activity, as proxied by growth rates of GDP per capita, capital formation and new firm density. Our results indicate that this effect is not driven by the breakdown of securitization markets during the crisis, as it is also present in the pre-crisis period.

Importantly, different types of securitizations have different effects. Whereas securitization of loans to households is negatively related to economic activity, securitization of business loans has a weak positive effect on the economy. The findings are consistent with the *credit composition channel*, by which securitization of non-business loans leads to an increase in the share of credits flowing to households, as the cost of firm financing. While this may spur demand in the short run, it will hamper investment and lead to lower growth.

Our results carry clear policy messages. Securitization may not only have effects on the parties immediately involved in the securitization process, but also for the wider economy. Most importantly, the results suggest that the impact of securitization depends on the underlying type of collateral. While securitization of business loans may encourage investment and spur economic activity, securitization of consumer loans may at the aggregate divert resources away from productive purposes. The ongoing debate on whether to revive securitization should thus focus on which part of the securitization market to stimulate. Policy makers clearly recognize the importance of fostering “high-quality” securitization, that is, securitizations that are transparent and include collateral of low risk borrowers. Our analysis suggests that the authorities should not only care about the securitization quality, but also whether the collateral is in the form of household or business loans. If the objective is to stimulate growth and investment, the focus should be on the latter.

²⁰ The use of securitization technology intensified from late 90s onwards, not leaving us a long time horizon to analyze the long-run effects.

Appendix.

Table A1

Sample countries and securitization activities.

The distribution of the total amount of securitization issuances in millions of U.S. dollars across countries.

Country	1995–2000	2001–2006	2007–2012	Country	1995–2000	2001–2006	2007–2012	Country	1995–2000	2001–2006	2007–2012
ARE ^a	0	350	1,599	ESP ^a	20,506	210,705	178,215	NOR ^a	0	0	4,370
ARG	2,788	334	150	FIN ^a	2,540	997	637	NZL ^a	1,042	942	941
AUS ^a	39,912	181,385	138,601	FRA ^a	44,881	43,744	21,854	OMN ^a	0	925	0
AUT ^a	650	5,785	4,292	GBR ^a	126,893	827,100	563,392	PAK	250	0	0
BEL ^a	5,497	7,596	12,924	GRC ^a	1,100	13,609	7,198	PAN ^a	186	150	1,240
BHR ^a	0	334	0	GTM	0	0	480	PER	550	1,903	4,094
BIH	0	0	110	HKG ^a	2,606	2,122	2,207	PHL	75	0	0
BLZ	0	45	0	IDN ^a	886	0	9	POL ^a	809	625	342
BRA	4,093	6,624	7,977	IRL ^a	0	711	29,449	PRT ^a	2,400	38,414	23,143
CAN ^a	17,168	41,527	43,800	ISL ^a	0	384	0	RUS	53	5,219	6,318
CHE ^a	5,943	7,160	1,515	ISR ^a	0	37	0	SGP ^a	225	4,319	2,345
CHL	150	40	0	ITA ^a	20,506	193,268	88,050	SLV	110	0	0
CHN	2,117	403	0	JAM	125	100	50	SWE ^a	2,040	4,346	4,973
COL	887	206	0	JPN ^a	44,515	119,289	160,690	THA	753	664	421
CRI	0	63	0	KAZ	0	700	1,400	TTO ^a	0	150	0
CZE ^a	0	218	0	KOR ^a	3,540	10,697	6,469	TUR	2,489	9,346	6,463
DEU ^a	25,541	124,317	162,988	LUX ^a	137	0	661	UKR	0	0	281
DNK ^a	223	1,132	21,797	MEX	11,780	1,516	8,105	USA ^a	2,189,615	7,181,403	2,773,118
DOM	22	0	0	MYS	81	1,344	315	VEN	4,120	0	0
EGY	0	1,554	0	NLD ^a	21,391	177,768	159,369	ZAF	361	7,634	7,355

Notes: Countries with no securitization issue include ARM, BGD, BGR, BOL, BRB^a, BWA, CIV, CYP^a, ECU, EST^a, FJI, GEO, GHA, GUY, HRV^a, HUN, IND, IRN, JOR, KEN, KGZ, KNA^a, KWT^a, LBN, LKA, LTU, LVA, MAR, MDA, MKD, MLT^a, MNE, MNG, MUS, MWI, NAM, NGA, NPL, PRY, QAT^a, SAU^a, SRB, SVK^a, SVN^a, SWZ, TUN, TZA, UGA, URY, ZWE.

^a Indicates developed countries (i.e. economies classified as high-income by the World Bank in 2013), which had at least one securitization in the sample period.

Table A2

Variable definitions and data sources.

Variable	Description	Source
GDP per capita growth	Real GDP per capita growth in percentages.	WDI
Gross capital formation	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	WDI
New firm density growth	The new business entry density, which is the number of newly registered limited liability corporations per calendar year, normalized by working age population.	WDI
Consumption share	Total consumption over the sum of investment and consumption.	Penn World Table 8
Securitization over GDP	Total amount of all rated asset-backed issues, mortgage-backed issues, CDOs and securities collateralized by commercial and multi-family properties over GDP. Excludes Fannie Mae and Freddie Mac issues, municipality issues and commercial papers. ^a	AB and CM Alert
Household securitization over GDP	Total amount of securitization collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.) over GDP ^a .	AB and CM Alert
Business securitization over GDP	Total amount of securitization collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.) over GDP ^a .	AB and CM Alert
Ln(Securitization deals)	Ln(1 + total number of securitization deals).	AB and CM Alert
Ln(Household securitization deals)	Ln(1 + total number of securitization deals collateralized by household related underlying assets (such as consumer loans, credit cards, mortgages etc.)) ^a .	AB and CM Alert
Ln(Business securitization deals)	Ln(1 + total number of securitization deals collateralized by business related underlying assets (such as commercial mortgages, small business loans, bank loans etc.)) ^a .	AB and CM Alert
Domestic credit to private sector	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, which establish a claim for repayment.	WDI
Stocks traded over GDP	Stocks traded refers to the total value of shares traded during the period. This indicator complements the market capitalization ratio by showing whether market size is matched by trading.	WDI
Trade over GDP	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI
Inflation	Inflation, consumer prices (annual %).	WDI
Government expenditure	General government final consumption expenditure (% of GDP).	WDI
Urbanization	Urban population (% of total).	WDI
Education	Gross secondary education enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.	WDI
Banking crisis	Dummy variable equals 1 if the country suffers from systemic banking crisis.	Laeven and Valencia (2013)
Activity restriction	Overall restrictions on banking activities regarding insurance, securities and real estate activities of banks. From 3 to 12. Higher values indicate more restriction.	WB surveys on bank regulation (Barth et al., 2013)
Initial capital stringency	Whether certain funds may be used to initially capitalize a bank and whether they are officially verified. From 0 to 3. Higher values indicate greater stringency.	WB surveys on bank regulation (Barth et al., 2013)

Table A2 (Continued)

Variable	Description	Source
Supervisory powers	Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems. From 4 to 16. Higher values indicate stronger supervision.	WB surveys on bank regulation (Barth et al., 2013)
Private monitoring	Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems. From 4 to 11. Higher values indicate stronger monitoring.	WB surveys on bank regulation (Barth et al., 2013)
Population growth	Population growth (annual %) is the exponential rate of growth of midyear population from year $t-1$ to t , expressed as a percentage.	WDI
Real interest rate	Lending interest rate adjusted for inflation as measured by the GDP deflator.	WDI
Institutional quality	An aggregate governance indicator (including different dimensions of governance such as rule of law, control of corruption etc.) proxying institutional quality (see Kaufmann et al. (2011)). Higher values indicate higher institutional quality.	World Government Indicators
Macroprudential index	An index proxying the usage of macroprudential policies (such as loan-to-value ratios, concentration limits etc.). Higher values indicate higher usage of macroprudential policies.	Cerutti et al. (2015)
Bank credit to deposits	Bank credit to bank deposits (%).	GFDD
Bank competition	Boone indicator. A measure of degree of competition based on profit-efficiency in the banking market. It is calculated as the elasticity of profits to marginal costs. An increase in the Boone indicator implies a deterioration of the competitive conduct of financial intermediaries.	GFDD
Bank soundness	Bank Z-score which captures the probability of default of a country's commercial banking system.	GFDD
Business securitization net of CDO over GDP	Total amount of business securitization net of collateralized debt obligations (CDOs) over GDP.	AB and CM Alert
Business securitization net of CLO over GDP	Total amount of business securitization net of collateralized loan obligations (CLOs) over GDP.	AB and CM Alert
Securitization by financial firms	Total amount of securitization issued by financial firms over GDP.	AB and CM Alert
Securitization by non-financial firms	Total amount of securitization issued by non-financial firms over GDP.	AB and CM Alert
NPL to gross loans	Bank non-performing loans to gross loans at the country-level (%).	GFDD

^a See the appendix for the details of underlying collaterals. All securitization variables are lagged by one period.

Table A3

Types of securitization.

Collateral codes from the AB Alert and CM Alert databases and how we classify different types of securitizations.

Household related:	Business related:	
AL Auto leases	AC Aircraft-lease receivables	MZ Mutual fund (12b-1) fees
AS Auto loans (subprime)	AF Auto-fleet leases	NM Net interest margin
AU Auto loans (prime)	AK Airline-ticket receivables	NR Natural resources
BO Boat loans	BZ Bank loans (CLOs)	PF Project finance
CN Consumer loans, unsecured	CA Catastrophic risk	RN Rent receipts
CR Credit cards	CB Collateralized debt obligation	RO Royalties
HE Home-equity loans	CK Credit risk ^a	RV Recreational-vehicle loans
HI Home-improvement loans	CM Commercial MBS	RY Remittances (by immigrants)
HL Home-equity lines of credit	CM Commercial MBS (non-performing)	SA Servicer advance receivables
MH Manufactured housing loans	DR Delinquent receivables ^a	SB Small-business loans
MI Non-U.S. residential loans	EL Equipment loans	SC Small-business loans (Non-U.S.)
MO Motorcycle loans	EQ Equipment leases	SE Legal settlements
MR Reverse mortgages	EX Export receivables. (Ex-Im Guarantee)	TL Tax liens
NE High-LTV ("no-equity") loans	EZ Export receivables (Other)	TM Timeshare loans
NP Non-performing mortgages	FE Miscellaneous ^a	TO Toll-road receivables
RM Residential mortgages (includes Alt-A)	FF Franchise fees	TP Transportation
SM Subprime mortgages	FL Franchise loans	TR Trade receivables
ST Student loans	FP Floorplan loans	TU Truck loans
	GC Guaranteed investment contract	UT Utility receivables
	HC Healthcare receivables ^a	VI Vitiatical settlements
	IN Insurance-premium loans	WB Whole-business
	MU Municipal leases	WE Weather

Notes: Collateral codes are taken from the AB Alert and CM Alert databases.

^a Indicates rather ambiguous types of collateral. Their exclusion does not affect the results.

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