The Good, the Bad, and the not-so Ugly of Credit Booms: Capital Allocation and Financial Constraints*

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Abstract

We provide international empirical evidence that periods of rapid expansion in credit—credit booms—lead to a tradeoff between a relaxation of financial constraints and a worsening of capital allocation. This tradeoff is stronger across small, financially constrained, and more innovative firms, as well as for firms in less tangible and more opaque industries. The misallocation effect is stronger than the relaxation of financial constraints in higher income countries, and in countries with larger and worse regulated financial systems. Credit booms with larger capital misallocation are associated with a higher probability of experiencing a banking crisis and with poor economic and financial performance after the boom.

Keywords: Credit boom; Capital Allocation; Financially Constrained Firms

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1. Introduction

Research conducted in the wake of the Global Financial Crisis of 2008 provided convincing empirical evidence that episodes of rapid expansions in credit—henceforth credit booms—often lead to subsequent periods of low economic growth and financial turbulence (Borio and Lowe, 2002; Mendoza and Terrones, 2012; Jordà et al., 2011, 2013; Reinhart and Rogoff, 2009; Dell'Ariccia et al., 2016; Gorton and Ordonez, 2020). Trying to understand the causes of this association, some authors have proposed that credit booms lead not only to an expansion in credit, but also to a misallocation of capital to unprofitable or riskier firms because of an endogenous weakening of lending standards or a neglect of crash risk (Dell'Ariccia and Marquez, 2006; Figueroa and Leukhina, 2018, Berger and Udell, 2004, Dong and Xu, 2020). The increased misallocation resulting from the boom thus sows the seeds that lead to the future crisis.

On the other hand, an earlier body of literature demonstrated that the wider access to credit associated with a more developed financial system—usually characterized by larger financial intermediaries—leads to higher economic growth by relaxing the financial constraints faced by firms (Levine and Zervos, 1998; Rajan and Zingales, 1998; Levine, 2005). This raises the possibility that credit booms could have a silver lining through this channel, especially when financial constraints are particularly binding. If this is correct, the belief that credit booms are "at best dangerous, and at worst a recipe for financial disasters" (Gourinchas et al., 2001; Borio and Lowe, 2002) might need to be qualified.

In this paper, we provide novel empirical evidence that these two mechanisms are simultaneously at play during credit booms. Using detailed data spanning two decades of financial information on listed firms located in 35 advanced and developing economies, we show that the association of a firm's capital expenditures and growth opportunities (as captured by Tobin's Q) significantly weakens during credit booms, signaling increased capital misallocation.[1] At the same time, we find that the relationship between a firm's investment and its availability of internal resources—a standard measure of financial constraints—also weakens during credit booms, pointing to a relaxation of financial constraints. These results are robust to a battery of tests that consider different measures of growth opportunities, credit booms, and internal resources, as well as various alternative econometric specifications. We also show that these results are not likely to be driven by the mismeasurement of growth opportunities.

Our finding of a simultaneous worsening of capital allocation and a loosening of financial constraints during credit booms is novel and offers a potential explanation for the association between credit booms and the future macroeconomic and financial underperformance documented in the literature. The looser financial constraints during credit booms would give rise to an expansion in credit and economic activity. However, the additional credit would not follow a strict investment opportunity ranking, worsening the capital allocation and increasing the risk of underperformance. The relative strength of these two forces would determine the likelihood of a boom ending badly or well.

Further analysis shows that the tradeoff between capital misallocation and looser financial constraints during credit booms is stronger among smaller, more innovative and more financially constrained firms, as well as in industries that rely more on less tangible assets and are less transparent. We also find that the misallocation effect is somewhat stronger in advanced economies than in developing ones but the relaxation of financial constraints is clearly larger among the latter. This suggests that credit booms may have a silver lining in less developed economies, whereas the intertemporal tradeoff

[1] The use of the credit gap as a measure of the stance of the credit cycle was pioneered by Borio and Lowe (2002) and Drehmann and Tsatsaronis (2014) and has been widely adopted as a key criterion to determine the activation of countercyclical capital buffers in countries that have implemented Basel III solvency guidelines.

arising from the misallocation effect might be stronger in more advanced ones. Furthermore, the misallocation effect is dominant when firms face larger or poorly regulated financial markets, while the easing of financial constraints is stronger when markets are less developed, and firms have more limited access to foreign financing.

We also show that the misallocation effect of credit booms is quantitatively important at the macro level. We take our firm-level results to a macro level by studying how a the deterioration of the relationship between investment and Q between pre-boom and boom years experienced by a country affects its future macroeconomic and financial performance. We find that countries that experience a relatively larger misallocation of capital during a boom, experience a significantly bigger fall in economic activity and a higher probability of banking crises once the boom ends. On the other hand, there is no robustly strong association between the loosening of financial constraints during booms and future aggregate performance, suggesting that most of the benefits of the credit easing are contemporaneous. Nonetheless, results obtained when considering only large booms indicate that looser financial constraints during booms forecast lower aggregate profitability and a higher probability of banking crises, consistent with a mechanism where the increased leverage achieved by firms during a credit boom turns them more vulnerable to shocks, reinforcing the adverse consequences of capital misallocation.

The novel evidence presented in this paper contributes to several strands of literature. It contributes to the growing literature that studies the mechanisms behind the empirical association between credit booms and future macroeconomic underperformance. At the macro level, the theoretical literature has emphasized the financial accelerator and the investor sentiment views. According to the financial accelerator view, credit booms are associated with an increase in aggregate leverage that makes firms more vulnerable to adverse shocks, amplifying their effect and persistence

(Bernanke et al.; 1998; Brunnermeier and Sannikov, 2014; Eggerston and Krugman, 2012; Korinek and Simsek, 2014). On the other hand, the investor sentiment view poses that credit booms arise from exuberant investor sentiment resulting from endogenous fluctuations in beliefs (either rational or irrational) and are predictably followed by a reversal in sentiment and risk appetite (Bordalo et al., 2018; Moreira and Savov, 2017).[2] At the micro level, the theoretical literature has emphasized the endogenous evolution of lending standards and risk appetite resulting in excessive credit going to unproductive or riskier firms (Dell'Ariccia and Marquez, 2006; Figueroa and Leukhina, 2018, Berger and Udell, 2004). Our findings help bridge the micro and macro literatures by showing that the micro-level mechanisms associated with the distortion of capital allocation during credit booms are indeed present in the data and have consequences for future macroeconomic and financial performance.

Our work also contributes to the empirical literature on the misallocation of capital during credit booms. A strand of this literature has emphasized the excessive lending to riskier firms or sectors that takes place during these episodes as a driver of future adverse macroeconomic and financial outcomes (Jimenez et al., 2006; Dell'Ariccia et al., 2012; Brandao-Marquez et al., 2019; Muller and Verner, 2021). A different strand of this literature uses country-cases to study the allocation of capital during periods of credit expansion. This literature has shown that the decline in the level of productivity and the increase in its dispersion in the Southern European countries prior to the Global Financial Crisis is consistent with increased lending to high worth but low productivity firms (Gopinath et al., 2017), that state-owned and low productivity firms benefited from the credit expansion in China during 2009-2010 (Shen et al., 2016; Cong et al., 2019), and that that

[2] More recently, Krishnamurty and Li (2020) argue that both types of mechanisms must be at play to produce the observed patterns of credit expansions and compressed credit spreads, followed by economic contractions and widening of spreads that are typical of the credit cycle.

subsidized credit inclusion in Pakistan produced a substantial credit misallocation (Zia, 2008).[3] Our results are the first to show that credit booms are associated with a worsening of the relationship between capital expenditures and growth opportunities and that this form of misallocation is present in a broad set of countries and credit boom episodes, suggesting that excessive lending may not only go to riskier firms but also to firms that ex-ante exhibit worse investment opportunities. Furthermore, our findings also highlight that these potentially adverse effects are accompanied by the relaxation of financial constraints for smaller and more financially constrained firms, underscoring a relevant silver lining of these episodes.

The idea that credit booms may pose a tradeoff between a high contemporaneous GDP growth and a higher probability of future crises has been previously studied in the context of the liberalization experience of Mexico by Ranciere et al. (2006). Their analysis leads them to conclude that the direct effect of financial liberalization on growth by far outweighs the indirect effect via a higher propensity of crises. This resonates well with our finding that the beneficial effect of the relaxation of financial constraints seems to dominate the misallocation effect in emerging markets. On top of this, our results also point to a potential reversal of the tradeoff in advanced economies, where the benefits of credit booms seem smaller and the misallocation effect stronger.

Our empirical analysis of the relationship between capital expenditures, growth opportunities, and financial constraints builds on the approach pioneered by Fazzari et al. (1988) to estimate the importance of financial constraints for firms' investment decisions, and extended by Baker et al. (2003) to study how the investment of different types of firms reacted to

[3] While not focusing on a particular credit boom, Whited and Zhao (2020) show a significant misallocation of debt and equity in China. Considering the level of productivity of different sectors, the authors find important potential gains from reallocating debt and equity to firms with more productivity and with a better use of funds.

changes in Tobin's Q. More recently, McLean and Zhao (2014) studied the variation of the sensitivity of investment to Tobin's Q and to cash flow during the business cycle, showing that the former is higher and the latter lower during economic expansions. We complement their work by showing that the allocation of capital not only varies through the business cycle, but also through the credit cycle. Furthermore, we show that these two sources of cyclical variation in capital allocation work independently and in opposite directions: while the positive correlation of investment and growth opportunities is stronger during business cycles (consistent with the reduction in the cost of capital during economic expansions argued by McLean et al. 2014), credit booms lead to a weakening of this relationship, likely resulting from a deterioration in lending standards of financial intermediaries. We also present a novel analysis on the macroeconomic consequences of this misallocation.

The rest of the paper is organized as follows. Section 2 describes the data used in the econometric analysis and our methodological approach. Section 3 presents and discusses our main results. Section 4 concludes.

2. Methodology and Data

Our empirical approach builds on the standard investment regressions pioneered by Fazzari et al*.* (1988), and extended by Baker et al*.* (2003), Rauh (2006), and more recently by McLean et al*.* (2012), among others. With some variations, these regressions relate a firm's investment to its growth opportunities, usually measured by its average Tobin's Q, and its availability of internal resources, usually captured by its cash flow and intended to capture the importance of borrowing constraints. We modify this standard framework to test whether the relation between these variables changes during credit booms.

More precisely, we use firm-level data to estimate the coefficients of the following equation:

$$\frac{Capex_{ict}}{Assets_{ict-1}} = \alpha + \beta_1 Q_{ict-1} + \beta_2 \frac{CF_{ict}}{Assets_{ict-1}} + \beta_3 Boom_{ct} \qquad (1)$$
$$+ \beta_4 Q_{ict-1} X Boom_{ct}$$
$$+\beta_5 \frac{CF_{ict}}{Assets_{ict-1}} X Boom_{ct} + \mathrm{X_{it}} + fixed\ effects + \epsilon_{ict}$$

where our measure of investment for firm i in country c in year t is the ratio of capital expenditures over the lagged value of total assets $\left(\frac{Capex_{ict}}{Assets_{ict-1}}\right)$. As in the literature, our baseline measure of growth opportunities is the firm's lagged value of average Tobin's Q (Q_{ict-1}), which is computed as the ratio of the sum of its market value of equity and book value of debt to the book value of its assets.[4] The quotient of cash flows to lagged assets $\left(\frac{CF_{ict}}{Assets_{ict-1}}\right)$ measures the availability of internal resources and its inclusion in the model captures the relevance of financial constraints (Baker et al., 2003): the higher the sensitivity of investment to cash-flows the more stringent are these constraints. Cash flow is measured as net income before extraordinary items plus depreciation, depletion, and amortization. We include as additional control variables (X_{it}) a firms' size and profitability (captured by its (log of) total assets and return on assets). The data for computing these variables come from Worldscope. Table A1 provides the details on the construction of each indicator.

As suggested above, and shown in Equation (1), our empirical framework departs from the existing literature by including the dummy variable $Boom_{ct}$, which takes the value 1 when country c is experiencing a credit boom at time t, and zero otherwise. We also incorporate the interaction between the boom

[4] It is important to notice that the main theoretical predictions about Tobin's Q (Tobin, 1969) are related to marginal, not the average Q. However, since the former is unobservable, the literature has relied on measures of the latter (e.g., Brainard and Tobin (1968), von Furstenberg (1977), Fazzari, Hubbard, and Petersen (1988), Blanchard, Rhee, and Summers (1993), and Rauh (2006)). The Implications of this choice have been discussed theoretically (Hayashi (1982), Barro (1990), and Blanchard, Rhee, and Summers (1993)).

indicator and our measures of growth opportunities and financial constraints.

Our framework allows us to estimate the relation of investment with growth opportunities and with the availability of internal resources (captured by the coefficients β_1 and β_2 of Equation (1), respectively) and to study how each of these relations is affected by credit booms (coefficients β_4 and β_5 in Equation (1), respectively). In line with the literature, we expect to find that investment is positively related to growth opportunities ($\beta_1 > 0$) and to the availability of internal resources ($\beta_2 > 0$). The sign of the β_4 coefficient indicates whether the relation between investment and growth opportunities strengthens ($\beta_4 > 0$) or weakens ($\beta_4 < 0$) during credit booms, pointing to a reduced or increased degree of misallocation, respectively. Similarly, finding that $\beta_5 > 0$ would be consistent with financial constraints being more stringent during credit booms, and finding that $\beta_5 < 0$ means that these constraints ease during these episodes. The coefficient β_3 measures the average effect of booms on investment and will only be estimated in specifications that do not include a country-year fixed effect.

Our interpretation of the interaction coefficients β_3 and β_4 in Equation (1) as providing information on the variation in the quality of capital allocation and the strength of financial constraints depends on Tobin's Q adequately capturing growth opportunities and on the cash flow sensitivity of investment reflecting the presence of financial constraints. Beyond the discussion on whether average Tobin's Q truly captures the marginal Q (Hayashi, 1982), the literature has recognized that current cash flows may also contain information on future cash flows and investment opportunities (Poterba, 1988). Thus, our proposed interpretation of the regression coefficients relies on cash flow not containing additional information on investment opportunities after controlling by Q. Since this is an important assumption, we will subject it to a series of robustness checks that use further lags of cash flow—thus reducing its contemporaneous information value, use other measures of internal resources, split by types of firms that are more likely to be financially constrained, and use several alternative approaches to measure investment opportunities.

To identify credit booms, we rely on the credit-to-GDP gap (henceforth the “credit gap”). This is defined as the difference between the credit-to-GDP ratio and its long-term trend.[5] The measure is published by the Bank for International Settlements (BIS) and provides a comparable indicator across countries. It uses total credit to the private, non-financial sector and therefore captures borrowing from both domestic and foreign sources, as well as from banks and non-banks intermediaries. The credit gap has been widely adopted as a measure of the stance of the credit cycle after the Basel Committee for Banking Supervision (BCBS) assigned it a prominent role as a guide for policymakers on the decision of whether and when to activate the Countercyclical Capital Buffer that was introduced as part of the new Basel III solvency framework (Basel Committee for Banking Supervision, 2010). The indicator has proven to be useful for measuring financial vulnerabilities and for predicting banking crises (Borio and Lowe, 2002; 2004).

We define credit boom episodes as periods (years) t when the country i meets three conditions: 1) experiences positive GDP growth, 2) is not experiencing a banking crisis, and 3) exhibits a credit gap higher than 5%.[6] These three conditions help us focus only on episodes where the increase in the credit to GDP ratio is not driven by sharp economic downturns, which can bias our results. Although there is no generally agreed-upon value when the credit gap would be indicating that credit is growing “too rapidly”, the 5%

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[5] The BIS computes the long-term trend using a two-sided Hodrick-Prescott filter with the smoothing parameter lambda of 400000 (see Drehmann and Tsatsaronis, 2014).

[6] The second condition is consistent with Elekdag and Wu (2013). Authors document that document that credit booms are jointly associated with deteriorating bank and corporate balance sheet soundness.

threshold is a reasonable compromise between the lower and upper thresholds used in practice by several countries.[7]

Using a fixed threshold is not without criticism and may not identify all periods when credit is growing significantly faster than usual. In fact, the BIS warns authorities not to mechanically use the Credit Gap when setting the countercyclical capital buffer but rather apply judgement. We chose to rely on a fixed threshold to have a clean and judgement free measure, but checked that the results are robust to using various threshold levels, and alternative definitions of booms.

We estimate the parameters of Equation (1) by OLS, correcting the standard errors for heteroskedasticity and clustering them at the firm level to control for serial correlation. Our benchmark specification includes firm and country-year fixed effects. Thus, the identification of our estimates relies mainly on the variation within a country of the cross-sectional relationship between the dependent and independent variables included in the econometric model. In other words, ours is a differences-in-differences approach that compares how the slopes of the within-country relationships between investment and growth opportunities and cash flow change between normal years and credit boom years. This procedure accounts for potential missing-variables bias by controlling for all time-invariant firm characteristics and time-varying country shocks that may be relevant in the determination of average investment. Of course, this design does not allow to identify the average effect of a boom on investment. Since it is relevant to have an idea of the baseline impact of booms, even if potentially biased, we also run preliminary regressions excluding the country-year fixed effects.

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[7] Following BCBS recommendations, several jurisdictions consider a 2 percent gap as a lower threshold to start activating the countercyclical capital buffer and a gap of 10 percent as the point to reach the maximum buffer of 2.5 percent of risk weighted assets (European Systemic Risk Board, 2014). Other calibrations suggest a range between 4 and 20 percent. We use 5 percent as a compromise and conduct sensitivity analysis on the specific threshold.

The structure of our investment equation and the measurement of the key variables is probably the most frequently used in the literature. However, the existing papers differ in a few details. For instance, there are differences across papers on what expenditures are included in the measure of investment, in the variable used to normalize those expenditures, in the use of flows or stock of cash as the measure of internal funds, in the lags of the RHS variables considered, and in the use of variables in logs or levels, among others. For this reason, we conduct a series of robustness exercises to show that our set of choices does not crucially determine our main results.

We cleaned the data by discarding firms from the utilities and financial sectors, which usually are highly regulated, and firms with negative values for total assets, total liabilities, or book equity. Also, we only kept firms with assets above five million US dollars and firms in countries with data for at least twenty firms during the study period. Each accounting variable is winsorized at the top and bottom 1% to reduce the effects of outliers. We exclude countries with decades of tightly regulated credit markets as state intervention typically involves lending based on political connections instead of financial characteristics of firms (for instance, growth opportunities).[8] Our final sample is an unbalanced panel that spans the period 1990-2017 and contains 335,695 observations, corresponding to 28,595 firms in 35 emerging and developed countries. Under our baseline definition, there are 82 credit booms, with the median episode lasting for about three years. Around one fourth of the observations correspond to boom times. Table A2 in the appendix lists the boom episodes. Summary statistics are provided in Table 1.

[8] We employ the historical the Economist Intelligence Unit (EIU) Index associated with the corruption/state intervention in banks and exclude the countries with an historical average greater than 2 out of 4 for the sample period 1997-2017 (Argentina, China, India, Indonesia and Russia).

3. Results

We present our results as follows. First, we provide evidence and support for our main result that credit booms are associated with both an increase in capital misallocation and a relaxation of financial constraints, and discuss key robustness checks (tables 2 to 5). Next, we characterize the heterogeneity of the main findings across firms and industries (Table 6), across country characteristics (Table 7), and across types of credit booms (Table 8). Finally, we explore the macroeconomic consequences of the changes in capital allocation and financial constraints observed during credit booms (Table 9).

Before delving into the econometrics, Table 2 provides a general idea of the investment patterns of firms with different growth opportunities (Tobin's Q) and cash flow during credit booms and normal times. Using the median value for each variable, we split the sample into four groups: firms with low Q and low cash flow, high Q and low cash flow, high cash flow and low Q, and high cash flow and high Q. Panel A and Panel B show the average rate of investment (capital expenditures as a fraction of lagged total assets) for the four groups during non-boom and boom periods, respectively. The average investment rate is 6%, but it varies greatly across the four said groups. Consistent with previous results and with the notion that investment is dependent on growth opportunities, the third row in Panels A and B shows that investment is higher for firms with high Q than for those with lower values of Q, irrespective of their cash flow. It is also the case that investment increases with cash flows, irrespective of the growth opportunities of the firms (third column). These patterns are present both during normal years and during boom periods. The differences across groups are important, in the order of 1.5 to 2.5 percentage points for Q and 2.5 to 3.5 percentage points in the case of cash flow.

Panel C shows that the sizes of the differences in investment between groups with high and low values of Q or cash flows vary according to whether the country is experiencing a credit boom or not. For each group, the panel shows the difference in investment between boom times and non-boom periods. The third column of the panel documents that the positive relation between investment and cash flow is weaker during boom times, by 20 to 30 basis points. Thus, during boom times, the investment rate of firms with fewer internal funds is not so much lower than that of companies with more resources. This is consistent with the view that the additional credit allows firms with fewer internal funds to increase their capital expenditures. Financial constraints seem, thus, relaxed during boom times.

The bottom row of Panel C, shows that the difference between the rate of investment of firms in the high Q versus those in the low Q group is also smaller during booms: between 12 and 22 basis points (depending on the level of cash). That is, the positive relation between investment and Q weakens when credit is growing faster than usual. This result suggests that booms are associated with investment of lower quality in the sense of being less concentrated in firms with better growth opportunities. We call this the misallocation effect.

Relatively speaking, when a credit boom ensues, investment increases the most for the set of firms with low Q and low cash flow. The group that is relatively less benefited by the credit boom is the one with high cash flow and high Q. The effect is economically important: while the investment rate of firms in the latter group remains almost unaltered, that of the former is 12% higher than in non-boom periods.

One can interpret these features of the data as suggestive of the existence of a trade-off with two conflicting effects on firm investment. On the one hand, companies with little internal resources get the chance to raise investment during credit booms. This is consistent with a view where, when credit grows faster, financial constraints are eased and firms with good prospects but little cash can invest more (the good side of booms). On the other hand, booms are also associated with investment being relatively less concentrated on firms with higher growth opportunities. This is the bad side of booms since firms with poorer growth opportunities increase their capital expenditures.

3.1 Baseline results

The regression results reported in Table 3 confirm that the above patterns persist and are statistically significant when applying the econometric framework presented in Equation (1). Results presented in column (1) include firm and year fixed effects. The estimates reported confirm the findings in the literature: investment is positively and significantly related to Q and cash flow. This is consistent with the generally agreed view that, although firms make their investment decisions based on the opportunities at hand, financing can be an important constraint. The sign and magnitudes we find are in line with those earlier reported in the literature. The estimated coefficient for the credit boom dummy turns out to be positive and significant.

The remaining results reported in the table address the core question of this paper of whether the consequences of a credit boom for investment differ across the firms located in the country experiencing the boom according to their growth opportunities and availability of internal funds. To this end, these regressions add the interaction terms between the credit boom dummy and Tobin's Q and cash flow described in Equation (1). They also include a full set of fixed effects that control for all firm invariant characteristics and country specific shocks, so that the identification exploits only the within country, cross firm variation of the data. We consider each interaction term at a time and then both together.

The negative and significant sign for the interaction between the boom indicator and Q in column (2) shows that, while firms with better growth opportunities tend to invest more, they do so to a lesser degree during credit booms. The slope of the relationship between investment and Q declines by around 8% during booms. Similarly, column (3) shows that the extent to which investment depends on cash flows also declines during booms, by 12.5% in this case. These two effects are independent of each other, as documented in column (4) with both interactions being significant when entering together. The regression reported in column (5) shows that our results remain robust when we control for firm size (log of total assets) and profitability (ROA).

These patterns are apparent when seen graphically. Figure 1 shows the sensitivity of investment to both growth opportunities (Figure 1a) and internal funds (Figure 1b) around credit boom episodes, beginning the year prior to the onset of the boom (t-1) and through the third year. The sensitivity measures are computed using local projections (Jordà, 2005) and running a set of regressions that fix at t-1 the period at which the RHS variables of equation (1) are measured but sequentially change the horizon at which investment is measured, from t to t+3. As can be seen, the slopes get reduced significantly in the first period of the boom. The reduced sensitivities triggered by a boom extend over time but appears to be more persistent for cash flow.

3.2 Robustness

Table 4 tests the robustness of our main result to changes in various aspects of the estimation, namely the identification of booms (Panel A), alternative specifications (Panel B) and the measurement of the dependent and independent variables (Panel C).

As previously discussed, the 5% threshold in the credit gap that we use to determine the presence of a credit boom is arbitrary. Columns (1)-(3) in Panel A show the baseline results using alternative credit-gap thresholds. Higher thresholds are of course associated with a lower frequency of booms. We still apply the other two conditions (positive GDP growth and no banking crisis) to define booms. The general picture that arises is the same as in the baseline regressions: the key coefficients have similar sign and magnitude.

In columns (4) and (5) of Panel A we use an alternative definition of credit boom based on Mendoza and Terrones (2008, 2012), who associate credit booms with periods where real *per-capita* credit is significantly above its country-specific long-run trend. We consider two different thresholds that identify a credit boom with years when real per-capita credit is larger than 0.5 and 1.5 times its historical standard deviation.[9] Columns (4) and (5) present the results. Our results are generally robust to using this alternative definition. When we use the higher threshold in the Mendoza and Terrones' definition of booms, the differential effect of Q, while being negative is not statistically significant. This is likely related to the fact that the test loses power as the number of booms falls to around half that of the other definitions.

Overall, results in Panel A of Table 4 show that our main findings are not crucially dependent on the specific manner of defining credit booms. Regressions reported in columns (1)-(4) of Panel B of Table 4 provide further support to our main findings using two continuous measures of credit expansions—the credit gap and the ratio of private credit to GDP—instead of a credit boom dummy. To capture the nonlinear effects implicit in the characterization of credit booms, in each case we also present results obtained including the squared value of the credit measure. These results are consistent with the evidence presented above regardless of whether we use the continuous version of the credit gap (columns 1 and 2) or the private credit to GDP (columns 3 and 4). Notably, the significant results obtained for

[9] Following their procedure, we apply to the annual series of real per capita credit of each country a Hodrick-Prescott filter to separate a trend and a cyclical component. Denoting the cyclical component of credit in any given country by C_t, we identify a credit boom when C_t is large relative to its (within country) standard deviation $C_t, \geq \varphi\sigma(C_t,)$, with φ a scale factor. The credit boom variable $Boom_{ct}$ takes the value 1 when the condition is met, otherwise the dummy takes the value of 0.

the interaction term between Q and the squared value of the credit gap or credit to private sector show that the relation between credit expansions and capital misallocation is nonlinear.

McLean and Zhao (2014) document that the sensitivity of investment to Tobin's Q increases and that of cash flow decreases during *economic* expansions. In columns (3) and (4) of Panel B, we add the interaction of Q and cash flow with two indicators for economic expansion: GDP growth and a dummy that takes a value of 1 if the year-on-year growth rate of industrial production is positive, and zero otherwise.[10] The results show that the effect documented by McLean and Zhao is not peculiar to U.S. firms, especially when considering the industrial production measure. Nonetheless, the coefficients for the interactions with credit boom are still negative and significant, indicating that the credit cycle mechanism is not just a reflection of the business cycle effect. Thus, the tradeoff we document is specific to credit booms.

In the last column (7) we add the interaction between a time trend and Q. Some recent work has shown that the fit of the investment regressions has changed over time (see, for instance, Andrei et.al (2019) and Verona (2019)). The growing importance of intangibles may be in part responsible for these variations. To the extent that our identification comes from the cross-firm time variation of the data, this introduces the possibility that our results reflect these changes rather than effect of credit booms if the frequency of the latter also changes systematically in time. The estimate of the coefficient for the interaction between Q and the time trend suggests that the relation has become weaker in time. However, the coefficient for our variable of interest (the interaction between Q and Booms) is unchanged with respect of the

[10] Mclean and Zhao (2014) rely on expansion measures based on industrial production, NBER-defined expansions, and a sentiment indicator. Data are only available for industrial production (and GDP) for a larger number of countries.

benchmark result. We further tested this notion with time fixed effect for different periods and got similar results.

Although we employ the measures used most often for investment, growth opportunities and cash-flow, Panel C of Table 4 explores the robustness of our results to alternative measures of these concepts previously used in the literature. Column (1) shows an alternative measure of investment, where the level of capital expenditures is scaled by the lagged value of property, plant and equipment (PPE). Columns (2) and (3) use two alternative measures of growth opportunities: the natural logarithm of our growth opportunities indicator (McLean and Zhao, 2014) and Erickson and Withed (2010, 2012) definition of Tobin's Q.[11] Columns (4) and (5) use two alternative measures for the availability of internal funds that proxy for the tightness of financial constraints: the lagged value of our cash flow measure over the lagged value of total assets—which partly addresses concerns about the relation between cash flow and investment opportunities—and the stock of cash and equivalents over the lagged value of total assets (Love, 2003), respectively.

The results reported in the various columns of Panel C are, in general, unaltered by these changes: the coefficients for the interaction of boom with both cash flow and Q are virtually always negative and most of the time significant. The main exception is seen in column (5), when the interaction of cash stocks with the credit boom indicator is not statistically insignificant. This indicates that the relationship between cash stocks and investment is not weaker during credit booms. This finding could still be consistent with a relaxation of financial constraints during credit booms if the source of cash

[11] Sum of the long-term debt, short-term debt and the market capitalization minus the current assets over the gross value of property plant and equipment (denominator). The use of this measure of this alternative q is related to previous work by Salinger and Summers (1981) and Fazzari, Hubbard, and Petersen (1988) and it is designed to capture investment opportunities only in property, plant, and equipment. Also, Erickson and Whited (2000) shows that this alternative q is a good proxy for Tobin's q as improves measurement quality.

stocks varies across periods. For instance, during booms firms may be better able to accumulate cash from external sources ahead of executing their investment plans.

3.3 Is average Q truly capturing growth opportunities?

A common criticism to the Fazzari et.al (1988) approach is that the empirical measure of Tobin's Q—average Q—may not adequately capture growth opportunities, giving rise to spurious relationships between investments and other variables that could also correlate with growth opportunities, like cash flows (Hayashi, 1982 and Poterba, 1988). This criticism is less of a concern for our key interaction coefficients that are identified through a differences-in-differences approach. Nonetheless, the criticism could be valid if the correlation between average Q and growth opportunities varied more strongly with the credit cycle than the potential correlation between cash flow and growth opportunities. This could happen, for instance, if the informational content of stock prices and average Q about growth opportunities declined credit booms. A related concern is that observed Q may be endogenous to the investment decisions of firms, giving rise to a reverse causality issue.

We address these concerns in three ways. First, we build the following three different measures of growth opportunities that are either pre-determined or exogenous to current market conditions and use them instead of Q in the estimation of Equation (1):

- The average growth of sales during the last three years (*Sales Growth 3yrs*): this measure addresses the common criticism related to the endogeneity of Q and has been widely used as an alternative measure of growth opportunities (Biddle et al., 2009). For instance, Gupta and Yuan (2004) and Fisman and Love (2007) use sales growth of U.S. industries as a measure of growth opportunities.

- Predicted growth opportunities based on Global Q: we exploit the comovement of growth opportunities across firms in similar countries and in the same industry to create a measure of global growth opportunities (*Global Q)* following Fishman and Love (2004).[12] For each industry *s* and country *c*, we compute *Global Q* as the size weighted Q of firms in the same industry and in countries in the same quintile of GDP per capita. We then run a time-series regression for each firm *i* using its Q as dependent variable and *Global Q* as a regressor:

$$Q_{icst} = \delta_{0i} + \delta_{1i} Global\ Q_{cst} + e_{icst},$$

  and use the predicted value of this regression as the measure of growth opportunities.[13]

- Fundamental Q: we follow Badertscher et al., (2013), Campello and Graham (2013), and Gao and Yu (2020), and construct a measure of investment opportunities based on firm fundamentals. For all the firms in a given country, in the same industry and for each year, we run a regression (Pooled OLS) between Q and the following four regressors: return on assets, one-year sale growth, net income and the leverage ratio. We then use the predicted value of this regression as a measure of fundamental Q and the residual as a measure of mispricing.

In addition, we estimate the coefficients of Equation (1) using the Arellano Bond (1991) estimator that deals with endogeneity by using lagged values of the endogenous variables in levels and differences as instruments. We

[12] Along the same lines, Bekaert at. al (2007) use global price to earnings (PE) ratios to construct an exogenous measure of a country's growth opportunities, which is similar to our Q measure in the sense that both are forward looking.
[13] We obtain the fitted Q using the all the observations available for each firm during our sample period. However, in the panel-regression analysis we exclude the firms with less than 10 observations to estimate (δ_0 and δ_1).

consider as endogenous variables the (lagged) Q, our measure of cash flow and the interaction of these two variables with the boom dummy.

Finally, we conduct two empirical exercises to address the possibility that Q might be less informative about investment opportunities during booms because of mispricing or low information production. First, we add the interaction between the residual from the fundamental Q regression (a measure of mispricing) and credit boom to the baseline Equation (1) estimated using fundamental Q as measure of growth opportunities. Second, we estimate Equation (1) controlling for the cross-sectional dispersion on stock return volatilities across firms in a country each year—a measure of the information produced by agents in the economy (Chousakos et al., 2018)—and its interaction with Tobin's Q. This helps us test whether the negative coefficient obtained for the interaction between credit booms and Tobin's Q simply captures that credit booms are periods when there is less information production and Q is therefore less informative about growth opportunities.

Table 5 shows the results of the aforementioned exercises. Our baseline findings are not much affected by considering the three alternative measures of growth opportunities (columns (1)-(3)) or using the Arellano & Bond (1991) estimation procedure (column (4)). In all these cases, the relation between both cash flows and growth opportunities and investment is positive in normal times but declines during credit booms. This suggests that the effects we document are not likely driven by a potential mismeasurement of investment opportunities or endogeneity.[14] The results controlling for the

[14] Column (5) includes the residual of the regression in the fourth approach, which could be associated with the mispricing contained in the Q. When including this variable in the main regression, we are considering the possibility that the Q becomes a noisier proxy for growth opportunities during credit booms. We find that, indeed, the interaction term between mispricing in the Q and the credit booms dummy is negative and statically significant. Hence, our results suggest that the reduction of the investment-grow opportunity sensitivity during boom times is not only capturing the fact that the Q becomes a poor proxy for growth

possibility of mispricing (column (5)) show that indeed a higher degree of mispricing (captured from a larger deviation of Q from fundamentals) results in higher investment, but less so during booms. Nonetheless, the sign, significance, and magnitude of the coefficient of the interaction between credit booms and investment opportunities remains similar and significant. The results that control for the degree of information production, reported in column (6), show that indeed there is a stronger correlation between Q and investment when there is more information produced in the economy, itself a novel result, but this is not crucially driving the negative coefficient obtained for the interaction of Q and credit booms.

3.4 Further Results

Firm and industry characteristics matter for investment decisions, making it easier or harder to invest depending on the situation and the development stage of the firm. Even though growth opportunities and internal resources always play a relevant position in an investment decision, it is natural to think that their importance varies across types of firms. Table 6 explores this possibility by comparing the impact of booms on the sensitivity of investment to Q and cash flow across different groups of firms. This provides an intuition for what is behind our results and allows identifying the groups for which these issues are more critical.

Columns (1)-(2) display the coefficients associated with the interaction term $Q_{t-1}XBoom_t$ (capital misallocation during booms) for two groups of firms based on firm/industry characteristics (size, financial constraints, innovation, tangibility, and opaqueness). Columns (3)-(4) consider the same groups of firms and show the coefficients associated with the interaction term $CF_t/Assets_{t-1}XBoom_t$ (relaxation of financial constraints during booms).

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opportunities during a credit expansion, but we also find that the decision of firms to follow a strict investment opportunity ranking is weaken, which is consistent with our main results.

We first look at size by splitting the sample using the median (whole sample) value of total assets. Our results show that the differential effect of booms is concentrated among smaller firms (row (i)). It is especially in this group that, during boom times, growth opportunities and credit constraints matter less. One would expect this result if credit constraints were more stringent for smaller companies and assessing their prospects harder. We further check next if the evidence is consistent with this view by looking at more direct measures of financing constraints and the easiness of evaluating the firm's quality.

We split the sample according to the Whited and Wu (2006) index of financial constraints.[15] The results show that the impact of credit booms is larger for firms that are more likely to be financially constrained (row (ii)). This finding provides further evidence that the negative coefficient obtained for the interaction of credit booms and cash flows in the baseline regression is evidence of eased financial constraints. It is especially for constrained firms that credit booms bring a trade-off between increased investment for firms strapped from credit and relatively higher capital expenditure for those with bad prospects.

We look next at how the effect of credit booms across firms differs according to the relevance of innovation to the firm. The split is based on the ratio of R&D expenses to total assets, where R&D intensive firms are considered more innovative. The impact of credit booms on the relation between Q and investment is larger for more innovative firms (row (iii)). This is consistent with the idea that lenders can discriminate some but not all firms based on their growth opportunities. To the extent that the prospects of more

[15] Whited and Wu (2006) use an inter-temporal investment model with costs of external financing in which financial constraints are represented by the shadow cost of raising new equity. They parameterize this shadow cost as a linear function of firm characteristics whose coefficients are then derived from a GMM estimation of the investment Euler equation. The index is calculated using their results, which are:

$$WWijt = -0.091\left(\frac{Cash}{Assets}\right)_{ijt} - 0.062(Pay\ Dividends\ Dummy)_{ijt} + 0.021\left(\frac{LT\ Debt}{Assets}\right)_{ijt} - 0.044\ Log(Assets)_{ijt} + 0.102(Ave.Industry\ Sales)_{jt} - 0.035(Sales\ Growth)_{ijt}$$

innovative firms are harder to assess, in normal times they will find it hard to access external financing. However, when credit increases rapidly financiers might channel funds even to these firms for which their prospects are not so easily determined.

We also show that both the misallocation and the credit relaxation effects are less relevant for firms operating in industries that have more tangible assets. A credit boom would have a limited effect on the relation between investment and opportunities and internal funds for those firms that have always better access to finance via the pledging of collateral. It is for those that lack collateral that the boom may bring about a trade-off by easing financing constraints and worsening the quality of investment. This is consistent with the findings that changes in the availability of funding matter less when assets are harder (Braun, 2003). The results of the split are consistent with this view (row (iii)).

Finally, the extension of credit is dependent on the ability of a lender to assess the credit risk of firms. This is likely to vary across industries: determining the prospects and riskiness of a particular firm may be easier in industries where firms are more similar because benchmarking is possible. Although, it is hard to find good proxies for the heterogeneity of firms within industries, we follow Braun and Raddatz (2016) and construct a rough proxy based on the number of subindustries within the industry. We compute the number of four-digit SIC codes within each two-digit SIC code and classify industries as opaque if their figure is above the median and transparent if it is below. During credit booms, firms in more opaque industries may be able to improve their access to external funding and invest more as lenders ease their credit standards. The results reported in row (v) are consistent with this conjecture.

The regressions reported in Table 7 offer various splits of our sample based on country characteristics. Like in Table 6, columns (1)-(2) display the coefficients associated with the interaction term $Q_{t-1}XBoom_t$ (capital misallocation during booms) for various groups and columns (3)-(4) show the coefficients associated with the interaction term $CF_t/Assets_{t-1}XBoom_t$ (relaxation of financial constraints during booms) for the same groups of firms.

We first split the sample according to the World Bank's classification of countries by income level. A comparison of the interaction coefficients shows that, while the misallocation effect of credit booms is more significant among high income countries (row (i), columns (1) and (2)), the effect of credit booms on the relaxation of financial constraints is much stronger in less advanced economies (row (i), columns (3) and (4)). These results suggest that the large increase in credit during booms may be more pernicious in countries that are normally thought of being better in allocating resources to more promising projects independent. It is mostly in rich countries that there is a trade-off between capital misallocation and the relaxation of financial constraints. Less developed countries will mostly enjoy the positive aspect of booms. This view is reinforced when looking at country measures of the availability of external funds. In particular, we find that the relaxation of financial constraints during booms is more prevalent in countries with less developed equity markets (stock market capitalization to GDP, row (ii)) and in economies with more limited access to foreign financing (row (iii), according to the capital account openness index developed by Chinn and Ito (2006)).

The quality of financial regulation also seems to play a role in constraining the degree of misallocation (row (iv)). The coefficient for the interaction between growth opportunities and credit booms is significantly negative mainly among countries with low regulatory quality (according to the Economist Intelligence Unit). On the contrary, countries with high regulatory quality seem to benefit from the relaxation of financial constraints without a significant increase in misallocation (row (iv), columns (2) and (4)).

Different credit booms might have diverse consequences for the degree of misallocation and relaxation of financial constraints. Table 8 presents regressions that consider an anatomy of credit booms. First, we separate those credit booms characterized by a decrease in lending rates (supply driven booms) from those that where credit and rates increase (demand driven booms). We find that booms driven by supply exhibit greater misallocation while providing little relaxation of credit constraints (column (1)). During demand-driven booms, however, both effects seem to be present (column (2)). This result is consistent with a view where decreasing interest rates induce financial institutions to take on more risk by lending to firms that would otherwise not lend because of their poor prospects (see Brandao-Marquez et al., 2019). The episodes where the rapid increase in credit is more likely driven by banks seeking to lend more tend to be far more negative in terms of capital allocation than those where it is the firms that demand more financing than usual.

In columns (3) and (4) we split the sample based on the duration of the episodes: short booms lasting 3 or less years and long booms. The results indicate that when the large increase in credit occurs in a relatively short period of time (short booms), the impact is worse; these episodes induce capital misallocation but do not bring about a significant relaxation of financial constraints. The positive side of booms is only present if the boom extends in time. These findings could be the reflection of how a credit boom matures. When credit grows too rapidly, financial institutions have little time to evaluate and discriminate across firms based on their prospects and disperse funds to them all. However, as the boom extends over time, banks can better assess growth opportunities and become more discriminating.

Finally, column (5) considers the flipside and looks for the effect of credit crunches. We define a credit crunch as a period in which the credit gap is lower than -5%. The coefficient for the interaction between boom and cash is positive. As expected, crunch periods are associated with more stringent financing constraints, making investment more dependent on the availability of internal funds. However, we no longer find evidence for the misallocation effect. When financial institutions reduce drastically the supply of credit, they do not seem to cut lending to worse firms first but rather to cut loans across the board. These results suggest that credit crunches are not necessarily cleansing episodes that bring capital allocation more in line with growth opportunities, nor simply the flipside of booms: they just have a negative impact on investment.

3.5 Aggregate Effects

If credit booms induce misallocation of capital and relax the financing constraints faced by firms, a natural question that follows from our results is whether this phenomenon has consequences for the aggregate economy.

Our framework provides simple measures of the extent to which the degree of misallocation and credit constraints are eased during a specific credit boom: the change in the slope of the relationship between Q and investment and between cash flow and investment that takes place during the boom. To compute these measures, we first estimate a series of time-varying, country-specific coefficients for the cross-sectional relationship between investment, Q, and cash flows (β_{1ct} and β_{2ct}) in country c at time t as follows:

$$\frac{Capex_{ict}}{Assets_{ict-1}} = \alpha_{ct} + \beta_{1ct} Q_{ict-1} + \beta_{2ct} \frac{CF_{ict}}{Assets_{ict-1}} + \epsilon_{ict}$$

Next, for each individual credit boom, we identify two separate periods covering the three years before the boom (pre-boom) and the boom years (boom), and compute the average value of $\hat{\beta}_{1ct}$ and $\hat{\beta}_{2ct}$ in each of these spells. This process yields, for each boom b taking place in country c, two coefficients: $\hat{\beta}_{1cb}^{PRE}$, $\hat{\beta}_{1cb}^{BOOM}$, and analogous coefficients for $\hat{\beta}_2$. The degree to which the credit boom modifies the allocation of capital relative to the pre-boom period can then be captured by $\Delta\hat{\beta}_{1cb} = \hat{\beta}_{1cb}^{BOOM} - \hat{\beta}_{1cb}^{PRE}$. Analogously, the degree to which financial constraints are relaxed during the boom is computed as $\Delta\hat{\beta}_{2cb} = \hat{\beta}_{2cb}^{BOOM} - \hat{\beta}_{2cb}^{PRE}$.

The following regression allows us to assess the relation between these two aspects of a credit boom and aggregate economic variables:

$$\Delta \mathrm{Y}_{cb} = \gamma_0 + \gamma_1 \Delta\hat{\beta}_{1cb} + \gamma_2 \Delta\hat{\beta}_{2cb} + \mathrm{e}_{cb} \quad (2)$$

where the unit of observation is a boom episode *b* taking place in country *c*. $\Delta \mathrm{Y}_{cb}$ corresponds to the change of the aggregate outcome observed in country *c* between the pre-boom period and the post-boom period (the three years following the end of the boom). As aggregate outcomes we consider GDP growth, aggregate sales, stock market returns, return on equity, and the occurrence of banking crises.[16] We perform a bootstrap exercise to randomly generate the independent variables $\Delta\hat{\beta}_{1cb}$ and $\Delta\hat{\beta}_{2cb}$. We resample the original dataset and run the Equation (2) 1000 times. The estimation of the parameters is through a robust regression model in the case of the four first outcomes and we rely on a logit model for the probability of banking crises.

Booms where the deterioration in allocation is larger (i.e. the change in $\Delta\hat{\beta}_{1cb}$ is more negative) should result in worse future outcomes. If during booms capital flows to firms with poorer prospects, allowing them to invest more, the proceeds of aggregate investment should be worse on average. If this is so, we would expect the estimate for γ_1 to be positive for growth, market returns, sales, and profitability. Conversely, since poorer outcomes hamper the ability to repay the funds a larger deterioration in the quality of allocation would increase the chances of experiencing a banking crisis ($\gamma_1 < 0$).

Likewise, a weakening relation between investment and cash flow should be related to higher growth and capitalization ($\gamma_2 < 0$) because more firms with good prospects will be able to invest. On the other hand, since strong cash

[16] GDP Growth come from the World Development Indicators. Sales and stock market returns are aggregates from Worldscope data. For the banking crisis indicator, we use the measure computed by Laeven and Valencia (2018).

flows represent a cushion that allows firms to repay the creditors even in bad times, increased lending to firms with weaker cash flows during boom times could result a higher probability of having a banking crisis ($\gamma_2 < 0$).

Table 9 presents the results of this exercise. Panel A shows the findings considering all booms, while in Panel B we concentrate only on the largest booms (9% threshold of credit gap). As expected, booms in which the allocation of capital deteriorates the most are followed by a decline in growth, aggregate sales, market returns, and return on equity, and with an increase in the chance of experiencing a banking crisis. All the effects are both stronger and more significant in the case of large booms. Economically, the deterioration in the quality of aggregate investment induced by booms has a major impact. For large booms, a one standard deviation increase in the misallocation index is associated with 1.05 percentage points decrease in GDP growth and a 30% increase in the probability of experiencing a banking crisis.

The relaxation of credit constraints also yields the expected result: when investment is relatively more concentrated on firms with high internal cash, subsequent GDP growth, stock returns, sales growth, and return on equity are higher, while the probability of banking crises is lower. The coefficients are not always significant but are always of the expected sign and results tend to be stronger (i.e., larger and statistically significant) when we focus on large booms.

4. Concluding remarks

We present novel evidence on how periods of rapid increases in credit influence investment at the firm level. On the one hand, booms induce a weakening in the relation between investment and cash flows, allowing firms with little internal resources to carry on with their investment plans. This relaxation of financial constraints represents the good side of credit booms. On the other hand, investment becomes less tightly associated with the growth opportunities of firms; compared to non-boom times, investment increases more for those with poorer prospects. This misallocation effect is the bad side of booms. Thus, episodes of large expansions in credit are not unambiguously negative: there is a trade-off between increasing aggregate investment and decreasing its quality.

Critically, this trade-off plays out differently across types of firms and countries, and according to the characteristics of booms. It is stronger for small, financially constrained, and more innovative firms, as well as for firms in less tangible and opaque industries. It also grows with the duration of the credit boom. The misallocation effect is stronger than the impact on the relaxation of financial constraints in more developed economies, while the opposite is true among emerging market economies.

At the macro level, credit booms with larger capital misallocation are associated with a higher probability of experiencing a banking crisis and with poor economic performance after the boom. Thus, credit booms seem to be more pernicious among advanced economies and to have a silver lining in emerging markets where financial constraints are usually more prevalent (the not-so ugly).

These results help us increase our understanding of why some credit booms end up badly—when the misallocation effect is relatively stronger and the easing of financing constraints weaker—and shed some light on the conditions in which this is more likely to occur. They also highlight the importance of the distribution of credit within sectors, on top of the aggregate volume of credit, for our understanding of the macroeconomic and financial risks arising from credit booms. While most current theoretical models focus on the distribution of credit and net worth across sectors (e.g. Brunnermeier and Sanikov, 2014), our results point out the importance of developing models that introduce additional heterogeneity.

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Figure 1: Credit Boom Effect over Different Investment Horizon - Local Projections

The figure presents the evolution of the sensitivity of capital expenditures to growth opportunities (Figure 1a) and internal funds (Panel b) from the year prior to the onset of a credit boom (t-1) through the third year of the episode. The sensitivity measures are computed by running the investment regression separately in each spell. The shaded areas correspond to a band of 1.645 standard deviations around the mean coefficient.

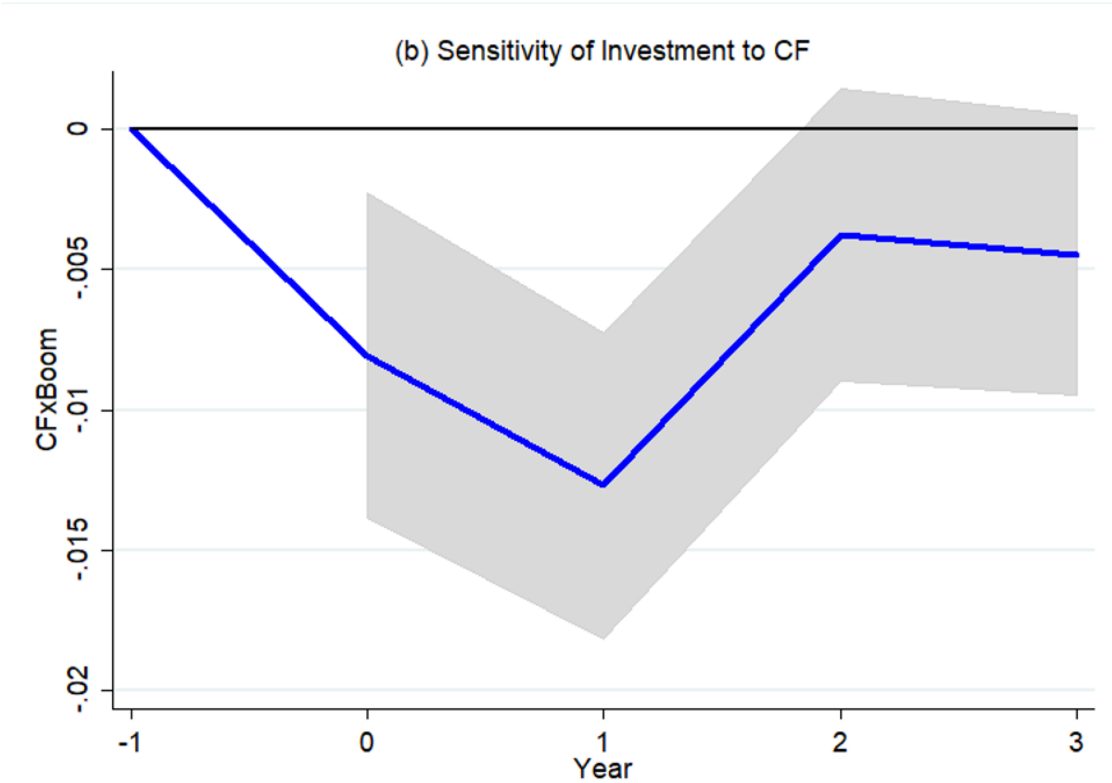
(b) Sensitivity of Investment to CF
CFxBoom
0
-.005
-.01
-.015
-.02
-1
0
1
2
3
Year

Table 1: Descriptive Statistics

Panels A-C present summary statistics for the key variables during boom and non-boom years, as well as for the whole sample. Panel D displays the summary statistics for country variables. Credit boom periods correspond to years when a country meets three conditions: 1) positive GDP growth, 2) there is not a banking crisis and 3) the *Credit Gap* measure is greater or equal than 5%. The *Credit Gap* measure is provided by the Bank for International Settlements (BIS) and is defined as the difference between the credit-to-GDP ratio and its long-term trend. $Capex_{it}$ / $Assets_{ict-1}$ is the ratio of capital expenditures to the lagged value of total assets. Q_{it-1} is the sum of the market value of equity plus total assets minus the book value of equity, all divided by total assets. CF_{it} / $Assets_{ict-1}$ is ratio of cash flow to the lagged value of total assets, where cash flow is measured as net income before extraordinary items plus depreciation, depletion, and amortization. All firm-level variables come from Worldscope and are winsorized at the 1st and 99th percentile. We detail how we construct each variable in Appendix A1.

Panel A: Normal Times (Non-Boom Periods)						
	N	Mean	SD	P25	Median	P75
$Capex_t$ / $Assets_{t-1}$	252546	0.06	0.08	0.02	0.04	0.07
Q_{t-1}	252546	1.51	1.17	0.92	1.16	1.64
CF_t / $Assets_{t-1}$	252546	0.06	0.14	0.03	0.07	0.12

Panel B: Credit Boom Times						
	N	Mean	SD	P25	Median	P75
$Capex_t$ / $Assets_{t-1}$	83149	0.07	0.09	0.02	0.04	0.08
Q_{t-1}	83149	1.65	1.29	0.96	1.25	1.81
CF_t / $Assets_{t-1}$	83149	0.06	0.16	0.02	0.08	0.13

Panel C: Total Sample – Firm Level						
	N	Mean	SD	P25	Median	P75
$Capex_t/Assets_{t-1}$	335695	0.06	0.08	0.02	0.04	0.08
$Capex_t/PPE_{t-1}$	334780	0.30	0.52	0.08	0.16	0.31
Q_{t-1}	335695	1.54	1.20	0.93	1.18	1.68
$Ln(Q_{t-1})$	335693	0.27	0.53	-0.08	0.17	0.52
Alternative Q_{t-1}	315017	4.41	16.99	0.16	0.71	2.20
Sales Growth$_t$ *(3yrs)*	292183	0.15	0.57	-0.09	0.10	0.34
$CF_t/Assets_{t-1}$	335695	0.06	0.14	0.03	0.07	0.12
$CF_{t-1}/Assets_{t-1}$	334112	0.05	0.22	0.03	0.07	0.11
$Cash_{t-1}/Assets_{t-1}$	335419	0.16	0.17	0.04	0.10	0.22
Ln(Size)	335695	12.51	1.87	11.15	12.30	13.68
ROA	335695	0.01	0.15	0.00	0.03	0.07
WW Index	325204	-0.54	0.09	-0.61	-0.54	-0.48
Innovation	154550	0.04	0.08	0.00	0.01	0.05
Tangibility	335687	0.29	0.20	0.14	0.26	0.39
Opacity	335695	27	16	14	24	40

Panel D: Total Sample – Country Level						
	N	Mean	SD	P25	Median	P75
$Boom_t$	910	0.30	0.46	0.00	0.00	1.00
$Crunch_t$	910	0.26	0.44	0.00	0.00	1.00
Boom Duration	273	5.86	3.01	3.00	6.00	8.00
Credit Gap (%)	910	1.79	14.39	-5.50	2.41	9.03
GDP Growth	910	0.03	0.03	0.01	0.03	0.04
Domestic credit to private sector (% of GDP)	779	1.031	0.47	0.66	1.02	1.38
GDP per capita (US dollars)	910	32911	18922	14777	33970	44942
Industrial Production (Dummy)	615	0.62	0.47	0.00	1.00	1.00
Market Capitalization (US billion dollars)	820	109972	305600	9725	24463	88876
Chinn-Ito Index	904	1.57	1.18	1.06	2.33	2.33
Financial System Regulation	800	3.63	0.84	3	4	4

Table 2: Level of investment during boom and non-boom periods for different groups of firms

This table presents the rate of investment (the ratio of capital expenditures to the lagged value of assets) for different groups of firms and time periods. Firms with a ratio of market to book assets (cash flows to lagged value of total assets) above the median are classified as High Q (High CF) and firms below the median are classified as Low Q (Low CF). Each panel shows the rate of investment for the different groups during non-boom periods (Panel A) and boom periods (Panel B). The third row in each Panel corresponds to the difference in investment between the High and Low Q firms, while the third column exhibits the difference between the High and Low CF groups. Panel C shows the differences between of each figure in boom times with respect to non-boom periods.

Panel A: Non-Boom periods			
Q\CF	*Low CF*	*High CF*	*H-L*
Low Q	3.49%	6.88%	3.39%
High Q	5.81%	8.56%	2.75%
H-L	2.32%	1.68%	-0.64%

Panel B: Boom periods			
Q\CF	*Low CF*	*High CF*	*H-L*
Low Q	3.94%	7.11%	3.17%
High Q	6.17%	8.61%	2.44%
H-L	2.23%	1.5%	-0.73%

Panel C: Boom vs. Non-Boom			
Q\CF	*Low CF*	*High CF*	*H-L*
Low Q	0.45%	0.23%	-0.22%
High Q	0.36%	0.05%	-0.31%
H-L	-0.09%	-0.18%	

Table 3: Capital Allocation, Credit Booms and Financial Constraints

This table presents the results of a series of regressions that study the role of credit booms on the relation between investment and growth opportunities and financial constraints. The dependent variable is the ratio of capital expenditures to the lagged value of total assets ($Capex_{it}/Assets_{t-1}$). The independent variables are the lagged value of the growth opportunities (Q_{ict-1}), computed as the sum of the market value of equity plus total assets minus the book value of equity, divided by total assets, the ratio of cash flow to lagged assets ($CF_{it}/Assets_{t-1}$), where cash flows are measured as the net income before extraordinary items plus depreciation, depletion and amortization over the lagged value of total assets; and the dummy variable, $Boom_{ct}$, which takes the value 1 when country c is experiencing a credit boom at time t (and zero otherwise). In addition, the specification includes two interaction terms, $Q_{it-1}XBoom_{ct}$ and $CF_{it}/Assets_{it-1}XBoom_{ct}$, to capture the change in the sensitivity of investment to growth opportunities and financing constraints during boom times, respectively. Column (1) includes firm and year fixed effects. Columns (2)-(5) consider firm and country-year indicators. In columns (1) and (5) we include as additional control variables: *Ln(Size)* and *ROA*. All variables are defined in Appendix A1. Standard errors (in parentheses) are adjusted for heteroscedasticity and clustered at firm level. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Dependent variable:	$Capex_t$ / $Assets_{t-1}$				
	(1)	(2)	(3)	(4)	(5)
Q_{t-1}	.013***	.013***	.013***	.013***	.013***
	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)
CF_t / $Assets_{t-1}$	.116***	.071***	.074***	.074***	.110***
	(.005)	(.002)	(.002)	(.002)	(.005)
$Boom_t$	.001***				
	(.0004)				
$Q_{t-1}XBoom_t$		-.001***		-.001***	-.001***
		(.0004)		(.0004)	(.0004)
CF_t / $Assets_{t-1}XBoom_t$			-.010***	-.009***	-.008**
			(.003)	(.003)	(.004)
$Log(Size)_t$	.004***				.006***
	(.0004)				(.0005)
ROA_t	-.045***				-.042***
	(.004)				(.004)
Firm F.E	Yes	Yes	Yes	Yes	Yes
Cty-Year F.E	No	Yes	Yes	Yes	Yes
Year F.E	Yes	-	-	-	-
Obs.	335695	335695	335695	335695	335695
R^2	.512	.522	.522	.522	.523

Table 4: Robustness

This table checks the robustness of the results presented in Table 3. Panel A shows the results of estimating Equation (1) using different thresholds of *Credit Gap* to identify credit booms (Columns (1)-(3)) and an alternative definition of credit booms (Columns (4) and (5)) from Mendoza and Terrones (2008, 2012). Panel B provides alternative specifications of Equation (1) by employing different country variables that either replace the credit boom dummy or add a different dimension of a country's economic performance. Panel C employs alternative measures of investment, growth opportunities (GO) and financing constraints (CF), as indicated at the top of each column. Column (1) uses capital expenditures over the lagged value of property plant and equipment ($Capex_t/PPE_{t-1}$). Columns (2) and (3) use alternative measures of growth opportunities. $Ln(Q_{t-1})$ is the natural logarithm of the Tobin's Q measure. $Alternative\ Q$ is the sum of long-term debt, short-term debt and the market capitalization minus the current assets over the gross value of property plant and equipment (denominator). Column (4) uses the lagged value of cash flows over lagged assets; and column (5) uses the lagged value of stock of cash and equivalents over the lagged value of total assets ($Cash + Eq_{t-1}/Assets_{t-1}$). Standard errors (in parentheses) are adjusted for heteroscedasticity and clustered at firm level. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Panel A: Robustness to Booms Definitions					
	Threshold Credit Gap			MT Boom Definition	
	4%	6%	7%	0.5 Std Dev.	1.5 Std Dev.
	(1)	(2)	(3)	(4)	(5)
Q_{t-1}	.013***	.013***	.013***	.013***	.013***
	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)
CF_t / $Assets_{t-1}$	.111***	.110***	.111***	.112***	.110***
	(.005)	(.005)	(.005)	(.005)	(.005)
$Q_{t-1}XBoom_t$	-.001***	-.0009**	-.0008*	-.0007**	-.0004
	(.0004)	(.0004)	(.0005)	(.0004)	(.0006)
CF_t / $Assets_{t-1}XBoom_t$	-.011***	-.011***	-.013***	-.009***	-.010*
	(.003)	(.004)	(.004)	(.003)	(.006)
Firm F.E	Yes	Yes	Yes	Yes	Yes
Cty-Year F.E	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes
# of Boom Episodes	96	82	77	82	46
Obs.	335695	335695	335695	322202	322202
R^2	.523	.523	.523	.528	.528

Panel B: Alternative Specifications							
Country Variable$_t$:	Credit Gap		Credit to Private Sector to GDP		GDP Growth	Industrial Production (Dummy)	Time Trend
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Q_{t-1}	.013***	.013***	.013***	.013***	.013***	.012***	.017***
	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)	(.0004)	(.0006)
CF_t / $Assets_{t-1}$	.109***	.110***	.104***	.104***	.108***	.106***	.110***
	(.005)	(.005)	(.005)	(.005)	(.005)	(.006)	(.005)
$Q_{t-1} X Boom_t$					-.002***	-.002***	-.001***
					(.0004)	(.0004)	(.0004)
CF_t / $Assets_{t-1} X Boom_t$					-.009***	-.010***	-.008**
					(.004)	(.004)	(.004)
Q_{t-1} X $Country\ Variable_t$	.002	.001	-.004***	.004	.029***	.001***	
	(.002)	(.002)	(.0007)	(.004)	(.009)	(.0003)	
CF_t /$Assets_{t-1}$ X $Country\ Variable_t$	-.072***	-.075***	-.058***	-.098***	.258***	-.012***	
	(.015)	(.015)	(.005)	(.026)	(.071)	(.003)	
Q_{t-1} X $Country\ Variable_t^2$		-.032***		-.003**			
		(.007)		(.001)			
CF_t /$Assets_{t-1}$ X $Country\ Variable_t^2$		.054		.014			
		(.057)		(.009)			
$Q_{t-1} X Time\ Trend_t$							-.0003***
							(.00003)
Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cty-Year F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	335695	335695	314998	314998	335695	293726	335695
R2	.523	.523	.537	.537	.523	.543	.524

Panel C: Measurement Robustness					
	$Capex_t / PPE_{t-1}$	$Ln(Q_{t-1})$	*Alternative Q measure*	CF_{t-1} / $Assets_{t-1}$	$Cash_{t-1}$ / $Assets_{t-1}$
	Dependent Var.	GO	GO	CF	CF
	(1)	(2)	(3)	(4)	(5)
GO	.105***	.039***	.0001***	.014***	.013***
	(.003)	(.0007)	(.00002)	(.0003)	(.0003)
CF	.137***	.101***	.113***	.010***	.036***
	(.041)	(.005)	(.006)	(.002)	(.002)
$GOXBoom_t$	-.014***	-.002***	-.00008***	-.002***	-.002***
	(.004)	(.0008)	(.00002)	(.0004)	(.0004)
$CFXBoom_t$	-.044	-.006*	-.007*	-.007**	.001
	(.031)	(.004)	(.004)	(.003)	(.002)
Firm F.E	Yes	Yes	Yes	Yes	Yes
Cty-Year F.E	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes
Obs.	334761	335693	314641	334059	335412
R^2	.347	.528	.52	.519	.52

Table 5: Measurement Error in the Tobin's Q

This table presents four ways of accounting for potential measurement errors in the proxy for growth opportunities (Tobin's Q). The first approach (Column 1) uses *Sales Growth (3yrs),* which is the average growth of sales during the previous three years. The second approach (Column 2) runs our Equation (1) using the Arellano-Bond (1991) estimator. For brevity we report only the coefficient associated with the Equation (1). The third approach (Colum 3) exploits the co-movement in growth opportunities across similar countries and within the same industry. We create a measure of "Global" growth opportunities (Global Q) calculating, for each firm, the weighted value (according to firm size) of the firms' Q in similar countries (in terms of GDP per capita) and in the same industry. This new variable serves as an instrument for Q. In the fourth approach, for all the firms in a given country, in the same industry and for each year, we run a regression (Pooled OLS) using the Q as dependent variable and four regressors: 1) return on assets (ROA), (2) 1-year sale growth (SG), (3) net income and (4) the leverage ratio. We use the predicted Q (*Fundamental Q*) as the measure of the firms' marginal Q. In all columns, we follow the same specification in Equation (1), although we replace Q with each instrument. In columns (6) we add the interaction term between our Q measure and the cross-sectional dispersion (CSD) of stock price volatilities to account for the level of firm-specific information. In all the columns we include as additional control variables: *Ln(Size)* and *ROA*. Standard errors (in parentheses) are adjusted for heteroscedasticity and clustered at firm level. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

	Sales Growth (3yrs) -GO	Arellano Bond Q_{t-1}, CF	Global Q Q_{t-1}	*Fundamental* Q_{t-1}		Cross-sectional dispersion
	(1)	(2)	(3)	(4)	(5)	(6)
GO	.015***	.013***	.012***	.015***	.018***	.013***
	(.001)	(.0004)	(.0007)	(.0005)	(.0005)	(.0003)
CF	.135***	.113***	.175***	.104***	.099***	.111***
	(.006)	(.006)	(.007)	(.006)	(.006)	(.005)
$Boom_t$		.007***				
		(.001)				
$GOXBoom_t$	-.006***	-.003***	-.001**	-.002***	-.002***	-.002***
	(.002)	(.0005)	(.0005)	(.0006)	(.0006)	(.0004)
$Residual\text{-}GO$					.010***	
					(.0003)	
$Residual\text{-}GOXBoom_t$					-.001**	
					(.0005)	
CF_t / $Assets_{t-1}XBoom_t$	-.009**	-.010**	-.013***	-.008**	-.007*	-.008**
	(.004)	(.005)	(.004)	(.004)	(.004)	(.004)
$GOXCSD_t$						.0003***
						(.0001)
Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E	-	Yes	-	-	-	-
Cty-Year F.E	Yes	No	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	313748	271764	256057	235469	235469	335616
R^2	.517	-	.457	.559	.567	.523

Table 6: Heterogeneity Across Firms and Industries

This table presents regressions studying the heterogeneity of the relation between credit booms, capital allocation and firm's financial constraints. Columns (1) and (2) display the coefficients associated with the interaction term $Q_{t-1}XBoom_t$ (capital misallocation during booms) for the two groups of firms based on firm/industry characteristics described in each corresponding row. Columns (3) and (4) show the coefficients associated with the interaction term $CF_t/Assets_{t-1}XBoom_t$ (relaxation of financial constraints during booms) for the same groups of firms. We split the sample of firms according to the median of each of the firm or industry characteristics: (i) firm size (total assets), (ii) the index of financial constraints proposed by Whited and Wu (2006), (iii) the ratio of R&D expenses over total assets as a measure of how innovative is each firm, (iv) the industry ratio of property, plant and equipment over total assets and (v) the degree of heterogeneity of firms within industries, measured as the number of Four-Digit SIC codes within each Two-Digit SIC code and classify industries as opaque if their figure is above the median and transparent if it is below. In all the columns we include as additional control variables: *Ln(Size)* and *ROA*. All variables are defined in Appendix A1. Standard errors (in parentheses) are adjusted for heteroscedasticity and clustered at firm level. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

	$Q_{t-1}XBoom_t$		CF_t / $Assets_{t-1}XBoom_t$		N Observations	
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Level:	(A)	(B)	(A)	(B)	(A)	(B)
(i) Small (A) vs. Big (B)	-.002***	-.001	-.010***	.005	167848	167847
	(.0005)	(.0007)	(.004)	(.009)		
(ii) Constrained (A) vs. Unconstrained (B)	-.002***	.00002	-.014***	-.009	162602	162602
	(.0005)	(.0007)	(.004)	(.011)		
(iii) More (A) vs. Less Innovative (B)	-.002***	.0002	-.007*	-.010	77275	77275
	(.0004)	(.001)	(.004)	(.012)		
Industry Level:						
(iv) Intangible (A) vs. Tangible (B)	-.002***	-.001	-.011**	-.004	211113	124582
	(.0004)	(.001)	(.003)	(.010)		
(v) Opaque (A) vs. Transparent (B)	-.001***	-.0003	-.009***	-.013	286041	49654
	(.0004)	(.002)	(.004)	(.016)		

Table 7: Heterogeneity Across Country Characteristics

This table presents how the relation between credit booms on capital allocation and financial constraints varies according to different country characteristics. Columns (1) and (2) display the coefficients associated with the interaction term $Q_{t-1}XBoom_t$ (capital misallocation during booms) for two groups of firms based on country characteristics described in each corresponding row. Columns (3) and (4) show the coefficients associated with the interaction term $CF_t/Assets_{t-1}XBoom_t$ (relaxation of financial constraints during booms) for the same group of firms. We use four country characteristics to split the sample: (i) the World Bank's classification of countries according to their level of income;(ii) the stock market capitalization to GDP to distinguish between countries with developed and underdeveloped equity markets (below/above the sample median);(iii) the Chin-Ito Index of the degree to which the countries are open to international capital flows (below/above the sample median); (iv) the financial regulatory system quality index from the Economist Intelligence Unit (low quality is with less than or equal to 3 and high quality is greater than 3). In all the columns we include as additional control variables: *Ln(Size)* and *ROA*. All variables are defined in Appendix A1. Standard errors (in parentheses) are adjusted for heteroscedasticity and clustered at firm level. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

	$Q_{t-1}XBoom_t$		CF_t / $Assets_{t-1}XBoom_t$		N Observations	
	(1)	(2)	(3)	(4)	(5)	(6)
(i) Country Classification:	(A)	(B)	(A)	(B)	(A)	(B)
Low Income (A) vs. High Income (B)	-.002*	-.001***	-.028***	-.004	83643	252052
	(.0009)	(.0004)	(.007)	(.004)		
(ii) Equity Mkt. Development:						
Underdeveloped (A) vs. Developed (B)	-.001	-.001***	-.028***	-.002	114309	221386
	(.0008)	(.0004)	(.008)	(.004)		
(iii) Capital Account Openness:						
Low (A) vs. High (B)	-.002*	-.001***	-.027***	-.004	83596	252099
	(.001)	(.0004)	(.010)	(.004)		
(iv)Financial Regulatory System:						
Low Quality (A) vs. High Quality (B)	-.002***	-.003	-.002	-.021***	264767	70928
	(.0004)	(.004)	(.001)	(.008)		

Table 8: Credit Booms Anatomy

This table presents how the relation between credit booms on capital allocation and financial constraints varies according to different types of booms. Column (1) considers only credit booms that are accompanied with decreasing interest rates (supply driven booms). Columns (2) only includes credit booms driven where interest rates are increasing (demand driven booms). Columns (3) and (4) employ booms with a duration less or equal than 3 years (Short Booms) and greater than 3 years (Long Booms), respectively. Column (5) looks not for the effect of booms but for the impact of credit crunches. The latter are defined as episodes where the *Credit Gap* measure is less than -5%. In all the columns we include country-year and firm fixed effects. In all the columns we include as additional control variables: *Ln(Size)* and *ROA*. All variables are defined in Appendix A1. Standard errors (in parentheses) are adjusted for heteroscedasticity and clustered at firm level. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Dependent variable:	$Capex_t$ / $Assets_{t-1}$				
	Decreasing Int. Rate	Increasing Int. Rate	Short Booms	Long Booms	Credit Crunches
	(1)	(2)	(3)	(4)	(5)
Q_{t-1}	.012***	.013***	.013***	.013***	.013***
	(.0004)	(.0004)	(.0003)	(.0003)	(.0003)
CF_t / $Assets_{t-1}$	.120***	.130***	.122***	.106***	.106***
	(.007)	(.007)	(.006)	(.005)	(.005)
$Q_{t-1}XBoom_t$	-.002***	-.001***	-.002**	-.001***	-.0006
	(.0005)	(.0005)	(.0008)	(.0004)	(.0004)
CF_t / $Assets_{t-1}XBoom_t$	-.005	-.009*	.007	-.012***	.006*
	(.004)	(.005)	(.007)	(.004)	(.004)
Firm F.E	Yes	Yes	Yes	Yes	Yes
Cty-Year F.E	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes
Obs.	201816	187087	270170	317087	335695
R^2	.534	.55	.546	.532	.523

Table 9: Aggregate Effects

This table shows how the degree of misallocation and relaxation of credit constraints is related to macroeconomic aggregate conditions following booms. We perform a bootstrap exercise (1000 draws) to randomly generate the independent variables, which are the changes in the sensitivity of investment to growth opportunities ($\Delta\hat{\beta}_{1cb}$) and cash flow ($\Delta\hat{\beta}_{2cb}$) during the boom with respect to the previous three years and run the Equation (2): $\Delta Y_{cb} = \gamma_0 + \gamma_1\Delta\hat{\beta}_{1cb} + \gamma_2\Delta\hat{\beta}_{2cb} + e_{cb}$. In columns (1)-(4), the dependent variables are the average change of *GDP growth*, *Stock Market Returns, Aggregated Sales* and *Return on Equity (ROE)* in the three years following a credit boom with respect to the 3 years prior to the episode. The dependent variable in column (5) is an indicator of whether the country experiences a *Banking Crisis* in the three years that follow the boom, taken from Laeven and Valencia (2018). In columns (1)-(4) the equation is estimated using a robust regression, while in column (5) the estimates are based on a logit model. Panel A includes all booms and Panel B for which the credit gap is larger than 9%. Standard errors are in parentheses. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Panel A: All Booms					
	Δ GDP growth	Δ Stock Return	Δ Sales Growth	Δ ROE	Δ Baking Crisis
	(1)	(2)	(3)	(4)	(5)
$\Delta\hat{\beta}_{1cb}$	0.236***	2.658**	0.340*	0.646***	-20.460**
	(0.080)	(1.284)	(0.184)	(0.227)	(7.782)
$\Delta\hat{\beta}_{2cb}$	0.006	0.142*	0.053***	0.094***	-0.110
	(0.008)	(0.076)	(0.017)	(0.030)	(0.741)
N Booms	75	70	70	70	76
R^2	0.072	0.132	0.071	0.151	

Panel B: Large Booms					
	Δ GDP growth	Δ Stock Return	Δ Sales Growth	Δ ROE	Baking Crisis
	(1)	(2)	(3)	(4)	(5)
$\Delta\hat{\beta}_{1cb}$	0.505***	7.961***	0.606**	1.015**	-38.254*
	(0.138)	(1.572)	(0.289)	(0.426)	(20.652)
$\Delta\hat{\beta}_{2cb}$	0.022	-0.017	0.088***	0.114***	-3.396**
	(0.015)	(0.123)	(0.032)	(0.042)	(1.516)
N Booms	40	39	38	39	41
R^2	0.263	0.402	0.277	0.233	

Table A1: Definition of variables

Variable	Dimension	Baseline Definition	Alternative Definition (if applies)	Source
Investment ($Capex\ /\ Assets_{t-1}$)	Firm-level	Capital Expenditures (WC04601)/ Lagged Total Assets(WC02999)	(Capital Expenditures (WC04601)+RD(WC01201))/ Lagged Total Assets(WC02999) (Capital Expenditures (WC04601)+RD(WC01201) + + SGA(WC1101))/ Lagged Total Assets(WC02999) Capital Expenditures (WC04601)/Lag of Total Property Plant and Equipment (WC02501).	Worldscope
Growth Opportunities (Q_{t-1})	Firm-level	Tobin's Q Assets: (Market value of common equity (W08001) + (Total Assets(WC02999) - Book Value of Common Equity(WC03501)))/Total Assets(WC02999)	*q-Tobin*: (LT Debt (WC03251)+ST (WC03051)+ Market value of common equity (W08001) - Current Assets(WC02201))/ Gross Property Plant and Equipment (WC02301) Average Sales growth (3 year). Growth: Log(Sales(t)/Sales(t-1))-Log(CPI(t)/CPI(t-1). Sales (WC01001).	Worldscope and World Development Indicators
Cash Flow ($CF_t\ /\ Assets_{t-1}$)	Firm-level	(Net Income before Extraordinary Items (WC01551)+ Depreciation and Amortization	Lagged Cash & Equivalents (WC02001) /Lagged Total Assets (WC02999)	Worldscope

		(WC01151) / Lagged Total Assets (WC02999)		
Size	Firm-level	USD Total Assets: Total Assets (WC02999) / Ave. Nominal Exchange Rate		Worldscope and World Development Indicators
ROA	Firm-level	Net Income Before Preferred Dividends (WC01651)/Total Assets (WC02999)		Worldscope
Innovation	Firm-level	R&D (WC01201) / Total Assets (WC02999)		Worldscope
Opacity	Industry-Level	Number of 4 digit sic codes in a 2 digit code		
Financial Constraints	Firm-level	Whited and Wu (2006). $WWijt =$ $-0.091\left(\frac{Cash}{Assets}\right)_{ijt} -$ $0.062(Pay\ Dividends\ Dummy$ $0.021\left(\frac{LT\ Debt}{Assets}\right)_{ijt} -$ $0.044\ Log(Assets)_{ij}$ $0.102(Ave.Industry\ Sales)_{jt}$ $0.035(Sales\ Growth)_{ijt}$		Worldscope
Tangibility	Industry-level	Country-Sector-Year Median of Property, Plant and Equipment over Total Assets (WC02501/WC02999)		Worldscope
Credit Boom	Country-level	Credit boom periods correspond to years when a country meets three conditions: 1) positive GDP growth, 2) there is no a banking crisis and 3) the *Credit Gap* measure is	Boom MT: Mendoza and Terrones (2008, 2012) associate credit booms with periods where real per-capita credit of a country is significantly above its long-run trend.	IFS and World Development Indicators

		greater or equal than 5%.		
Credit Crunch		Credit crunch periods correspond to years the *Credit Gap* measure is less or equal than -5%.		IFS and World Development Indicators
Industrial Production (Dummy)	Country-level	Dummy variable that takes the value of 1 if a country has a positive annual growth in the industrial production.		Bloomberg
Wealthness	Country-level	Gross Domestic Product		World Development Indicators
Financial Development	Country-level	Ratio Market Capitalization to GDP		World Development Indicators
Openness	Country-level	Chinn and Ito (2008)		Authors' website
Financial Regulatory System Quality	Country-level	Financial regulatory system quality index from the Economist Intelligence Unit (goes from 1 (low quality) to 5 (high quality).		Economist Intelligence Unit (EIU) Index

Table A2: Credit Boom Episodes

This table presents the episodes of credit booms for the different countries in our final sample. Credit boom episodes corresponds to years when a country meets three conditions: 1) positive GDP growth, 2) there is not a banking crisis and 3) the *Credit Gap* measure is greater or equal than 5%. The Credit Gap measure is provided by the Bank for International Settlements (BIS) and it is defined as the difference between the credit-to-GDP ratio and its long-term trend. The Table includes the starting and ending year of the booms as well as its duration (number of years).

Country	**Starting Year**	**Peak Year**	**Ending year**	**Duration (years)**
Australia	1985	1989	1990	6
Australia	2001	2007	2008	8
Austria	2000	2000	2000	1
Belgium	1991	1992	1992	2
Belgium	1994	2000	2001	8
Belgium	2004	2004	2004	1
Belgium	2016	2016	2016	1
Brazil	2011	2012	2014	4
Canada	1990	1990	1990	1
Canada	1992	1992	1993	2
Canada	2010	2016	2017	8
Switzerland	1987	1989	1990	4
Switzerland	2010	2012	2020	11

Chile	1993	1998	1998	6
Chile	2000	2001	2002	3
Chile	2013	2015	2016	4
Colombia	2010	2015	2017	8
Germany	1999	2000	2001	3
Denmark	1989	1989	1990	2
Denmark	2000	2002	2002	3
Denmark	2004	2007	2007	4
Spain	1998	2007	2007	10
Finland	1986	1990	1990	5
Finland	2006	2008	2008	3
Finland	2010	2010	2011	2
Finland	2015	2015	2015	1
France	1989	1991	1992	4
France	2007	2007	2007	1
France	2010	2012	2012	3
France	2015	2017	2020	6

United Kingdom	1982	1990	1990	9
United Kingdom	1993	1993	1993	1
United Kingdom	2000	2002	2006	7
Greece	1999	2007	2007	9
Hong Kong SAR, China	1990	1990	1990	1
Hong Kong SAR, China	1997	1997	1997	1
Hong Kong SAR, China	2007	2008	2008	2
Hong Kong SAR, China	2010	2014	2014	5
Hong Kong SAR, China	2016	2017	2020	5
Hungary	2000	2007	2007	8
Ireland	1991	1993	1993	3
Ireland	1997	2007	2007	11
Italy	1989	1992	1992	4
Italy	1994	1994	1994	1
Italy	2000	2007	2007	8
Italy	2010	2010	2011	2
Japan	1983	1990	1992	10

Japan	2017	2017	2020	4
Korea, Rep	1991	1991	1993	3
Korea, Rep	2008	2008	2008	1
Korea, Rep	2010	2010	2010	1
Mexico	1991	1992	1992	2
Mexico	2013	2016	2017	5
Malaysia	1996	1996	1996	1
Malaysia	2014	2015	2018	5
Netherlands	1999	1999	2000	2
Netherlands	2011	2011	2011	1
Norway	1989	1989	1990	2
Norway	2002	2008	2008	7
Norway	2010	2010	2010	1
Norway	2012	2012	2012	1
Norway	2015	2016	2016	2
New Zealand	2005	2007	2007	3
Poland	2008	2009	2010	3

Portugal	1996	2001	2002	7
Portugal	2004	2004	2007	4
Singapore	1996	1997	1997	2
Singapore	2012	2014	2014	3
Singapore	2016	2016	2017	2
Sweden	1986	1990	1990	5
Sweden	2002	2002	2002	1
Sweden	2006	2007	2007	2
Sweden	2010	2010	2011	2
Sweden	2013	2013	2013	1
Thailand	1989	1996	1996	8
Thailand	2012	2015	2020	9
Turkey	1997	1997	1997	1
Turkey	2006	2008	2008	3
Turkey	2010	2011	2017	8
United States	2001	2006	2006	6

South Africa	1998	1998	1999	2
South Africa	2006	2008	2008	3