CREDIT-LESS RECOVERIES: THE ROLE OF INVESTMENT-SAVINGS IMBALANCES

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Abstract

This paper argues that the investment–savings imbalances of households and companies play an important role in determining the probability that an economy experiences a credit-less recovery, following a recession. The investment–savings gap determines the need for "external" finance of the private sector in the form of either bank credit or capital market financing. Using a broad dataset covering 96 countries and 272 recovery episodes, we provide empirical evidence that credit-less recoveries are indeed associated with both low and declining financing needs of the private sector, as proxied by the investment-savings gap at the trough of the recession and its adjustment during the downturn. We show that this reflects a rebalancing of wealth towards financial assets during the downturn which can subsequently be used to finance real investment during the recovery stage, even in the absence of positive bank credit flows. Lastly, we provide empirical evidence that, controlling for the change in investment-savings imbalances, economies whose economic downturn was preceded by a credit boom are more likely to experience a credit-less recovery.

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1. Introduction

Credit-less recoveries have come into the mainstream of economic research following the global financial crisis of 2008-2009 and the concurrent recession. The related literature expanded rapidly in just a few years. Calvo *et. al* (2006) had set the stage, coining the expression “phoenix miracle” to convey the puzzle inherently associated with a rebound of economic activity in the absence of bank credit. Notable more recent contributions include Claessens *et al.* (2009), Abiad *et al.* (2011), Bijsterbosch and Dahlhaus (2011) and Sugawara and Zalduendo (2013), all of which empirically explore the nature of credit-less recoveries and their possible determinants.

Although a large battery of variables is considered in the aforementioned literature, an aspect which has arguably been overlooked is the role of investment-savings imbalances in determining the probability of credit-less recoveries. From a flow of funds perspective, imbalances between investment and savings of the private non-financial sector reflect its needs for net external financing, i.e. financing from sources other than private savings, such as bank credit, equity and bond market financing. Thus, the lower the investment-savings gap, the lower the net external financing needs of the private sector, and hence the more likely an economic recovery without bank credit should be. From the perspective of national accounting, the investment-savings gap of the private sector reflects the difference between the current account deficit and the budget deficit of the government. The individual role of large current account deficits and fiscal deficits in triggering economic crises has been extensively studied in the literature. We reconsider the role of the current account deficit in determining the probability of credit-less recoveries and argue that the economic intuition commonly provided in the literature on this matter may be misguided. We link the aforementioned two perspectives and reinterpret the role of the two deficits in the occurrence of credit-less recoveries, from the prism of the investment-savings imbalances and flow of funds approach.

Indeed, drawing on the large dataset employed in this paper, a substantial share of credit-less recoveries seem to be associated with a low or declining investment-savings gap of the private sector. We use existing theoretical concepts to formalize the hypothesis that such a decline increases the probability of the subsequent recovery being credit-less. We formally test this hypothesis in a number of alternative specifications and sample sizes and present empirical evidence in its favour. Next, we explore how these changes in the investment-savings gap are actually financed, in terms of flows of funds. We find that the decline in the investment-savings gap during economic downturns which are followed by credit-less recoveries reflects an increased accumulation of financial assets by households and companies. These financial assets can subsequently be used to finance real investment (and thus the rebound of economic activity) during the recovery stage, even in the absence of positive credit flows. Finally, we provide empirical evidence that economies whose downturn was preceded by a credit boom are more likely to experience a credit-less recovery.

The remainder of the paper is structured as follows: Section 2 concisely presents some stylized facts on credit-less recoveries and motivates our alternative perspective on their possible determinants. Section 3 derives a proxy for the main variable of interest, i.e. the private sector's external financing needs, and outlines the dataset and econometric methodology. Section 4 presents our empirical findings. Section 5 provides some robustness checks of our specification and findings. We conclude in Section 6, where we set out some policy implications of our results.

2. Credit-less recoveries from a different angle

2.1 A review of the literature

Several empirical findings are already emerging as stylized facts in this strand of the academic literature. In particular, a country is likelier to experience a credit-less recovery when:

- *the preceding recession was deep*, a large decline in output thought to imply unused existing production capacity which can be readily tapped into to spur a rebound of growth, even in the absence of credit expansion (Abiad *et al*., 2011 and Bijsterbosch and Dahlhaus, 2011, *inter alia*).
- *the recovery was preceded by a credit boom and/or a financial crisis* (Abiad *et al.*, 2011 and Bijsterbosch and Dahlhaus, 2011)
- *a substantial REER devaluation occurred during the downturn*, the intuition being that a pick-up in exports may drive an economy out of recession without much need for domestic credit (Darvas, 2013, *inter alia*).
- *a sharp improvement in the CA balance was recorded during the downturn*, thought to suggest a substantial restructuring of the economy towards tradeable sectors, reflected in an increase in exports (Sugawara and Zalduendo, 2013 and Darvas, 2013).
- *it is financially open*, indicating a higher exposure to rapid capital outflows (Sugawara and Zalduendo, 2013).

Additionally, Sugawara and Zalduendo (2013) were the first to systematically consider policy variables,[1] and find that the probability of a credit-less recovery is higher if, during the downturn:

- *there was an easing of fiscal policy*, as the ensuing expansion would be driven, in part, by public expenditure, implying a lower demand for bank credit during the recovery phase
- *there was a tightening of monetary policy*, as this would imply less funding would be available to the private sector.

2.2 Why the economy's financing needs may matter

The main theoretical premise of this paper stems from the savings-investment imbalance concept. Investment is a key variable underpinning economic growth, as is routinely reiterated in the reports of the World Bank and the IMF. Indeed, Ottonello (2010) rightly points out that recoveries should be viewed as "phoenix miracles" only to the extent that investment, their underlying driving force, is not contemporaneously rebounding. The mirror image of investment is its financing, i.e. savings in the broad sense. It is these two variables that we focus on in the present exploration of credit-less recoveries, within the savings-investment imbalance context.

Taking a broad view of conventional national accounting identities, the gap between private investment and private savings, I-S, is thought to reflect the external financing needs of an economy's private sector. If I-S is positive, the private sector needs external financing as its savings are not sufficient to cover investment. Conversely, if S is sufficiently large to cover I, there is no need for external financing of economic agents' activities. By implication, as S increases, the need for credit expansion to underpin economic growth should become less pressing.

In order to get some insight into the role of bank credit in financing private investment, consider the aggregated flow of funds identity of households (HHs) and non-financial companies (NFCs):

$$I+\Delta FA=S+\Delta L \qquad (1)$$

Equation (1) says that private sector investment, i.e. the sum of real investment, I, and financial investment (the change in financial assets), ΔFA, is financed through private

[1] Sugawara and Zalduendo (2013) also provide a thorough review of the theoretical and empirical literature on credit-less recoveries, covering approaches from the micro-sectoral level to the broad macro perspective.

savings, S, and bank credit, ΔL.[2] Hence, I-S equals the change in the net financial liabilities of HHs and NFCs, ΔL-ΔFA, where ΔL denotes the change in loans to the private sector and ΔFA the change in the private sector's financial asset holdings. This identity has the following implication: holding the rate of accumulation/depletion of financial assets, ΔFA, constant, the higher the financing needs of the private sector, I-S, the higher its dependence on bank credit. Conversely, if private savings exceed private investment (I-S<0), then investment can be financed even with negative credit growth (ΔL<0), i.e. the recovery can be credit-less. If this proposition holds, then we should observe that economies which experienced a credit-less recovery had high savings relative to investment at the trough of the recession.

In fact, using a large dataset, covering 96 countries and 272 recovery episodes, we find that more than 80% of credit-less recoveries are characterized by a negative financing gap, i.e. I-S<0 at the trough of the recession, compared to 50% for credit-supported recoveries (see Figure 1.a). Pursuing this argument further, it follows that, in addition to the level of the investment-savings gap, its change during the economic downturn may also be important for the availability of internal funds to finance investment during the recovery. Turning again to the data, Figure 1.b suggests that approximately 85% of credit-less recoveries in our dataset are characterized by a declining investment-savings gap, Δ(I-S)<0, from the peak of the business cycle to the trough of the recession, compared to 65% for credit-supported recoveries.

The decline in the investment-savings gap during the preceding downturn may be related to higher procyclicality of investment relative to savings. Investment usually declines sharply during recessions whereas savings decline less or even increase as a fraction of GDP, as interest rates decline during economic downturns and households tend to increase precautionary savings due to higher economic uncertainty. Table 1 reports non-financial investment and savings of HHs and NFCs as a fraction of GDP before and after the great recession of 2008 for several EU countries. With no exception, the investment-to-GDP ratio declined (in some countries even sharply) during the recession, whereas the savings-to-GDP ratio increased or remained stable. As a result, the investment-savings gap narrowed

[2] In the simple economy we consider in this context, the financial assets held by HHs and NFCs are cash, bank deposits and government bonds. Banks accept deposits and provide loans to HHs and NFCs. The government finances its budget deficit either through issuance of sovereign bonds or through high-powered money from the central bank. The current account deficit of the economy is financed by net acquisition of domestic financial assets (sovereign bonds and deposits) by foreign residents. NFCs finance investment through retained earnings, bank loans or equity issuance. Savings of the private sector consist of savings of HHs and retained earnings of NFCs. HHs use savings to invest in equity, bonds or cash and deposits. HHs own all equity of NFCs, hence, firm equity cancels out when we aggregate financial assets of HHs and NFCs because it is an asset for HHs and a liability for NFCs.

significantly in most countries or turned negative, suggesting that, in the aftermath of the recession, private savings exceeded private investment. Figure 2 plots the investment-savings gap for a number of EU countries. The figure illustrates that during the 2008-2009 recession savings-investment imbalances narrowed significantly.

In view of all the above, the following proposition is put forth: *the smaller the external financing needs of the private sector and/or the faster these financial needs are declining during the economic downturn, the less credit would be required for growth to begin recovering at the trough of a recession; thus, the higher the probability of a credit-less recovery, and vice-versa*. This proposition is formalized and tested empirically in the following sections.

3. The empirical methodology

The most comprehensive dataset available for our empirical work is that of Sugawara and Zalduendo (2013), henceforth SZ. It is a dataset which is exceptionally rich in terms of both the number of countries and the breadth of variables included. Moreover, it comprises quarterly data, which allow for a more precise identification of turning points. The sample spans the period 1965Q1 – 2011Q4. The panel is unbalanced, covering 96 countries. Data are drawn mostly from the IMF's International Financial Statistics database and, secondarily, from the OECD's Quarterly National Accounts and the IMF's World Economic Outlook database.[3]

In line with the literature, economic troughs in SZ are identified from the cyclical component of GDP and are defined as the points which fall one standard deviation below trend, spaced at least 8 quarters apart.[4] A total of 272 recovery episodes are thus identified in the sample, of which 105 in advanced economies and 113 in emerging economies, with 54 categorised as "other". A credit-less recovery is defined as one where average negative real credit growth was experienced over the 8 quarters following the trough. By this measure, roughly one in four economic recovery episodes can be thought of as credit-less.

For our empirical application, we proxy the investment-savings gap of the private sector (henceforth denoted φ) as the difference between the current account deficit and the fiscal deficit (both as a fraction of GDP), using the national accounts' identity:[5]

I-S ≡ current account deficit – fiscal deficit,

[3] For a complete description of the dataset see Sugawara and Zalduendo (2013).
[4] The cyclical component of GDP is defined as the difference between the log of real GDP and trend GDP, the latter computed using a Hodrick-Prescott filter.
[5] This is because flow of funds data are not available for most countries in our dataset.

This identity forms the basis of the "twin deficits" literature (e.g. Corsetti and Müller, 2006). The underlying intuition is that an excess of private investment over private savings can be financed either by a higher current account deficit (i.e. capital inflows from abroad) or by a lower budget deficit (i.e. freeing up private savings to finance investment).[6]

Guided by the above identity, we use data from the SZ dataset on the "twin deficits" to proxy the investment-savings gap of the private sector. Note that the fiscal deficit in the SZ dataset is cyclically adjusted, hence, our proxy is by construction less than perfectly correlated with the actual investment-savings gap of the private sector. Moreover, differences in methodology between national accounts data and flow of funds data make the proxy naturally imperfect. However, we evaluated the ability of our proxy to track the investment-savings gap of the private sector for a number of European economies where flow of funds data are available, and find that it performs well.[7]

The estimations presented in Section 4 are probit regressions, specified as follows:

$$Prob(y_{\mathrm{i,t}} = 1 | X_{\mathrm{i,t}}) = F(X'_{\mathrm{i,t}}\beta)$$

The binary dependent variable $y_{\mathrm{i,t}}$ takes the value 0 if a recovery is credit-supported and 1 if it is credit-less. The function F is the cumulative normal distribution and $X_{\mathrm{i,t}}$ is a vector of regressors that drives the incidence of credit-less events. We use the SZ specifications as a benchmark, on the basis of which we proceed to test a series of sequentially nested hypotheses stemming from our main theoretical thesis. Thus, our estimates are directly comparable to the findings of SZ and extend them in several ways.

Our main *ex ante* expectation is that our proxy φ for the external financing needs of the private sector, which we include in alternative forms in the vector of regressors $X_{\mathrm{i,t}}$, has explanatory power for the probability of a credit-less recovery. In line with the literature, a number of additional variables have been included in $X_{\mathrm{i,t}}$, in order to gain further insight or to confirm the aforementioned stylized facts. These are:

[6] An alternative interpretation, which is more standard within the "twin deficits" context, is that budget deficits must be financed by either an increase in private sector savings or a reduction in investment or an increase in the current account deficit (i.e. by higher capital inflows from abroad), thus the link between the two deficits.

[7] We evaluated the ability of our proxy to track the investment-savings gap of the private sector for Germany, France, Portugal, Finland, Denmark, UK, Spain, Netherlands, Italy, Sweden and Greece (data are available by the authors on request). In many cases there seems to be a roughly constant difference between the two series, which can be accounted for by differences in methodology between national account data and flow of fund data, and the fact that we use cyclically adjusted data for the fiscal deficit. However, the proxy seems particularly good at capturing turning points, which is what is essential for our regression specifications, given that they primarily involve peak-to-trough changes.

GDP growth (trough minus peak): the depth of the recession, measured as the peak-to-trough percentage change in real GDP.

R.E.E.R. (trough minus peak): the real exchange rate adjustment, measured as the peak-to-trough percentage change in the IMF's real effective exchange rate.

Exports (%GDP, peak): the country's openness, measured as the share of exports in GDP (both goods and services) at peak.

Capital Account Openness (peak): the country's openness to capital flows at peak, based on the Chinn and Ito (2008) index.

Fiscal Policy (easing, trough minus peak): the stance of fiscal policy, measured as the change (trough minus peak) of the cyclically adjusted fiscal deficit as a percent of GDP.

Current Account (%GDP, trough minus peak): the change (trough minus peak) of the current account balance as a percent of GDP.

Monetary Policy (easing, trough minus peak): the stance of monetary policy, measured as the change (trough minus peak) of the velocity of broad money (broad money divided by GDP).

IMF program (dummy, trough): a dummy variable indicating whether the country was under an IMF programme (i.e. making use of GRA credit) at trough.

Public Debt (%GDP, trough): the public debt to GDP ratio at trough.

Inflation (y-o-y, trough): the year-on-year rate of inflation at trough.

Real credit growth (trough minus peak): the peak-to-trough change in real credit growth

Loans to GDP (trough minus peak): the peak-to-trough change in the ratio of private sector credit to GDP

It is important to underline that, while our dependent variable is timed *post*-trough, all explanatory variables are timed either *at* the trough or *pre*-trough (i.e. peak-to-trough differences or values at peak). Thus, in all of our specifications, the nature of the recovery is conditioned exclusively on information available *before* its onset. This is, in a sense, a purist approach, given that much of the literature also makes use of contemporaneous information on the recovery itself. Nonetheless, this framework allows greater confidence in the empirical findings we present, as it alleviates any question of endogeneity.

4. Our empirical findings

Our empirical findings are presented in Tables 2 – 6, in a progressive sequence of tests. Table 2 presents a number of specifications which include our proxy for the level of financing needs as a share of GDP at the trough of the recession, denoted φ^t, along with various combinations of other variables which have been found significant in determining the probability of a credit-less recovery. Estimation 1 corresponds to the SZ benchmark specification. Estimation 2 corresponds to the SZ “Fiscal Monetary” specification, augmented by φ^t. Estimations 3 and 4 correspond to the SZ “Economic Conditions 1 and 2” specifications, augmented not only by φ^t but also by the fiscal policy easing variable, as it is key to our analysis. Estimation 5 corresponds to the most encompassing SZ specification, entitled “Economic Policies”. The coefficient on φ^t is estimated to be negative and is significant in most of the specifications. Moreover, in terms of R^2, these specifications compare favourably with the corresponding SZ ones. In line with our theoretical hypothesis, the size of financing needs as a share of GDP at the bottom of the downturn appears to be important to the economy’s probability of a credit-less recovery. More specifically, economies which, at the trough of a recession, have *lower* financing needs, appear to have a *higher* probability to rebound without bank credit.

The fact that the peak-to-trough change in the current account deficit and the fiscal deficit are also included in estimations 1-5 allows us to re-interpret the SZ findings regarding these two variables from the prism of our theoretical premise. Recall that, as discussed in Section 3, the difference between the two deficit variables is, by definition, equal to the peak-to-trough change in our proxy φ. Hence, Table 2 provides insights as to which of the two deficits (fiscal or external) contributes more to financing the change in the savings-investment gap of the private sector during the downturn, when it is followed by a credit-less recovery.

Notably, the coefficient on fiscal easing peak-to-trough is positive and highly significant throughout, echoing the SZ finding that expansionary fiscal policy during the downturn increases the probability of a credit-less recovery, the recovery being instead driven, presumably, by public expenditure. This is in line with the argument of subsection 3.3 that an excess of private investment over private savings can be financed by a lower budget deficit (i.e. by freeing up private savings to finance investment). The inverse (i.e. I-S<0) could reflect a higher budget deficit. It could also reflect a lower current account deficit (i.e. requiring less capital inflows from abroad). Indeed, the change in the current account balance has a positive sign, as in SZ, Darvas (2013) and others. However, it is now clearly less significant than in SZ, and in some cases not significant at all, implying that the decline in the financing needs of the private sector during the economic downturn reflects an increase in the fiscal deficit rather than a decline in the external deficit.[8]

[8] In contrast, the standard interpretation provided for the finding of a significant positive coefficient on the peak-to-trough change in the current account balance in similar specifications is that an improvement in this variable may be thought to suggest a substantial rebalancing of the economy towards exports (see inter alia SZ and Darvas, 2013). However, this argument is not very plausible, as any substantial restructuring towards tradable sectors of the economy would require considerable time to materialize and bear fruit in the form of higher export performance. In fact, it is all too

The other explanatory variables have, by and large, the same sign and level of significance as in SZ and others: the probability of a credit-less recovery is higher the greater the peak-to-trough decline in real GDP, the lower the economy's trade openness and the higher its financial openness at peak, while tighter monetary policy peak-to-trough, higher inflation, higher indebtedness and the absence of an IMF program at trough also have the same effect.

In Table 3, we decompose the level of financing needs at trough φ^t into the sum of the level at the preceding peak and its peak-to-trough change, which we denote φ^p and $\Delta^{t-p}\varphi$, respectively. This decomposition allows us to assess whether the adjustment of the investment-savings gap during the downturn plays an important role in determining the probability of a credit-less recovery, over and above its initial level.[9] This yields a more intuitive specification, as the probability of a recovery being credit-less is essentially conditioned on the nature and characteristics of the downturn, and the situation of the economy before it, abstracting from the exact conditions at the trough. We test, in particular: i) whether a decline in a country's external financing needs of the private sector from peak to trough (i.e. a negative value of $\Delta^{t-p}\varphi$) is associated with a statistically significant increase in the probability of a credit-less recovery, and ii) whether the size of the investment-savings imbalance prior to the onset of the recession affects the probability that the recovery may be credit-less. On the basis of the estimates presented in Table 3, it seems that both the initial level and the peak-to-trough change of φ significantly affect the probability that an economy experiences a credit-less recovery, the latter appearing significant irrespective of the exact specification or sample size. This probability is higher, the *lower* the private sector's initial financing needs and the *greater* their decline during the downturn. In economic terms, our estimates suggest that the change of φ during the downturn is roughly twice as important as the initial level of φ. Interestingly, the most encompassing model specification (estimation 5) suggests that the probability of a creditless recovery is affected by the change in φ during the downturn independently of its initial level. Table 4 presents the corresponding estimates, including only the peak-to-trough change in the private sector's financing needs, i.e. adhering to the approach adopted for the other macroeconomic variables and the standard specification in SZ and much of the related literature which focuses exclusively on peak-to-trough developments as regressors. The results are much the same, but the coefficient on $\Delta^{t-p}\varphi$ is now even more significant.

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common that a current account improvement during a recession reflects not an increase in exports but rather a decline in imports as a result of curtailed domestic demand.

[9] We take care to adjust the vector of regressors appropriately, so as to avoid potential collinearity problems. In this case, the peak-to-trough changes in the current account and fiscal deficit have been excluded, as $\Delta^{t-p}\varphi$ is a linear combination of the two.

Having already established that a decline in the private sector's financing needs during the economic downturn significantly increases the probability of the ensuing recovery being credit-less, we now turn to the question of what this decline means, in terms of flows of funds. Given the aggregate flow of funds identity (1), the private sector's financing needs equal the change in the net financial liabilities of HHs and NFCs, ΔL-ΔFA. Thus, a decline in the private sector's financing needs during a downturn could reflect either a decline in the flow of bank loans to the private sector, i.e. $\Delta^2 L<0$, or increased accumulation of financial assets, i.e. $\Delta^2 FA>0$. In order to test which of these two financing channels is predominantly associated with the occurrence of credit-less recoveries, we construct a proxy for $\Delta^2 FA$ by subtracting $\Delta^{t-p}\varphi$ from the peak-to-trough change in the ratio of loans to GDP. In other words, based on equation (1), we decompose $\Delta^{t-p}\varphi$ into two flow of funds components corresponding to $\Delta^2 L$ (referred to as "Loans to GDP" in the relevant table) and $\Delta^2 FA$ (referred to as "Fin. assets").

Table 5 presents a battery of estimations exploring this decomposition. Throughout them all, the coefficient on the change in financial asset holdings ("Fin. assets") is highly significant and positive, in line with the negative sign of the coefficient of the change in φ reported in Tables 3 and 4. This is strong evidence in support of the hypothesis that credit-less recoveries are associated with a rebalancing of the private sector's financing means towards financial assets over the downturn. Our results suggest that credit-less recoveries are likelier if, during the downturn, the private sector has accumulated net financial assets, thus implying availability of private sector financial assets to cover its financing needs for real investment, and thus to finance a recovery, even in the absence of positive credit flows. The coefficients on the change in loans to GDP is negative, as expected, confirming the overall mechanics of the flow of funds identity, but is only significant in the most extended specification, a sign that perhaps changes in this variable have a less clear association with the likelihood of a credit-less recovery occurring but, rather, are associated with downturns *per se*.

In sum, our results suggest that credit-less recoveries are strongly associated with a decline in the external financing needs (investment-savings gap) of the private sector during the economic downturn. In turn, this decline in the financing needs for real investment is related to a rebalancing of wealth from real assets to financial assets.

Finally, in Table 6 we explore whether the recent trajectory of bank credit growth matters. There is ample empirical evidence that credit booms precipitate sharp busts in credit and economic activity (see for example Gourinchas *et al.,* 2001 and Schularick and Taylor, 2012). There is also evidence that financial crises increase the probability of a credit-less recovery (Abiad et al 2011, Bijsterbosch and Dahlhaus 2011). In an effort to construct a suitable proxy, we consider the peak-to-trough change in real credit growth as an additional regressor to some of the most extended specifications of Tables 2-4. A sharp decline in this variable could be seen as an indication that a credit boom preceded the downturn and/or that a financial crisis occurred during the downturn. The estimated coefficient is negative and significant when added to the specification including φ^t, without affecting the significance of φ^t itself or any of the other variables (estimation 1). This implies that the sharper the peak-to-trough decline in real credit growth, the higher the probability that the ensuing recovery will be credit-less. When φ^t is decomposed into φ^p and $\Delta^{t\text{-}p}\varphi$ (estimation 2), or when only $\Delta^{t\text{-}p}\varphi$ is included (estimation 3), the change in real credit growth loses its significance. However, when the change in real credit growth is included in interaction with φ^t, it becomes significant again and leads to a marked increase in R^2. Furthermore, the interaction term has an intuitive coefficient: given that, as seen in Figure 1.b, φ^t is mostly negative in credit-less recovery episodes, a positive coefficient of the interaction term implies that the sharper the peak-to-trough decline in real credit growth, given negative financing needs at trough, the higher the likelihood that the recovery will be creditless, over and above the effect of $\Delta^{t\text{-}p}\varphi$.[10] This would suggest that it is not the past trajectory of bank credit growth *per se* that matters in this context (as proposed by Abiad *et al.*, 2011, *inter alia*), but rather its coincidence with a rebalancing of the economy over the downturn, in the form of a decline in the investment-savings gap.

5. Robustness checks

While the results are not reported here in the interest of brevity, sub-sample estimations along the advanced-emerging economy distinction yield much the same results.[11] Moreover, the inclusion of an advanced economy dummy turns out to be mostly insignificant in interaction with other variables, other estimates remaining largely unaffected. Moving to

[10] We also experimented with other proxies. We included credit growth at peak, whose estimated coefficient was negative, an indication perhaps that high credit growth at the peak of the cycle does not in itself imply a credit boom. The inclusion of private sector credit to GDP at trough and at peak, measures of either bank dependence or of a preceding credit boom, was positive. This is intuitive, as *ex ante*, bank-based economies, which have a developed banking system and rely on it heavily for the financing of private sector activities, are thought to be likelier candidates for a credit-less recovery episode (see Reichlin, 2013, and Allard and Blavy, 2011), while economies which depend more on capital market financing are less likely to undergo a very sharp liquidity squeeze. Finally, we considered a relative measure, the ratio of real private sector credit growth to real GDP growth at peak, designed to capture whether, at peak, credit was increasing at rates disproportionate to the real growth rate. According to our estimates, if credit is growing faster than output at the peak of the cycle (a possible indication of a preceding credit boom) it is relatively likelier that a credit-less recovery will follow the downturn. However, these measures were significant in some of the more parsimonious specifications but not significant when monetary and other policy variables were included (results available upon request).

[11] Results available from the authors upon request.

more parsimonious specifications also does not qualitatively alter our findings. These robustness checks suggest that our estimates are stable across specifications.

As an alternative approach to checking the robustness of our findings, we abstract from the somewhat limiting concept of credit-less recoveries and consider instead the importance of financing needs φ to developments in credit during recoveries in general. To this aim, Table 7 presents OLS estimations, where the average real credit growth over the 8 quarters *following* a trough has been regressed on the average real output growth recorded over the same period, and on the variables employed in our earlier estimations. Note that the dependent variable is constructed so as to precisely match the definition of a credit-less recovery adopted previously, which also referred to credit developments 8 quarters following the trough. Moreover, the only contemporaneous variable is output growth, while all other variables are timed either at the trough or before it, as peak-to-trough differences, so that these estimations may best serve as robustness tests of our probit results. In brief, these regressions are designed to explore whether the factors considered in Section 4 affect post-trough credit growth in general and, more specifically, to see whether financing needs, as captured by our proxy, play a role in this respect.

The estimated coefficients on the change in financing needs $\Delta^{t-p}\varphi$ is positive as expected and highly significant in all Table 7 estimations, as is the coefficient on post-trough average output growth. Hence, we find that an increase (decline) in the private sector's financing needs during the downturn implies higher (lower) credit growth during the recovery phase. This corroborates the main finding of Section 4. The coefficient on φ^t itself is also positive, though insignificant. The estimated coefficient on loans to GDP at peak is highly significant and negative, as is the one on credit growth relative to GDP growth, confirming the earlier finding that recessions in bank dependent economies, preceded by credit booms are associated with relatively slower credit growth during the rebound. Finally, the coefficients on the other variables are also intuitive, implying that average real credit growth during the rebound is positively related to average real output growth over the same period, an appreciation of the domestic currency and monetary policy easing during the downturn and negatively related to inflation at the trough of the recession.

6. Conclusions and policy implications

We argue that a decline in the private sector's financing needs –the savings-investment imbalance– during a recession increases the probability that the ensuing recovery may be credit-less. We construct a suitable proxy and obtain empirical evidence in support of this hypothesis. We show that such a decline reflects a rebalancing of wealth towards financial assets on behalf of the private sector during the downturn, which frees up funds to finance real investment during the recovery stage, even in the absence of positive bank credit flows. Finally, we provide evidence that economies whose downturn was preceded by a bank credit boom or was associated with a sharp decline in bank credit are more likely to experience a credit-less recovery. These insights are potentially valuable from a broader policy perspective, as they suggest that a rapid rebalancing of the economy is pivotal to ensuring an economic rebound, in situations where the banking sector is unable to provide sufficient credit.

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8. Tables and figures

Table 1
Savings and investment of private non-financial sector before and after the great recession – in % of GDP

	Greece		Spain		Germany		France		Italy		Netherlands		Portugal		Finland		Netherlands		UK	
	S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I
2007	0.120	0.230	0.120	0.270	0.220	0.180	0.180	0.180	0.170	0.190	0.220	0.170	0.090	0.200	0.175	0.195	0.155	0.200	0.125	0.145
2009*	0.110	0.110	0.230	0.180	0.230	0.140	0.180	0.140	0.170	0.170	0.210	0.130	0.150	0.140	0.165	0.160	0.140	0.110	0.160	0.110

*: Numbers for Greece and Portugal refer to 2013, when GDP reached a trough. Source: ECB data warehouse.

Table 2

The impact of financing needs on the probability of a credit-less recovery: financing needs at trough (φ^t)

	est1	est2	est3	est4	est5
GDP growth (trough minus peak)	-0.054	-0.060	-0.121	-0.129	-0.161
	-2.56	-2.39	-4.11	-3.85	-4.59
	**	**	***	***	***
R.E.E.R. (trough minus peak)	-0.022	-0.026	-0.007	0.005	-0.004
	-1.76	-1.97	-0.52	0.33	-0.22
	*	**			
Exports (%GDP, peak)	-0.017	-0.018	-0.026	-0.028	-0.029
	-3.46	-3.29	-4.03	-3.99	-4.24
	***	***	***	***	***
Capital Acc. Openness (peak)	0.193	0.176	0.293	0.508	0.533
	1.79	1.60	2.10	3.18	3.16
	*		**	***	***
φ^t	-0.065	-0.058	-0.069	-0.097	-0.046
	-2.45	-2.10	-2.15	-2.42	-1.02
	**	**	**	**	
Current Acc. (%GDP, trough minus peak)	0.051	0.050	0.058	0.063	0.096
	1.80	1.57	1.78	1.86	2.05
	*		*	*	**
Fiscal Pol. (easing, trough minus peak)	0.135	0.135	0.134	0.182	0.196
	2.40	2.38	2.21	2.60	2.71
	**	**	**	***	***
Monetary Pol. (easing, trough minus peak)	.	-0.006	.	.	-0.019
	.	-1.64	.	.	-3.30
					***
IMF program (dummy, trough)	.	.	-0.804	-1.328	-1.808
	.	.	-1.56	-2.34	-2.82
				**	***
Public Debt (%GDP, trough)	.	.	0.012	0.008	0.013
	.	.	1.97	1.27	1.63
			**		
Inflation (y-o-y, trough)	.	.	.	0.108	0.123
	.	.	.	2.95	3.12
				***	***
Constant	-1.264	-1.147	-2.237	-2.924	-3.157
	-4.46	-4.12	-4.04	-4.61	-4.62
	***	***	***	***	***
Episodes	109.000	109.000	93.000	93.000	93.000
Prob.	0.000	0.000	0.000	0.000	0.000
Pseudo R^2	0.272	0.292	0.359	0.420	0.472

Note: Statistical significance at the 1%, 5% and 10% is denoted by ***, ** and * respectively, using robust standard errors for the z-statistics.

Table 3

The impact of financing needs on the probability of a credit-less recovery: financing needs at-peak (φ^p) and their peak-to-trough change ($\Delta^{t\text{-}p}\varphi$)

	est1	est2	est3	est4	est5
GDP growth (trough minus peak)	-0.052 -2.48 **	-0.058 -2.35 **	-0.121 -4.06 ***	-0.127 -3.69 ***	-0.160 -4.56 ***
R.E.E.R. (trough minus peak)	-0.018 -1.44	-0.022 -1.65 *	-0.006 -0.38	0.004 0.25	-0.004 -0.24
Exports (%GDP, peak)	-0.017 -3.25 ***	-0.018 -3.06 ***	-0.026 -3.51 ***	-0.027 -3.22 ***	-0.030 -3.56 ***
Capital Acc. Openness (peak)	0.207 1.95 *	0.188 1.76 *	0.309 2.23 **	0.507 3.04 ***	0.522 3.15 ***
$\Delta^{t\text{-}p}\varphi$	-0.131 -3.51 ***	-0.125 -3.08 ***	-0.140 -3.08 ***	-0.170 -3.05 ***	-0.154 -2.52 **
φ^p	-0.065 -2.35 **	-0.058 -1.98 **	-0.070 -2.05 **	-0.090 -2.07 **	-0.035 -0.78
Monetary Pol. (easing, trough minus peak)	. .	-0.005 -1.70 *	. .	. .	-0.018 -3.50 ***
IMF program (dummy, trough)	. .	. .	-0.873 -1.73 *	-1.454 -2.58 ***	-1.987 -3.23 ***
Public Debt (%GDP, trough)	. .	. .	0.010 1.72 *	0.006 0.98	0.013 1.69 *
Inflation (y-o-y, trough)	. .	. .	. .	0.091 2.40 **	0.109 2.81 ***
Constant	-1.229 -4.27 ***	-1.110 -3.88 ***	-2.108 -3.54 ***	-2.603 -3.69 ***	-2.971 -3.97 ***
Episodes	109.000	109.000	93.000	93.000	93.000
Prob.	0.001	0.004	0.001	0.003	0.001
Pseudo R^2	0.259	0.280	0.350	0.402	0.462

Note: Statistical significance at the 1%, 5% and 10% is denoted by ***, ** and * respectively, using robust standard errors for the z-statistics.

Table 4

The impact of financing needs on the probability of a credit-less recovery: the peak-to-trough change of financing needs ($\Delta^{t\text{-}p}\varphi$)

	est1	est2	est3	est4	est5
GDP growth (trough minus peak)	-0.049	-0.056	-0.118	-0.118	-0.166
	-2.46	-2.33	-4.28	-3.72	-4.65
	**	**	***	***	***
R.E.E.R. (trough minus peak)	-0.021	-0.025	-0.007	-0.004	-0.006
	-1.82	-1.86	-0.56	-0.26	-0.37
	*	*			
Exports (%GDP, peak)	-0.014	-0.016	-0.022	-0.022	-0.030
	-2.83	-2.73	-3.66	-3.39	-3.53
	***	***	***	***	***
Capital Acc. Openness (peak)	0.188	0.169	0.265	0.415	0.507
	1.83	1.63	2.06	2.80	3.13
	*		**	***	***
$\Delta^{t\text{-}p}\varphi$	-0.077	-0.077	-0.079	-0.092	-0.132
	-2.99	-2.91	-2.53	-2.72	-3.22
	***	***	**	***	***
Monetary Pol. (easing, trough minus peak)	.	-0.006	.	.	-0.020
	.	-1.91	.	.	-3.56
		*			***
IMF program (dummy, trough)	.	.	-0.947	-1.475	-2.145
	.	.	-1.80	-2.44	-3.34
			*	**	***
Public Debt (%GDP, trough)	.	.	0.015	0.012	0.016
	.	.	2.47	1.90	2.30
			**	*	**
Inflation (y-o-y, trough)	.	.	.	0.063	0.106
	.	.	.	2.14	3.04
				**	***
Constant	-1.133	-1.009	-2.229	-2.561	-3.071
	-4.16	-3.68	-3.86	-3.81	-4.09
	***	***	***	***	***
Episodes	109.000	109.000	93.000	93.000	93.000
Prob.	0.000	0.002	0.000	0.001	0.000
Pseudo R^2	0.224	0.254	0.315	0.358	0.457

Note: Statistical significance at the 1%, 5% and 10% is denoted by ***, ** and * respectively, using robust standard errors for the z-statistics.

Table 5

The impact of financing needs on the probability of a credit-less recovery: a flow of funds decomposition of the investment-savings gap

	est1	est2	est3	est4	est5	est6
GDP growth (trough minus peak)	-0.081	-0.103	-0.120	-0.153	-0.120	-0.185
	-3.34	-3.93	-4.16	-4.89	-3.62	-4.50
	***	***	***	***	***	***
R.E.E.R. (trough minus peak)	-0.010	-0.012	-0.008	-0.010	-0.004	-0.009
	-0.76	-0.79	-0.58	-0.61	-0.29	-0.55
Exports (%GDP, peak)	-0.018	-0.020	-0.022	-0.027	-0.022	-0.031
	-2.70	-2.70	-3.69	-4.20	-3.41	-3.61
	***	***	***	***	***	***
Capital Acc. Openness (peak)	0.280	0.293	0.277	0.276	0.424	0.574
	2.26	2.32	2.12	2.04	2.78	3.15
	**	**	**	**	***	***
Fin. assets (%GDP, trough minus peak)	0.069	0.075	0.080	0.098	0.093	0.145
	2.35	2.33	2.49	3.20	2.67	3.38
	**	**	**	***	***	***
Loans to GDP (trough minus peak)	-0.105	-0.139	-0.113	-0.186	-0.116	-0.286
	-1.00	-1.19	-0.94	-1.42	-1.09	-2.29
						**
Monetary Pol. (easing, trough minus peak)	.	-0.008	.	-0.011	.	-0.021
	.	-2.12	.	-2.72	.	-3.72
		**		***		***
IMF program (dummy, trough)	.	.	-0.954	-1.077	-1.474	-2.334
	.	.	-1.80	-1.99	-2.42	-3.21
			*	**	**	***
Public Debt (%GDP, trough)	.	.	0.015	0.019	0.012	0.016
	.	.	2.49	3.15	1.91	2.32
			**	***	*	**
Inflation (y-o-y, trough)	.	.	.	.	0.063	0.110
	.	.	.	.	2.10	2.88
					**	***
Constant	-1.277	-1.227	-2.219	-2.372	-2.555	-3.151
	-3.77	-3.44	-3.87	-4.29	-3.80	-4.04
	***	***	***	***	***	***
Episodes	93.000	93.000	93.000	93.000	93.000	93.000
Prob.	0.001	0.002	0.001	0.000	0.002	0.001
Pseudo R^2	0.259	0.292	0.316	0.369	0.358	0.467

Note: Statistical significance at the 1%, 5% and 10% is denoted by ***, ** and * respectively, using robust standard errors for the z-statistics.

Table 6

The impact of financing needs on the probability of a credit-less recovery: the role of credit shortages

	est1	est2	est3	est4	est5
GDP growth (trough minus peak)	-0.139	-0.162	-0.162	-0.160	-0.159
	-3.67	-3.88	-4.19	-4.18	-4.34
	***	***	***	***	***
R.E.E.R. (trough minus peak)	0.003	-0.008	-0.008	0.004	0.005
	0.18	-0.44	-0.47	0.23	0.23
Exports (%GDP, peak)	-0.023	-0.028	-0.028	-0.028	-0.028
	-3.23	-4.23	-4.16	-4.04	-3.95
	***	***	***	***	***
Capital Acc. Openness (peak)	0.509	0.533	0.530	0.531	0.528
	2.78	2.99	3.00	2.99	3.07
	***	***	***	***	***
Monetary Pol. (easing, trough minus peak)	-0.015	-0.022	-0.022	-0.014	-0.014
	-2.75	-3.13	-3.13	-1.98	-1.97
	***	***	***	**	**
φ^t	-0.084	.	.	.	.
	-1.75	.	.	.	.
	*				
IMF program (dummy, trough)	-1.846	-2.515	-2.527	-2.514	-2.523
	-2.88	-3.61	-3.59	-3.10	-3.17
	***	***	***	***	***
Public Debt (%GDP, trough)	0.009	0.019	0.019	0.014	0.014
	1.37	1.90	2.53	1.84	1.84
		*	**	*	*
Inflation (y-o-y, trough)	0.128	0.161	0.161	0.173	0.173
	2.50	3.07	3.08	3.26	3.26
	**	***	***	***	***
Credit growth (change, trough minus peak)	-0.042	-0.007	-0.006	0.002	.
	-1.98	-0.26	-0.29	0.09	.
	**				
φ^p	.	-0.005	.	.	.
	.	-0.07	.	.	.
$\Delta^{t-p}\varphi$	.	-0.147	-0.144	-0.132	-0.130
	.	-2.43	-3.00	-2.41	-2.58
		**	***	**	***
Interaction term Δ^{t-p}(Credit gr.) with φ^t	.	.	.	0.011	0.011
	.	.	.	2.28	2.11
				**	**
Constant	-2.847	-3.552	-3.565	-3.515	-3.512
	-4.11	-3.89	-3.97	-4.25	-4.26
	***	***	***	***	***
Episodes	90.000	90.000	90.000	90.000	90.000
Prob.	0.002	0.003	0.003	0.000	0.000
Pseudo R^2	0.429	0.492	0.492	0.527	0.527

Note: Statistical significance at the 1%, 5% and 10% is denoted by ***, ** and * respectively, using robust standard errors for the z-statistics.

Table 7

OLS robustness tests

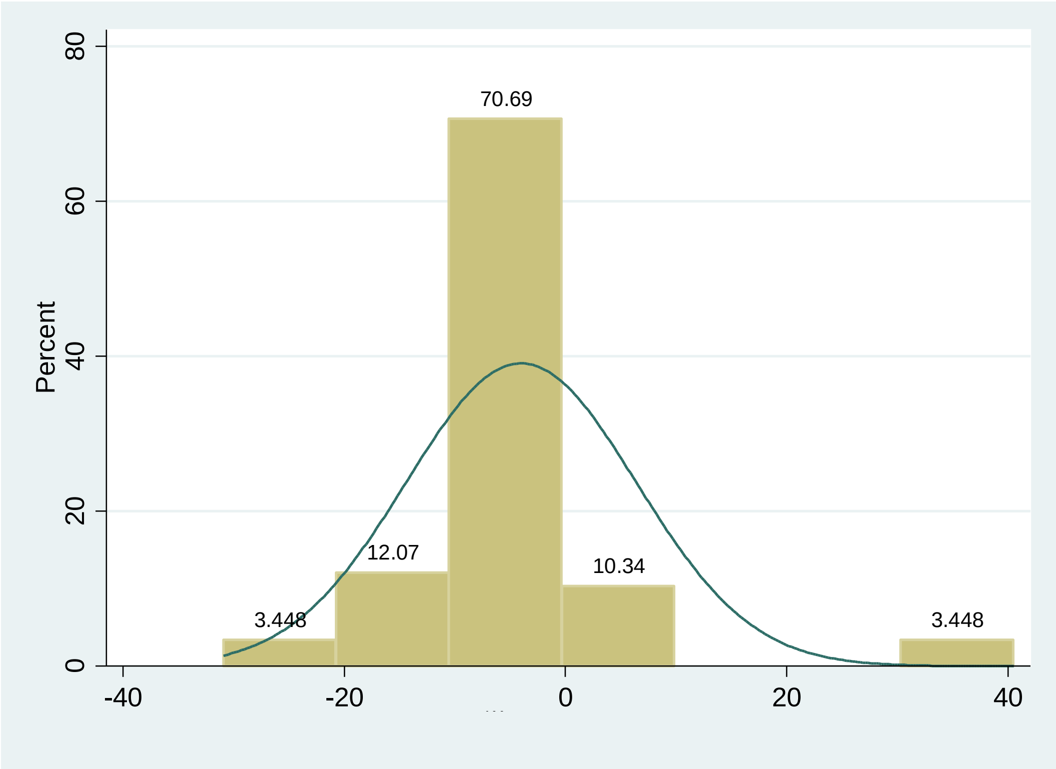
Dependent variable:
average real credit growth over the 8 quarters following the trough

	est1	est2	est3	est4	est5
GDP growth (mean, 2 years after trough)	1.196	1.150	1.177	1.209	1.373
	5.10	5.26	5.31	5.91	6.53
	***	***	***	***	***
GDP growth (trough minus peak)	0.355	0.452	0.387	0.538	0.591
	0.94	1.23	1.13	1.49	1.26
R.E.E.R. (trough minus peak)	0.524	0.508	0.425	0.288	0.040
	2.15	2.10	1.97	1.12	0.14
	**	**	*		
Exports (%GDP, peak)	0.041	0.082	0.052	0.054	0.035
	0.95	1.73	1.10	1.05	0.77
		*			
Capital Acc. Openness (peak)	-2.885	-2.034	-0.546	0.158	1.152
	-1.58	-1.19	-0.37	0.09	0.66
$\Delta^{t-p}\varphi$	2.065	1.898	1.722	1.779	1.879
	5.12	5.15	4.60	4.18	4.73
	***	***	***	***	***
φ^{t}	0.060	-0.070	0.176	0.407	0.323
	0.18	-0.22	0.51	0.82	0.59
Loans to GDP (peak)	.	-0.774	-0.721	-0.549	-0.215
	.	-2.99	-2.87	-1.72	-0.62
		***	***	*	
Credit growth (relative, peak)	.	.	-3.282	-4.901	-3.669
	.	.	-2.56	-3.44	-2.10
			**	***	**
Monetary Pol. (easing, trough minus peak)	.	.	.	0.121	0.163
	.	.	.	2.87	3.85
				***	***
IMF program (dummy, trough)	.	.	.	.	12.808
	.	.	.	.	1.60
Public Debt (%GDP, trough)	.	.	.	.	-0.077
	.	.	.	.	-0.91
Inflation (y-o-y, trough)	.	.	.	.	-0.795
	.	.	.	.	-2.10
					**
Constant	13.716	19.612	24.037	23.042	20.825
	2.81	3.50	3.89	3.30	2.80
	***	***	***	***	***
Episodes	129.000	129.000	126.000	91.000	77.000
Prob.	0.000	0.000	0.000	0.000	0.000
R^2	0.439	0.462	0.513	0.610	0.654

Note: Statistical significance at the 1%, 5% and 10% is denoted by ***, ** and * respectively, using robust standart errors for the *t*-statistics.

Figure 1.a: The distribution of the financing needs proxy at trough, φ^t,

for credit-less recoveries:



for credit-supported recoveries:

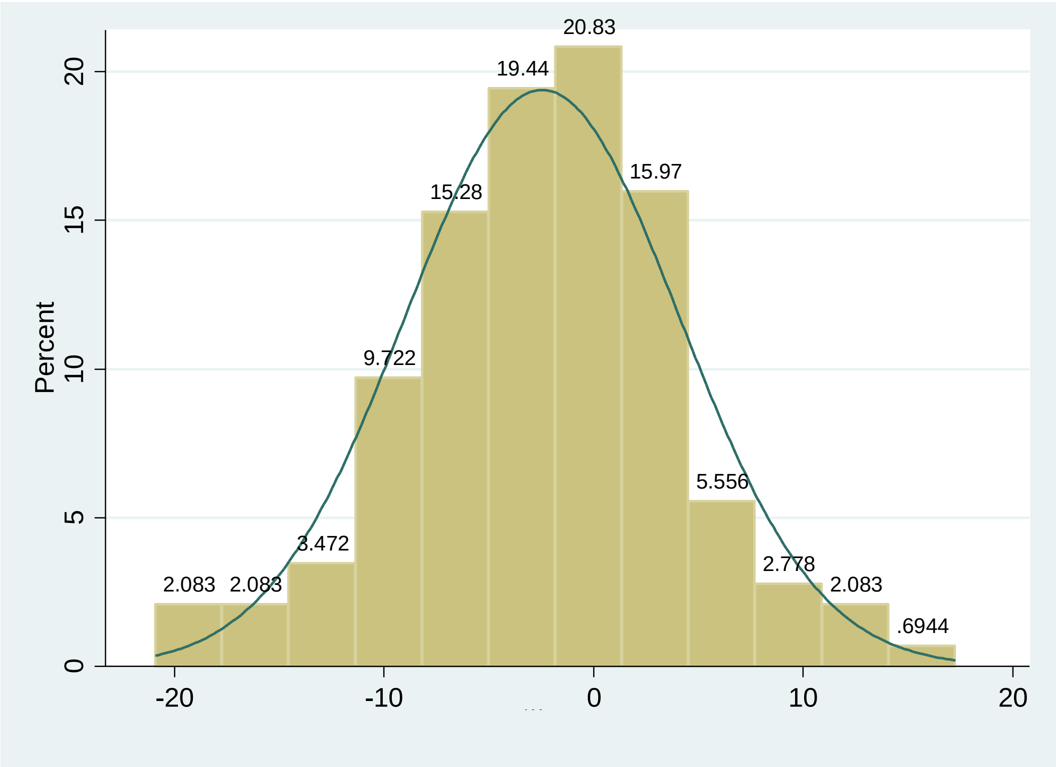
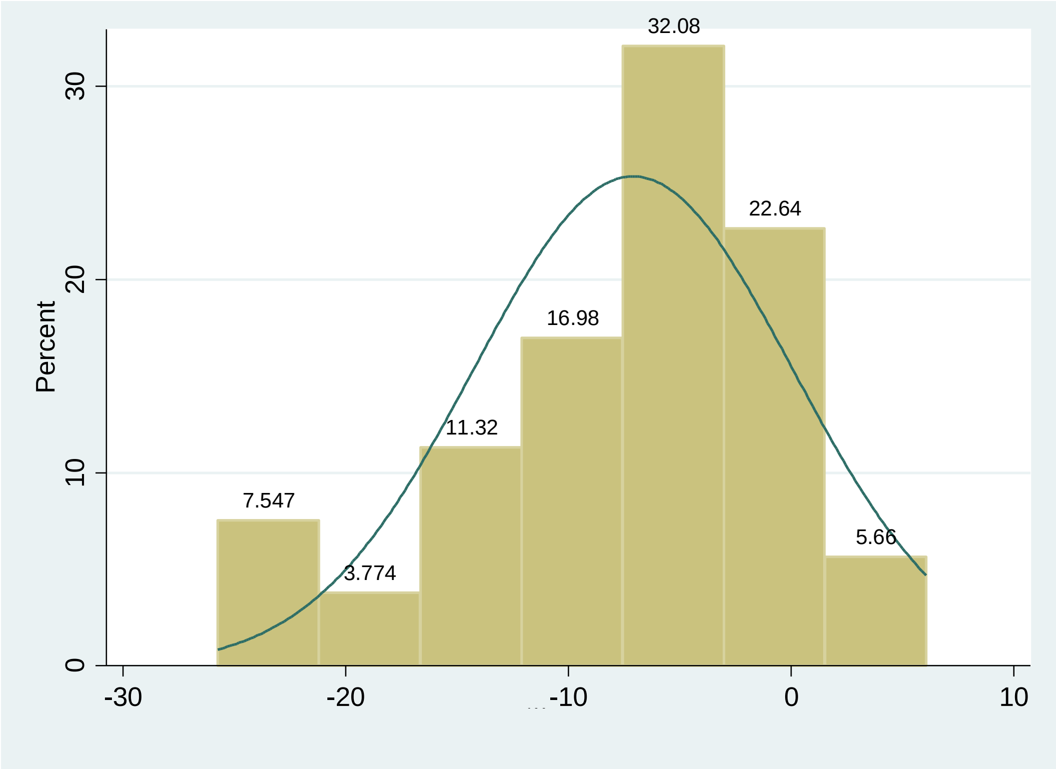


Figure 1.b: The distribution of the peak-to-trough change in the financing needs proxy, $\Delta^{t\text{-}p}\varphi$, for credit-less recoveries:



for credit-supported recoveries:

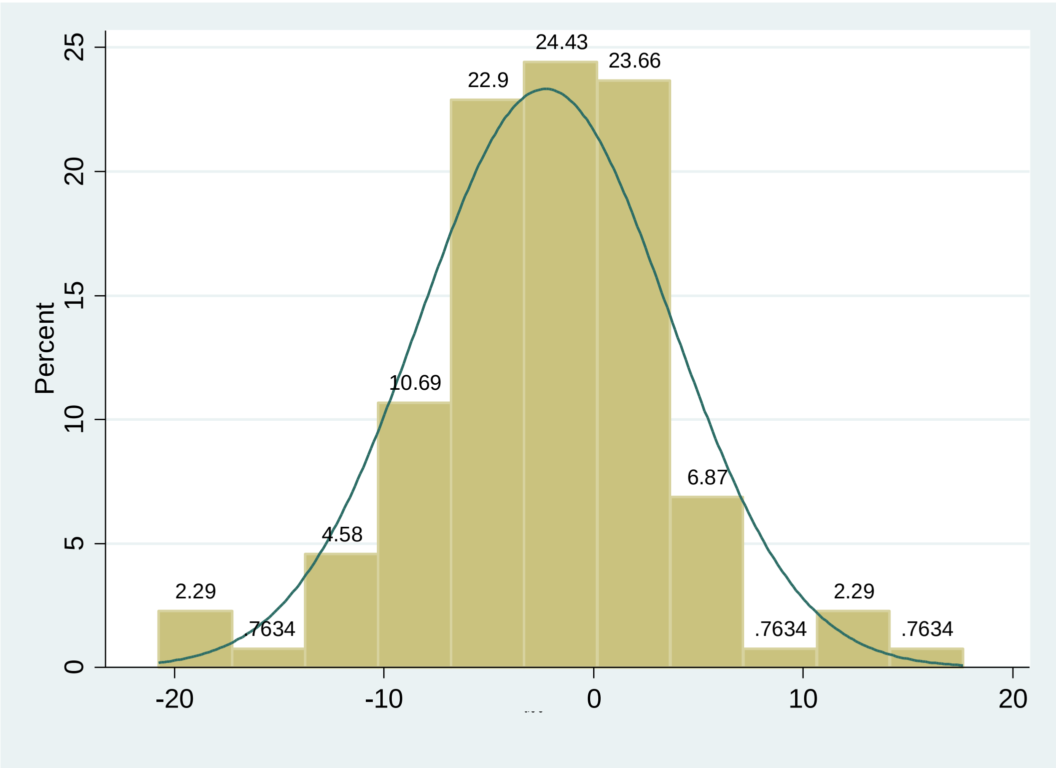


Figure 2: Investment-savings gap

of households and non-financial companies - % of GDP