

The effect of bank bailouts in the EU¹

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Abstract

The financial crisis renewed the debate on the bailout of financial institutions, questioning the effectiveness of such an intervention in restoring normal economic conditions. This paper analyzes the effect of State aids to distressed banks on the real economy, using a panel approach that covers all countries in the EU throughout the financial crisis. Results show that State aids were able to enhance economic conditions by restoring trust in financial markets. State aids boosted the ongoing substitution between securities and bank lending as the main financing channel of non-financial firms.

Keywords: State aids; bailout; economic growth; financial stability

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1. Introduction

The financial crisis renewed the debate on the bailout of banks and on its effect on the real economy. In this paper, we analyze how State aids to the financial sector affected the real economy in the European Union (EU) during the financial-euro crisis. Our main result is that State aids were able to stimulate the recovery of the economy. They restored trust in financial markets, allowing non-financial firms to substitute securities issuance for bank lending.

The debate on the bailout of a bank is the hot legacy of the financial crisis. On the one hand, the Lehman Brothers case showed that the default of a large financial institution could hamper trust in the financial sector, with a negative impact on the real economy. On the other hand, the use of public money to bailout banks significantly boosted public debt in many European countries, causing a weighty turbulence in the euro area with the crisis of peripheral countries. As a result, Europe was hit twice. The US subprime crisis mostly affected large investment banks and retail banks holding complex financial assets (2007-08). The subsequent euro crisis was instead associated with the sharp increase of public debt in several countries (2011-12).

These events stimulated European institutions to introduce a new set of rules aimed at limiting the possibility of State aids to the financial sector, promoting the bail-in of a bank in trouble rather than its bailout at the expense of taxpayers. Several European initiatives are going in this direction: the Communication by the European Commission (EC) on State aids to banks in 2013, the European Banking Union and the Bank Recovery and Resolution Directive. By replacing the bailout of a bank with a bail-in, the new rules try to break the direct link between bank troubles and public debt and to improve the bank governance, which should benefit from a more accurate oversight from shareholders and bondholders, see Goodhart and Avgouleas (2016) and Dewatripoint (2014). The literature concerning the bail-in/bailout option mostly concentrates on moral hazard effects, see Ennis and Keister (2009), Farhi and Tirole (2012), Hakenes and Schnable (2010), Gropp et al. (2010), Keister (2016) and Bianchi (2016). On the other hand, few studies try to answer to the question whether it is better, from a macroeconomic point of view, to let distressed banks fail or to bail them out.

Moreover, the literature concerning the effects of bank bailouts on the real economy is not conclusive. Detragiache and Ho (2010) consider 40 systemic banking crisis episodes between '80s and mid-2000s, and show that State interventions relying on a heavier fiscal burden are associated with a lower post-crisis GDP growth rate. No effect (or negative effect) of State intervention on the recovery of the real economy is detected in Honohan and Klingebiel (2003), Claessens et al. (2005), Cecchetti et al. (2009) and in Dell'Ariccia et al. (2008). On the other hand, Laeven and Valencia (2012a), using data from the Laeven and Valencia (2008) crises database, show that government

blanket guarantees on bank liabilities help to reduce liquidity pressure on banks. Laeven and Valencia (2012b) concentrate their attention on recent financial crises and show that bank recapitalizations have a more significant effect on the growth of financially dependent firms than other types of intervention. Analyzing a dataset of Japanese banks from 1998 to 2004, Giannetti and Simonov (2013) show that there exists a threshold for effectiveness, thus only bank bailouts with large enough capital injections are able to increase credit supply and to revitalize investments. Brei et al. (2013) find similar results on the recent crisis: bank recapitalizations convert into a greater credit supply only if bank balance sheets are sufficiently strengthened. Kollmann (2013) and Sandri and Valencia (2013) show that direct injections of capital are effective in stabilizing output and investment by reducing the spread between deposit and lending rate, hence bank recapitalizations can lead to a substantial welfare gain.

To the best of our knowledge, this paper provides the first analysis of the effect of State aids to the financial sector on the real economy in the EU across the financial/euro crisis.² We contribute to the literature by conducting a panel analysis on the performance of the 28 countries in the EU from 1999 to 2016. The panel approach allows us to consider simultaneously countries affected at different degrees by the crisis. This reduces the potential selection bias that may characterize other studies that consider only countries affected by a crisis, as pointed in Laeven and Valencia (2012b).

We monitor the state of the economy of a country through two macroeconomic variables: gross domestic product and gross fixed capital formation. We find evidence of a statistically significant positive impact of State aids on both these variables. The money of taxpayers conveyed in the bailout of banks was thus successful in stimulating economic recovery after the financial collapse.

A natural explanation of this result might be that the relief of banks' balance sheets allowed them to enhance credit supply to firms, which were able in turn to speed up the economic recovery, see Laeven and Valencia (2012b). This interpretation is not borne out by our analysis. We show that State aids resulted in a further reduction of bank credit, balanced out by a stronger issuance of bonds and shares by non-financial companies. This result is in line with the "spare tire" argument of Greenspan (1999) and Levine et al. (2016). According to this view, the access to financial markets mitigates the effects of a crisis because firms can substitute equity/bond issuances for bank loans during a banking crisis.

Langfield and Pagano (2015) already provided evidence in favor of this interpretation when monitoring the performance of countries during the financial crisis. However, we show that the

² We refer to Adamczyk and Windisch (2015) for an analysis of the effect of State aids on bank performance, which show that banks that received aids during the financial crisis have bounced back, and can be considered as healthy as ordinary banks.

effect on the real economy of State aids to the financial sector is more pervasive, and is not fully absorbed by the substitution of funding channels of non-financial companies.

Namely, a dynamic panel vector autoregression analysis shows how State aids were able to affect the ongoing substitution between firms' financing channels and boost the recovery of the stock market, which were able in turn to accelerate economic recovery. We corroborate our interpretation by showing that State aids have a stronger effect in countries characterized by a developed financial market and in countries that experienced a large credit growth before the crisis.

In order to evaluate the effect of State aids on the real economy, we thus proceed in two steps. We first prove that State aids helped economic recovery, and then we try to discern the channel through which they encouraged the economic upturn.

The paper is structured as follows. Section 2 describes the database and the panel regression models presented in the paper. Section 3 presents the results on the effects of aids on macroeconomic and financial variables, evaluating the impact of State aids in single-output models. Section 4 investigates the transmission channels of State aids to real economy, presenting the impulse-response analysis of the panel vector autoregressions and other additional robustness results. Section 5 concludes.

2. Statistical analysis: dataset and methodology

The dataset is constructed using data from Eurostat, European Central Bank (ECB) and Thomson-Reuters Datastream. The dataset covers the timespan 1999-2016. The amount of State aids across the 28 European countries of the Union on a yearly basis (from 2008 to 2016) comes from the European Commission (EC),³ and is set to zero between 1999 and 2007.

Figure 1 provides a picture of the aggregate cumulative State aids to financial institutions as a fraction of the aggregate amount of assets of the European banking system. State aids are classified according to four different categories: government guarantees, recapitalization measures, asset relief interventions and other liquidity measures. We provide the fraction of the aggregate cumulative amount of State aids used (Figure 1(a)) and approved (Figure 1(b)), divided by the total assets of financial institutions. Comparing the two pictures, we observe that the difference can be quite remarkable. For example, in 2012, a plan to recapitalize Spanish banks was approved by the EC up to 100 billion euros, but only 60 were effectively used.

The largest fraction of State aids (in terms of nominal value) is provided by guarantees, mostly backing bonds issued by banks. This type of interventions has been adopted by EU countries to

³ European Commission, The 2016 Scoreboard - Aid in the context of the financial and economic crisis, www.ec.europa.eu.

address the liquidity needs of banks during the crisis, when the interbank market was not operating correctly and, at the same time, it was almost impossible for banks of some countries to issue bonds. Recapitalizations are the second type of measure in terms of magnitude. Asset reliefs and other liquidity measures play instead a less significant role.

We concentrate our attention on aids that were effectively used by the financial system (*aids*). As a measure of the magnitude of bailouts, we consider at year t the cumulated amount of State aids used from 1999 up to t , normalized by the total assets of financial institutions of the country by the end of that year (*cum_aids*).⁴ The rationale for considering the stock of State aids, rather than the flow, is that it is the total amount of State aids since the start of the crisis that matters for economic recovery. We will come back on the flow/stock of State aids in what follows.

To evaluate the effects of State aids on the real economy we consider the growth rate of real gross domestic product (*gdp*) and the growth rate of real gross fixed capital formation (*gfcf*).⁵ Figure 2 provides the whisker plot of the macroeconomic variables across the panel.

The first dip that we observe accounts for the effects of the global financial crisis in Europe: by the end of 2009, both gross domestic product and investments registered a decline (around -5% and -15% on average, respectively). The recovery occurred in 2010 was followed by a downward pattern associated with the Eurozone crisis in 2012. Note that the performance of European countries showed a higher cross-country variance during the second wave with respect to the first one. The relapse was less significant than in the first recession, but more dispersed (actually, many countries did not experience a recession at all during the euro crisis). This confirms the well-debated heterogeneity of the upshots of the crisis across Europe.

In order to explore the transmission mechanism of State aids to the real economy, we first investigate to which extent the financing channels of non-financial companies were affected by the crisis and by State aids as well. To this end, we consider the amount of loans to non-financial companies from financial institutions and the amount of outstanding securities issued by non-financial companies, i.e., the aggregate stock of bonds and shares.

⁴ Notice that panel unit root test always refuses the null that *cum_aids* displays unit root. State aids relate to the level of distress of the banking sector. To control for this feature, we perform the panel regressions using cumulated State aids granted/used over total capital and reserves of financial institutions. As a robustness test, we also substitute cumulated State aids used over total assets with cumulated State aids approved over total assets. Finally, we consider as shorter time span (from 2008 to 2016), when the EU Member countries granted State aids after the financial crisis. Main results are robust to these tests.

⁵ We considered also different macroeconomic indicators to corroborate our analysis, namely, the first differences of the log-ratio between capital formation and *gdp*, the growth rate of industrial production (with 2015 as basis year), the growth rate of the number of employees and the first differences of the unemployment rate (computed as the ratio of unemployed population either to total population or to active population). The main results are confirmed.

Figure 3 reports the fraction of each channel over the total assets of EU monetary and financial institutions (Figure 3(a)) and over the total amount of financing sources for non-financial companies (Figure 3(b)). The financial and the euro crisis significantly affected the sources of funding of non-financial companies. After the burst of the dot-com bubble between 1999 and 2001, the financing through securities issuance by non-financial companies constantly declined up to 2008, in favor of bank lending. In 2008, the composition was as follows: 7% of bonds, 27% of shares and 66% of bank loans. The stock of securities declined also in 2008 and in 2011, but all the other years saw an increase of securities issuance as a source of funds for non-financial companies in most of the European countries. We observe the opposite dynamics for bank loans. This evidence is coherent with the de-leveraging/de-risking process of European banks coping with new regulatory standards. As a result, the composition of funding sources of non-financial companies at the end of 2016 was as follows: 10% of bonds, 37% of shares, 53% of loans. The relevance of funds coming from the market for non-financial companies has thus increased during the financial crisis. This descriptive analysis thus suggests that firms substituted securities issuance to bank loans after 2008. Namely, as suggested by the “spare tire” argument of Greenspan (1999) and Levine et al. (2016), the issuance of shares and bonds seems to be countercyclical, while the level of credit granted seems to be procyclical.

Figure 4 reports the whisker plots of the growth rate of the stock of securities issued by non-financial companies (*secur*, Figure 4(a)), the growth rate of the stock of loans granted to non-financial companies (*loans*, Figure 4(b)). Furthermore, in order to analyze the effect of State aids on financial markets, we consider also the growth rate of each country’s main stock index (*stock*, Figure 4(c)).

Securities and stock indexes share a similar behavior, both accounting for two dips in 2008 and in 2011, respectively. The growth rates of these variables remain instead positive from the end of 2012 on. The growth rate of loans instead is always positive before the crisis, and the cross-country median increases each year between 2003 and 2008, before dropping to a slightly negative value in 2009 and hovering around zero from there on. Our baseline model is as follows:

$$y_{i,t} = \alpha_0 + \alpha_i + \delta_t + \beta \cdot cum_aids_{i,t-1} + \sum_{k=1}^p \gamma_k \cdot z_{i,t-1}^k + \varepsilon_{i,t} \quad (1)$$

where α_0 is a constant, α_i are countries fixed effects, δ_t are time fixed effects, the endogenous variable is $y \in \{gdp, gfcf\}$, and the index $i=1 \dots 28$ identifies the EU countries in the panel.

The vector of regressors:

$$z^T = (intbk3m, fiscal, ulc, dereg, spread, secur, loans, stock) \quad (2)$$

is added to control for several features that may affect our endogenous variables. We regress y on the value of cum_aids and of z computed at $t-1$ to avoid possible reverse causality issues.⁶

The 3-month interbank rate (*intbk3m*) accounts for the monetary policy of each country's central bank.⁷ As an indicator of fiscal policy (*fiscal*), we use the growth rate of the difference between government expenditures and tax revenues.⁸ We control for the competitiveness of the economy with the unit labor cost (*ulc*). An index of economic deregulation (*dereg*) is included to control for the presence of political and regulatory hindrances in the functioning of the economy. We consider the Index of Economic Freedom, constructed by the World Bank, which combines information on market openness, regulatory efficiency and solidity of public accounts. Credit spread (*spread*), defined as the difference between 10-year government bond yield and the 10-year OIS rate, controls for sovereign credit risk. We include also the financing channels of non-financial companies, namely, the growth rate of the stock of securities (bonds and shares) issued by non-financial companies (*secur*), and the growth rate of the stock of loans granted to non-financial companies (*loans*). The rate of return of the stock index of the country (*stock*) accounts for the degree of profitability/evaluation of companies.⁹

To estimate our panels, we use a standard least-squares fixed effects panel estimator, with a correction to the covariance matrix accounting for possible cross-country heterogeneities. It may be argued that a suitable model for a macroeconomic covariate should include also its lagged value as a regressor. We also test a dynamic panel model using the two-step Blundell and Bond (1998) estimator (known as “system-GMM”) with forward orthogonal deviations transform and the Windmeijer correction to standard errors in the first step (Windmeijer, 2005). The system-GMM estimator is preferred to the first-difference GMM estimator because it maximizes information in the presence of missing observations (Blundell and Bond, 1998). The lagged value of y however never turned out to be significant in our regressions, thus we preferred to keep the simpler model.¹⁰

Summary statistics of all variables at country level are reported in Table 1.

⁶ The average variance inflation factor (VIF) is 2.68; the usual multicollinearity threshold is 5.

⁷ We use the 3-month Euribor rate for all countries currently in the Euro area.

⁸ We do not consider the government budget balance because is directly affected by State aids.

⁹ We test several specifications off the system (1)-(2). We replaced time fixed effects with the World Trade Balance index supplied by the World Bank as a proxy for global demand. As an indicator of fiscal policy, we use the average tax rate. Among the control variables, we also consider the output gap estimated by the EC, the average size of firms in the manufacturing sector, and the monetary aggregate M1 deflated by consumer price index as a proxy for liquidity availability. The main results are not affected, and these variables never turn out to be significant.

¹⁰ Results from conducting dynamic panel regressions are available upon request.

3. State aids and the real economy

In Table 2(a), we report the results from the estimation of model (1) with the vector of regressors z specified as in (2). As far as the control variable z is concerned, the analysis provides results aligned with economic intuition: credit spread and fiscal burden has a negative and statistically significant impact on gross domestic product and capital formation. Furtherly, we register a positive and statistically significant impact of the growth rate of securities on both *gdp* and *gfcf*. The growth rate of loans instead plays no role. We will come again to this point later in this section.

Cumulated State aids have a statistically significant positive impact both on the growth rate of gross domestic product and on the growth rate of capital formation. The magnitude of the effect on the variables is relevant. A 2% rise of the percentage of cumulated State aids over total assets of financial institutions, as experienced in Europe on aggregate between 2009 and 2012, induces a rise of 11 basis points (bps) in the growth rate of gross domestic product and a rise of 25 bps in the growth rate of investments. We can thus assess that State aids to the financial sector had a positive impact on the real economy.

We turn now to investigate the possible transmission channels between financial institutions and the real economy. A financial crisis may affect the real economy through three different transmission channels: the borrower balance sheet channel, the liquidity channel and the bank balance sheet channel (Basel Committee on Banking Supervision, 2011). According to the latter, any shock affecting the financial institution balance sheets should lead to a reduction of credit to the private sector, hampering investments and economic activity. If State aids were able to replenish the bank balance sheet channel, then we would observe bank lending bouncing back to normal conditions. As already observed, this interpretation is not borne out by our analysis. The evolution of financial sources of non-financial companies depicted in Figure 3 suggests that non-financial companies started to issue shares and bonds to finance their investments immediately after the financial crisis. Moreover, the amount of credit granted by financial institutions in the EU decreased as consequence of the de-risking/de-leveraging process that interested European banks after the burst of the crisis. As shown by the European Banking Authority (2017), during the last five years, risk weighted assets of the major banks decreased by 20% and the leverage ratio (capital divided by total assets) almost doubled during the same period.

In order to corroborate this descriptive analysis, we infer a set of panel regression in the form (1) for the set of relevant financial variables that we included in our analysis. The aim is to measure the effect of State aids on these variables. Specifically, we consider as the endogenous variable y one of

the financial variables, $y \in \{secur, loans, stock\}$. For any of these endogenous variables, the vector of regressors z embeds *fiscal*, *ulc*, *dereg*, *spread* and the other two financial variables, taken as explanatory regressors. We plug in the model both the level of State aids and the vector of regressors at $t-1$, to avoid possible reverse causality issues.

Results however do not show a significant impact of State aids on the growth rate of any of the financial variables under analysis. The “spare tire” argument of Greenspan (1999) and Levine et al. (2016) assesses that firms prefer bank loans during normal times, but equity and bond issuances substitute bank loans during banking crises. Our descriptive analysis corroborates this argument, yet this approach does not reveal whether State aids played any role in this substitution process. However, this outcome could be justified by the presence of adjustment costs. The issue of equities and bonds implies transaction costs that could induce firms not to optimize their capital structure year by year. As remarked by Leary and Roberts (2005), firms are inclined to adjust their leverage between the second and the fourth year following a shock.

To take into account the possibility that shocks to leverage have a persistence effect, we modify model (1) as follows:

$$\Delta y_{i,t} = \alpha_0 + \alpha_i + \delta_t + \beta \cdot aids_{i,t-1} + \sum_{k=1}^p \gamma_k \cdot \Delta z_{i,t-1}^k + \varepsilon_{i,t} \quad (3)$$

where Δ indicates the first difference operator and the variable $aids_{i,t-1}$ is the flow of State aids used by country i at time $t-1$ (equal to $\Delta cum_aids_{i,t-1}$). In model (3), we consider as dependent variables the first difference of the growth rate of financial variables, which allows us to remove persistent shocks.

In Table 2(b), we report the outputs from estimating model (3) on financial variables: the noticeable results are the positive impacts of *aids* on both the first differences of *secur* and *stock*. This means that, although both securities issuance and the stock index were already upward trending after the great dip in 2008, thus showing a positive growth rate, a new flow of State aids is able to increase this growth rate and thus to accelerate the upward pattern of these variables. Namely, the growth rate of securities rises by 103 bps and the growth rate of the stock index rises by 58 bps for a 1% increase of *aids*, and the results in Table 2(a) suggest that a higher growth rate of securities issuance positively affects the real economy.

Summarizing, the cumulated amount of State aids has a positive impact on the real economy, while the flow of State aids has a boosting effect on the level of securities issued by non-financial companies and on the country’s main stock index. These results suggest that State aids contributed

to revitalize the economy by restoring trust on financial markets and helping non-financial companies to issue more stocks and bonds as a substitute of loans that banks were not able to provide anymore.

Our results point out the role of State aids in fostering the economic activity and in favoring the substitution between securities and loans. Particularly, the results on financing sources substitution are strictly related to the literature on credit-less recoveries, see Abiad et al. (2009), Takats and Upper (2013), Sugawara and Zalduendo (2015) and Bijsterbosch and Dahlhaus (2015). Our analysis provides thus evidence that the recovery in Europe after the crisis was credit-less.

4. Impulse-response analysis and further results

In order to deepen the analysis of the transmission mechanisms of State aids to the real economy, it is worth to embed both financial and macroeconomic variables in the same regression. This allows us to explore the mutual interaction among economic variables over time. In this context, we conduct a panel vector auto regression (PVAR) analysis: namely, we consider a PVAR(1) in the form:

$$\Delta x_{i,t} = \alpha_0 + \alpha_i + A \cdot \Delta x_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

where¹¹ $x^T = (gdp, secur, loans, stock, cum_aids)$. The mutual impacts among current and lagged values are entailed in matrix A . We proceed to investigate the impact of State aids on the other endogenous variables through an impulse-response analysis. The large number of parameters to be estimated as compared to the size of the dataset forces us to include a single lag in the evolution equation. This issue clearly affects also the confidence bands of the variables' responses.

The first focus of this analysis is the short-term reaction of the system to an increase in the flow of State aids. The response of system (4) to a unitary impulse on $\Delta cum_aids = aids$ is represented in Figure 4. In line with the results of the dynamic panel, we find that a unitary impulse to *aids* has a positive impact at $t=1$ on *secur* (which is significant at 95% level), and a positive impact on *stock*

¹¹ For space conservation reasons, we focus the PVAR analysis on *gdp*. However, we obtain similar results using *gfcf*. The estimator is the two-step system-GMM with orthogonal deviations transformation that we described in section 2. Results are retrieved using Stata13 routine *pvar*. We use one-lag delayed endogenous variables as weakly exogenous instruments (*gmmstyle* instruments). The covariance matrix is robust to cross-country heteroscedasticity. The PVAR(1) described by (4) satisfies the stability condition. The Fisher-type and the Im-Pesaran-Shin panel unit root tests refuses the null that all panel displays unit roots at 0.1% confidence level. We also considered orthogonalized impulse-responses with several variables ordering. Main results are always confirmed. However, we prefer to present standard impulse responses to avoid biasing the results towards our interpretation by choosing ex-ante variable ordering.

and a negative impact on *loans* (both significant at 68% level¹²). Furthermore, a unitary impulse to *aids* has a positive impact at $t=2$ on *gdp*, which is significant at 68% level.

This analysis suggests that the positive effect of *aids* on the growth rate of securities and on the growth rate of the stock index is then transmitted to real economy. In order to verify this hypothesis, we explore the response of *gdp* to a unit impulse to either *secur* or *stock*. Results are reported in Figure 5. The response to any of these two impulses is positive and significant in $t=1$ at 95% confidence level. It is interesting to note that we do not measure any significant response of *loans* to an impulse to *secur*. This outcome implies that State aids are the unique responsible for a boost in the ongoing financing channels substitution process.

The “spare-tire” argument states that the access to the market improves macroeconomic conditions in a period of financial turmoil and produces an intertemporal substitution of funding channels. Our results prove that new flows of State aids foster this mechanism. While the deleveraging/de-risking process was freezing most of the banks, non-financial companies turned directly to the market, and with renewed confidence.

We investigate the robustness of our interpretation in several directions. Firstly, we consider the cumulated stock for each category of State aids to the financial sector (guarantees, recapitalization measures, asset relief interventions and other liquidity measures) as a fraction of total assets of financial institutions. The analysis shows that the positive effect is mostly due to guarantees, as suggested by Klingebiel et al. (2001), and recapitalizations, as suggested by Laeven and Valencia (2012a, 2012b), see Table 3(a) and Table 3(b) respectively. In particular, while the magnitude of the impact of cumulated guarantees is in line with that of cumulated total aids (a 2% rise of the percentage of cumulated guarantees over total assets increases *gdp* and *gfcf* by 13 bps and 31 bps, respectively), the impact of recapitalizations is much wider. Namely, a 2% rise in cumulated recapitalizations increases *gdp* and *gfcf* by 70 bps and 215 bps, respectively. Assets reliefs and other liquidity measures play instead a limited role.¹³

We further develop our analysis investigating how State aids affected the economy depending on the characteristics of the economy. We considered two main features of a country: i) financial structure and ii) credit market at the incipit of the crisis. The effects of a crisis seem to depend on the financial structure of the country. Levine (1997), Dell’Arriccia et al. (2008) and Kroszner et al. (2007), building on the large literature that highlights the relevance of the financial sector for the real economy, find that companies belonging to more financially dependent sectors or operating in States with larger financial sectors experience a greater contraction after a crisis. Instead, Cecchetti et al. (2009) find no evidence of correlation between credit to the private sector and output loss.

¹² Sims and Zha (1999) suggest the use of a confidence level of 68% in the framework of impulse-response analyses.

¹³ The estimated output with *assrel* and *othliq* as explanatory variables are available upon request.

To address how the size of the financial sector of a country interacts with State aids, we follow Langfield and Pagano (2015) and define the bank-market ratio as the ratio between financial institutions assets and market size (i.e. the stock of securities issued by the whole economy of each country). We define a dummy variable dum_a taking value equal to one if the bank-market ratio is above the cross-country median in 2007, and zero otherwise. The dummy variable equal to one is associated to a country where the market is limited as compared to the banking sector. In models (1) and (3), we consider the interaction of dum_a and $1-dum_a$ with the variable that express State aids.

In Table 4, we provide the results of this test. The coefficient of $1-dum_a$ interacted with cum_aids is statistically significant both in the case of gross domestic product and gross capital formation, while the interaction with dum_a is positive but not significant in both cases. It turns out that State aids were effective in boosting the real economy only in countries characterized by a developed financial market. Notice also the positive statistically significant effect of $1-dum_a$ interacted with $aids$ in the equation for the first differences of $secur$ and $stock$. State aids to the banking sector have thus been effective in restoring trust in financial markets, boosting non-financial companies' substitution of bonds and shares for loans in countries where the financial market was sufficiently developed.

Aisen and Franken (2010), show that credit growth during a crisis depends on the credit growth before the onset of the crisis: a credit boom prior to the crisis is able to reduce significantly the growth of credit during the crisis. We investigate this hypothesis considering the dummy variable dum_b which is equal to 1 if the growth rate of bank loans to non-financial companies between 2004 and 2007 is above the cross-country median in that year. In models (1) and (3), we consider the interaction of dum_b and $1-dum_b$ with the variable that express State aids.

In Table 5 we provide the results of this test. It turns out that State aids to the banking sector were effective in boosting the real economy only in the case of countries that experienced a significant growth of loans between 2004 and 2007 (credit-boom countries). Notice also the positive and statistically significant effect of dum_b interacted with $aids$ in the equation for the first differences of $secur$ and $stock$. State aids to the financial sector have thus been effective in countries where non-financial companies were more dependent on credit from banks. In these countries, State aids helped to restore trust in financial markets and boost non-financial companies' substitution of bonds and shares for bank loans.

6. Conclusion

The evidence provided in this paper shows two main results. First, State aids to financial institutions enhanced real economic conditions. This result is robust to many different

specifications. The second result concerns the mechanism through which State aids affect the real economy. In the literature, we find two competing hypotheses: i) banking recovery hypothesis, ii) “spare tire” hypothesis. The first states that the relief of banks’ balance sheets induced by State aids allows banks to enhance credit supply to non-financial companies, which are able in turn to speed up the economic recovery (Laeven and Valencia, 2012b). The second asserts that State aids are able to restore firms’ trust in financial markets, so that the issuance of shares and bonds can substitute bank loans during a banking crisis (Greenspan, 1999, and Levine et al., 2016).

Thanks to our empirical approach, based on a set of single-dimension dynamic panels and on a panel VAR, we are able to shed some light on these two hypotheses. The empirical evidence suggests that a substitution between financing channels was taking place after the crisis independently from State interventions, because of the de-leveraging/de-risking process affecting financial institutions in the EU. We find that State aids boosted this substitution mechanism, inducing a further reduction of loans, balanced out by a stronger issuance of bonds and shares by non-financial companies. Therefore, the “spare tire” argument holds, although the issuance of securities is not the unique channel through which State aids work. State aids play a more pervasive effect, by fostering also the growth of the stock index of the country. The real economy benefits from the interplay among all these effects.

Our results have important policy implications. A more balanced financial structure among European countries, i.e., less biased towards banks, could enhance economic growth. In this perspective, the launch of the Capital Markets Union by the European Commission is an important opportunity as its goal is to reduce dependency of (small) firms on banks. Moreover, despite the strict rules introduced at the European level, countries should be more flexible in granting State aids. In fact, our analysis has shown that they may accelerate economic recovery after a financial turmoil.

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