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SME Credit Constraints and Macroeconomic Effects

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Abstract: This research attempts to answer two particular questions: a) what factors drive SME credit constraints in the Irish economy and b) what is the impact of such constraints on the macro-economy, in particular on employment and investment. We find that constraints decrease with firm size while there is variation by sector. Our results indicate that firms applying to foreign-owned banks are more likely to be constrained. We also identify a direct effect of debt overhang on access to credit. Linking constraints to the macro-economy, we find a negative and significant effect of SME credit constraints on employment, while no effect is evident on firm investment.

Key words: Financial Crisis, Credit Constraints, Investment, Employment, SMEs

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SME Credit Constraints and Macroeconomic Effects

1. Introduction

The importance of small- and medium-sized enterprises (SMEs) to the Irish economy cannot be understated. The most recent CSO Business in Ireland survey (2010) indicates that SMEs constitute 99.8% of active enterprises, 69.1% of persons engaged, 51.5% of turnover and 46.8% of gross value added. While in the current environment a lack of aggregate demand for goods and services is undoubtedly the main challenge facing SMEs¹, there are many supply-side and structural influences on their operating climate that may matter as well. Determining which factors support or hinder SME performance and developing a supportive business environment for their successful operation is critical to a sustained, employment-intensive recovery.

Within this context and given the scale of the banking sector crisis in Ireland, there has been considerable research, both academic and policy-oriented, which has identified access to credit as a core constraint to SME performance (Forfas, 2012; NESC, 2012; Lawless & McCann, 2011; Holton & McCann, 2012; Holton et al., 2012). As a policy response, a number of measures have been undertaken to date, including SME lending targets for the main pillar banks, AIB and Bank of Ireland, the establishment of the Credit Review Office, and the continued development of non-bank financing initiatives, most noticeably by Enterprise Ireland. Further measures have been outlined in the *Action Plan for Jobs 2013*, including the establishment of SME equity and credit funds through the National Pensions Reserve Fund (NPRF) which are just beginning to come on stream, as well as a range of capacity building measures and information campaigns.²

Within the context of the existing work in this area, and drawing on the recent Department of Finance surveys of credit demand³, our research attempts to answer two particular questions: a) to determine what factors affect SME credit constraints in the Irish economy and b) what is the impact of SME credit constraints on the macro-economy.

Our research provides the following specific contributions. Firstly, we build on the existing work estimating the determinants of access to bank finance in Ireland (Lawless & McCann, 2011; Holton & McCann, 2012) by providing a deeper categorisation of types of constraint. Specifically, we break down financial constraints by firms who applied and were denied finance for a bank-based reason (credit rationing) and firms that were discouraged from applying due to banking-sector factors (discouraged borrowers). We also break down credit rationing by the type of loan application made, focusing on applications for working capital and capacity expansion. This granular review of constraints facilitates a targeted link to specific determinants and direct identification of the economic impacts. Our data also allow a detailed analysis by industrial sector. Building on the work

¹ See O'Connell, O'Toole and Žnudel (2013) for a review of the scale of the decline in household consumption in Ireland since the financial crisis. Casey and O'Toole (2013) also show that the firms in the Eurozone perceive finding customers as the main challenge to their operations. We confirm this finding for Ireland and the data is presented in Section 3.

² For a complete review of the policy measures undertaken to date, please see Action Plan for Jobs 2013 available at <http://www.djei.ie/publications/2013APJ.pdf>.

³ This survey was completed for the Department by Mazars for the periods April-September 2011 and October 2011 to March 2012 and by RedC for the periods April to September 2012 and October to March 2013.

of Holton et al. (2012), we test the impact of debt overhang on access to credit at the firm-level. For the first time, in an Irish context, we also explore the effect of relationship banking on access to credit.

Our final main contribution is to link SME credit constraints to the macro-economy. Access to external finance should affect firm decisions on capital investment activity, employment, productivity, innovation and international trade. Focusing on employment and investment, we fill a gap in the current research by directly identifying the link between SME credit constraints and the wider macro-economic developments in Ireland.

A number of findings emerge. On the determinants of SME credit constraints, we find that micro-sized enterprises are more likely to be constrained and that, in general, constraints decrease with firm size. To provide a sectoral review, we compare the degree of constraints in manufacturing to agriculture, construction & real estate, professional services, hotels, and wholesale & retail. Overall, we find that firms in construction & real estate and hotels are more likely to be constrained than those in manufacturing. This is not surprising given the large exposure banks had built up to this sector during the boom years..

In relation to the length of the banking relationship, we find that firms with a shorter banking relationship are more likely to be credit constrained. This corresponds to findings in the existing literature on relationship banking, which suggest that longer bank-borrower relationships should improve access to finance. We also test whether firm debt overhang is restricting access to credit and find that higher outstanding debt levels make a firm more likely to be credit constrained. This finding supports the work of Holton el al (2012). Finally, we test whether foreign bank ownership is affecting credit access and find the firms applying to majority foreign-owned banks are more likely to be credit rationed.

On the link between the macro-economy and SME credit constraints, we find strong evidence that constraints have a negative effect on employment. This finding is strongest for discouraged borrowers and is robust to both methodological and data concerns.

In relation to the effect of SME credit constraints on investment, there does not seem to be a significant link in our data. This result does not match our priors, but is robust to alternative specifications of the model. One possible explanation is that at the time of data collection, firms were very much in survival mode, and the majority of credit applications were for working capital purposes. In the context of a recovery, SMEs will inevitably require additional expansion capital and whether the system has the capacity to respond to increased demand and whether additional credit constraints will start binding is uncertain.

The rest of this paper is outlined as follows: Section 2 provides background context and reviews the relevant literature. Section 3 outlines the data and our methodological approach. Section 4 presents the results of the empirical analysis and Section 5 concludes.

2. Background and related literature

Since the financial crisis in Ireland, a number of research papers have emerged which study various aspects of the credit market for SMEs. Lawless & McCann (2011) consider the issue of SME credit supply and demand in Ireland drawing on two data sources, the CSO/Eurostat Access to Finance Survey and the ECB Survey on Access to Finance for SMEs (SAFE). Their methodology uses t-tests and propensity score matching to evaluate firms that were successful or unsuccessful in obtaining credit. They state that while credit applications have declined moderately, there has been a very large increase in rejection rates from under 2% in 2007 to 24% in 2010. Comparing rejected and accepted firms using production data, they also find no evidence that accepted firms were grouped by firm performance. Evaluating the ECB data, they note Irish firms were much more likely than firms in other countries to be rejected credit but no less likely to reduce credit demand.

Holton and McCann (2012) revisit the SME credit market in Ireland, considering both supply and demand indicators. They draw on both the ECB SAFE survey and the Department of Finance survey of the Irish credit market. Their research indicates that credit demand in Ireland lies close to the European average, that there is a high degree of borrower discouragement in Ireland, that rejection rates are high in Ireland relative to European averages and that changes in terms and conditions are least favourable in Ireland. While this study does not provide clear econometric evidence, it does provide an international context for evaluating the dynamics in the Irish credit market.

In a wider European context, a number of additional papers are close to our work. Holton, Lawless and McCann (2012) use firm-level data from the SAFE survey to simultaneously test the effect of developments in the real economy, bank balance sheets and borrower balance sheets on access to bank finance across the Eurozone. They identify three country-level aspects of the crisis: a weak real economy, reduced credit supply by financial institutions and debt overhang on corporate balance sheets. They link each of these factors, as well as various firm characteristics, to the following indicators of current credit market conditions: loan rejection, perceived availability, loan demand, the cost of credit, and loan conditionality. They find that larger and older firms face the lowest risk of having loans rejected, while firms with deteriorating business performance are more likely to perceive deteriorating credit availability. In relation to the country factors, they find that the level of private sector indebtedness negatively affects all aspects of SME credit, as does a challenging financial environment. A weakening in the real economy is only associated with reductions in credit demand.

Holton and O'Brien (2011) review the external financing conditions of both large corporate and SMEs in Ireland, the UK, US and Eurozone since the onset of the global financial crisis. Using aggregate data on the cost and volume of outstanding finance, they find that bank lending was adversely affected across all regions. They also find that large non-financial corporations have, to some extent, been able to substitute out of bank lending and into other market financing sources. They state that, while supply constraints are evident, low aggregate demand is also a factor affecting SME credit volumes.

While the issue of SME credit access and its impact on firms is a long standing research focus in the

international literature⁴, a number of papers have emerged since the crisis that focus specifically on determining how financing and credit access have changed, what are the determinants of credit constraints, and how has bank credit availability impacted economic activity. Popov and Udell (2012) test the sensitivity of credit supply to bank balance sheet conditions and assess the impact on borrowers of bank funding distress. Using data from the European Bank for Reconstruction and Development's Business Environment and Enterprise Performance Survey (BEEPS) for Eastern Europe, they find that firms' face much more difficulty accessing credit if their bank has funding challenges of its own. During the crisis, firms were more constrained if they were dealing with banks that experienced a decline in equity and tier 1 capital or suffered considerable losses. The effect on firms is also greater for riskier firms and firms with fewer tangible assets.

Clarke, Cull and Kisunko (2012) also draw on the BEEPS data to test the degree of financial constraints facing firms following the crisis, and how access to finance has impacted firm survival. They find a general easing in financing constraints between 2002 and 2005 with a noticeable tightening between 2005 and 2008. During the crisis, they find that the severity of the changes in financial constraints was more pronounced for large firms. It also seems that firms were more likely to survive the crisis if they had access to external finance. Ferrando and Griesshaber (2011) use data from the ECB SAFE to test the firm-level determinants of financing obstacles. They find that age and ownership are significant determinants of firms' perceived financing obstacles with mixed evidence for size and economic sector. Artola and Genre (2011) estimate whether sectoral or national characteristics drove perceived and experienced financial constraints. They find the perceptions of a credit crunch were broadly based across all types of SMEs, but that firms that actually experienced a constraint were more likely to be small and young firms. Lucey et al. (2012) examine the decision on whether or not to apply for intermediated debt over the period 2009-2012. It appears that firm age, size and existing debt matter, as do bank and liquidity conditions. They also indicate a role for cultural characteristics.

On the impact of financing constraints on the economy, there have also been a number of recent papers focusing on the current financial crisis.⁵ Kashyap and Zingales (2010) note that the financial crisis has refocused the debate on how firms finance their activities. Campello, Graham, and Harvey (2010) use survey data from 1,050 Chief Financial Officers in the U.S., Europe, and Asia to directly assess the effect of credit constraints during the financial crisis. They find that constrained firms planned deeper cuts in tech spending, employment and capital spending while also burning more quickly through cash stocks. Moreover, they find that an inability to borrow caused US firms to bypass attractive investment opportunities.

Duchin, Ozbas and Sensoy (2010) study the effect of the recent financial crisis on corporate investment and find that investment declines significantly, even controlling for firm-level characteristics and time-varying shocks. The decline is greatest for firms that have low cash reserves or high net short-term debt, are financially constrained or operate in industries that are very

⁴ See Chirinko (1993) and Hubbard (1998) for a review of the early literature and Guariglia (2008) and Beck (2006, 2008a,b) for a more recent review of where the debate currently stands.

⁵ Our work is also related to the broader literature on investment activity during financial crises. Kalemli-Ozcan et al. (2011) test the real effects of credit supply shocks using firm-level data from Latin America between 1990 and 2005 and find that the key factor hindering investment during financial crises is the decline in credit supply.

dependent on external financing. In an Irish context, O'Toole, Newman and Hennessy (2013) test the effect of financial constraints on investment in agriculture since the crisis and find that constraints were much higher in 2007, 2008 and 2009 relative to pre-crisis levels.

To our knowledge, there have been no studies evaluating the impact of credit constraints on firms' employment decisions in Ireland. Given that unemployment is a crucial worry in the current crisis, filling this gap in the analysis is desirable.

3 Data and methodological approach

3.1 Data

Measuring credit constraints

A widely debated issue in the international literature relates to the correct identification strategy for estimating firm credit constraints.⁶ Fundamental to the definition of being "credit constrained" is that the firm who requires credit must have either 1) a profitable investment opportunity that has a positive net present value at the current market cost of capital or 2) have a profitable ongoing operation which requires normal credit facilities. The credit supply constraint must therefore arise due to imperfections in capital markets which distort the proper allocation of credit and its transmission to firms as opposed to being determined by borrower-related factors.

In this paper, to test the determinants, and effects, of SME credit constraints in Ireland, we use data from the "SME Credit Demand Survey" completed by RedC for the Department of Finance (RedC, 2013). This survey provides a snapshot of the SME credit market, focusing on both aspects of credit supply and demand, for the six months from October 2012 to March 2013. The survey captures a representative sample of SMEs in the Irish economy and is stratified by size and economic sector.⁷ A cross-section of approximately 1,500 firms is collected (no panel element is available). The coverage includes firms in primary agriculture, industry and construction, and market and non-market services. Importantly from our perspective, it provides detailed information on firms' decisions about whether or not to apply for credit, and if they applied, information on their success in obtaining credit. Data are collated on the financial institution from which the SME sought financing and on the length of the relationship with their current finance provider. The survey also captures a range of information on firm size, age, trading status, profitability, employment activity and sector of activity.

To identify constraints, we follow O'Toole, Gerlach-Kristen and O'Connell (2013), and use two main categories of firms as follows:

Credit rationed: Firms that applied for finance but were refused or received less than 70 per cent of the amount sought and the refusal was for a bank-based reason; and

⁶ Casey and O'Toole (2013) and O'Toole (2012) provide an overview of the various approaches which have been used in the literature.

⁷ For more information on the sampling process or survey design please see Mazars (2012) or RedC (2012).

Discouraged Borrowers: Firms that did not apply for finance due to a bank-based reason.

The constraints are detailed in table 1 and are binary indicators taking the value of 1 if the firm is constrained and 0 otherwise. Before proceeding, it is important to be clear on what we define as credit rationing, and what we do not. Cases when a firm is granted a loan at a high interest rate but decides not to take up this offer do in our view not reflect credit rationing. Interest rates are high because the project is risky or the collateral is of low value, but the bank would supply funds at a risk-adjusted rate. As such, in defining credit rationing we therefore follow Bigsten et al. (2003), Byiers et al. (2010), O'Toole (2012) and Casey and O'Toole (2013). This departs from Popov and Udell (2012) and Holton et al. (2012), who count these firms as credit constrained.

We count as credit rationing cases where a loan application was rejected for a bank-related reason. For instance, if the bank decides to change its lending policies and not to provide loans to certain sectors anymore, a case of rationing exists. Rationing also captures cases in which the bank only grants a fraction of the requested loan. If the bank thinks an application is worthwhile, it should grant the requested loan in full, possibly at a higher interest rate. Not granting the full amount requested means the bank is rationing. Similarly, we count loan rejections on the grounds of poor collateral as credit rationing, because in normal circumstances the bank simply should charge a higher interest rate.⁸

There are three caveats to our categorisation. First, banks may in fact intend to ration credit to firms for whose loan applications they offer a very high interest rate. If really high interest rates are rationing in disguise, we underestimate the prevalence of credit rationing. Second, banks may cite firm-related reasons in a rejection letter when in fact the decision not to grant a loan was due to the sector a firm is in. Again, this would lead us to underestimate credit rationing. Third, and conversely, banks may quote bank-related reasons, such as a changed sectoral lending policy, when in fact the rejection was related to firm characteristics. In that case, we would overestimate the prevalence of credit rationing.

As firms use different bank-finance products for short-term operational activities and longer-term investment financing, and due to the fact that credit for ongoing operations and credit for new capital investments have different impacts on the overall economy, we create two further indicators of constraints which are subgroups of credit-rationed firms: a) firms that were *credit rationed for working capital* loans and b) firms that were *credit rationed for expansion/capacity building*. We have grouped firms into the working capital category if they stated one of the following reasons for applying: working capital/cash flow, decline in business revenues, slow down in debtor collection, and increasing bad debts. We have grouped firms into the expansion/capacity building category if they provided one of the following reasons for applying: new business venture, expansion, acquisition of assets and purchase, replacement, or lease new vehicle and/or equipment.

The final group of constrained firms we focus on are those who did not apply for finance due to a bank-based factor. These "*discouraged borrowers*" are constrained in that they are potential bank-finance applicants who are deterred due to their views on banks' lending activity. The bank-based

⁸ If we do not count poor collateral and partial loans as credit rationing, the main results in terms of employment and investment carry through in all cases..

factors we use as criteria in this definition are also presented in Table 1. Adding firms who were denied finance and those who did not seek bank finance gives an estimate of the *overall* level of *SME credit constraints* in the economy.

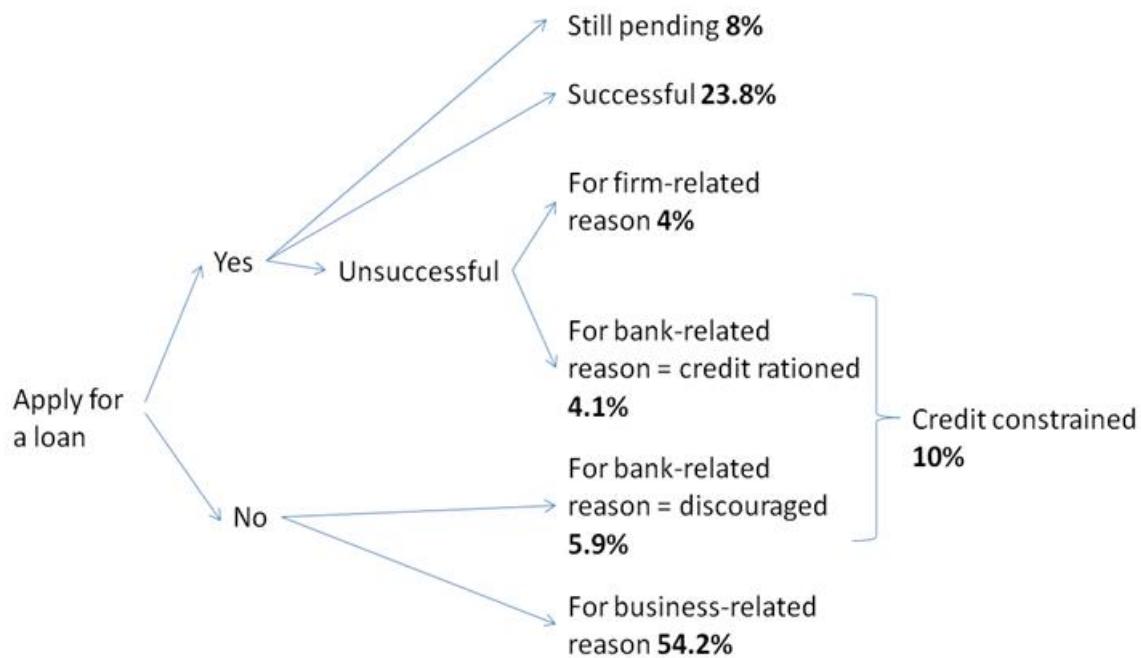
Table 1: Overview of SME credit constraint definitions

Constraint	Definition
Credit rationed	Constrained if applied for bank finance, were refused finance or received less than 70 per cent of the amount sought and refusal was a bank-based reason, i.e. - Change in bank's lending policy; - No longer a sector/business the banks lends too; - Granted a lower level than requested; or - Lack of collateral
Credit rationed for expansion	As per above but application was for an expansion loan
Credit rationed for working capital	As per above but application was for working capital finance
Discouraged borrowers (did not seek bank finance)	Did not apply due to a bank-based reason i.e. : - No trust in banks; - Believe banks not lending; or - Turned down before /possible rejection/procedure too difficult
Overall credit constraint	Credit rationed + Discouraged Borrowers

Note: All variables are binary indicators taking the value of one if the firm is constrained by that definition and 0 otherwise.

Figure 1 gives a breakdown of the various credit constraints affecting firms in the latest Department of Finance/ RedC survey. The figure also illustrates the percentage of firms who were successful in their applications for finance and the percentage of firms who did not apply for finance for non-bank-based reasons.

Figure 1: Breakdown of application rates, success rates and constraints.

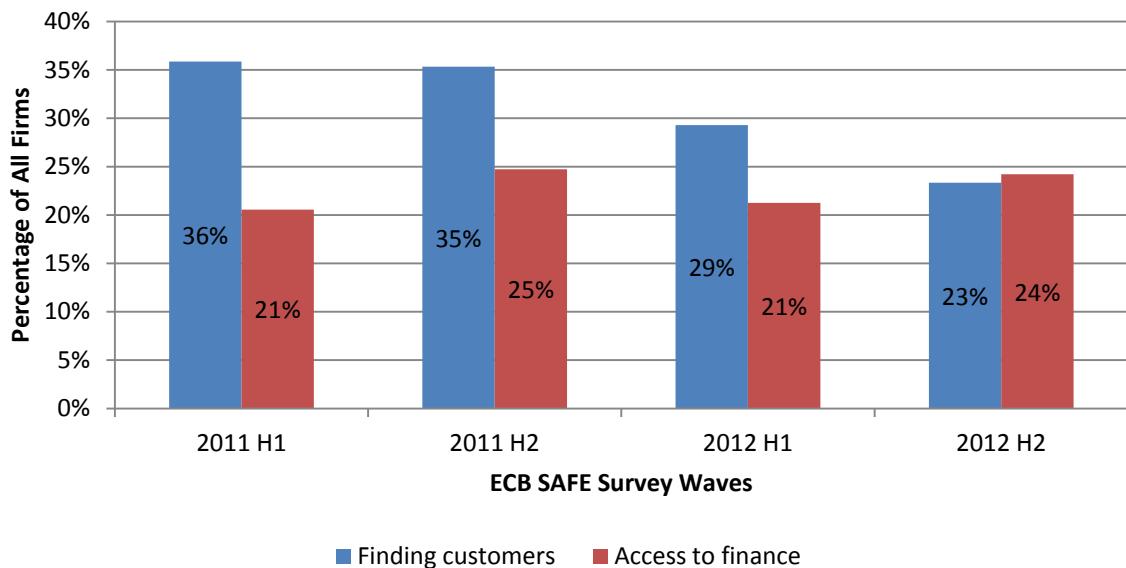


Source: Authors' calculations using RedC data from the October 2012-March 2013 survey

Figure 2 attempts to put the issue of credit constraints for Irish SMEs into context with other challenges facing the sector. Using data from the four most recent waves of the ECB SAFE survey we can see that access to finance ranks as second to finding customers for all waves barring the most recent in issues concerning Irish SMEs. This suggests that depressed levels of aggregate demand in the economy have been the main constraint on SME activity and growth during the crisis.

This is unsurprising given the unprecedented collapse in consumption expenditure in Ireland since the onset of the financial crisis (see O'Connell, O'Toole & Žnuderl (2013)). Nevertheless, especially given the equalisation in levels of concern in the most recent survey wave, credit constraints still represent a major issue and are an issue worthy of further study and policy response.

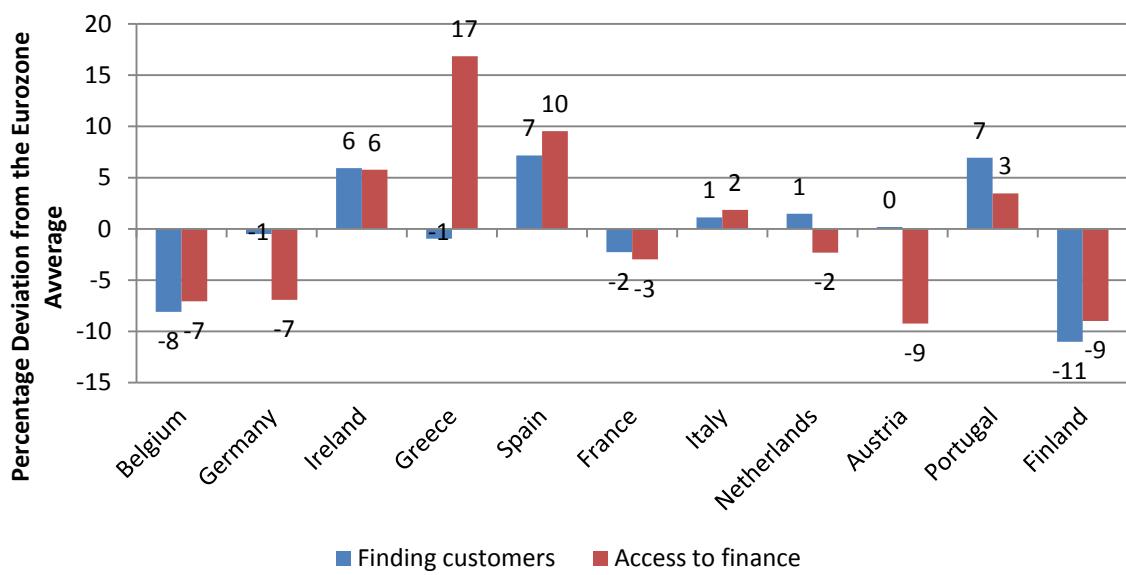
Figure 2: Main issues facing Irish SMEs



Source: ECB SAFE Survey, October-March 2013

Figure 3 puts the concerns of Irish SMEs in a broader Eurozone context. This figure illustrates the difference in average concerns of SMEs in several Eurozone countries from the overall average of the countries surveyed in SAFE since 2011. We can observe that Irish SMEs concerns about both finding customers and access to finance have been significantly greater than the average since 2011.

Figure 3: Main issues facing SMEs – Country-by-country deviation from ECB SAFE average since 2011

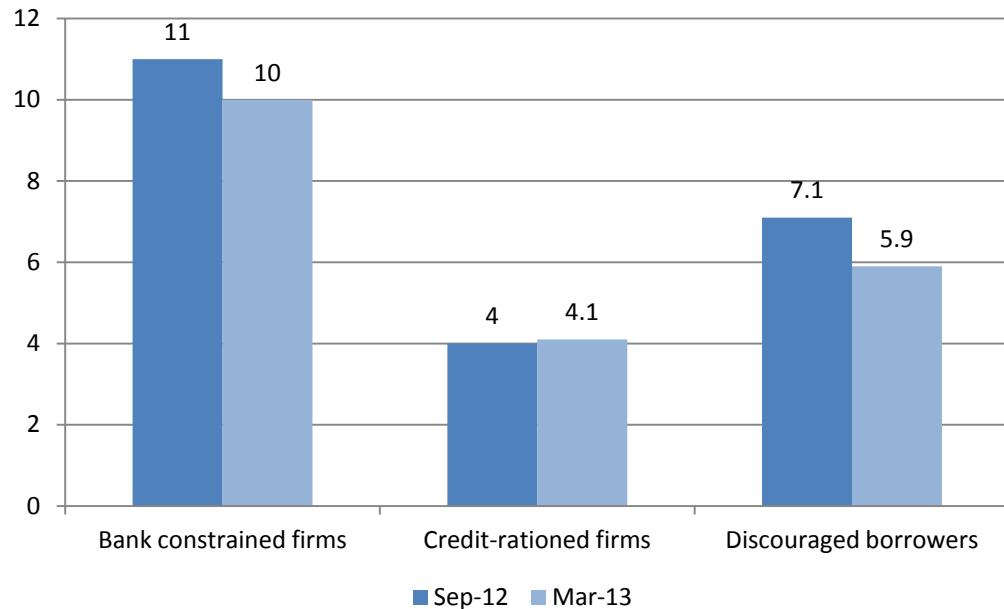


Source: ECB SAFE Survey, October-March 2013

Figure 4 displays the proportion of our sample firms which we classify as credit constrained across the latest two survey waves. The graph also demonstrates, of these credit-constrained firms, what proportion are credit rationed and what proportion constitute discouraged borrowers. We can observe that over the two waves considered the proportion of credit-rationed firms has remained

reasonably flat, while there appear to have been fewer discouraged borrowers.

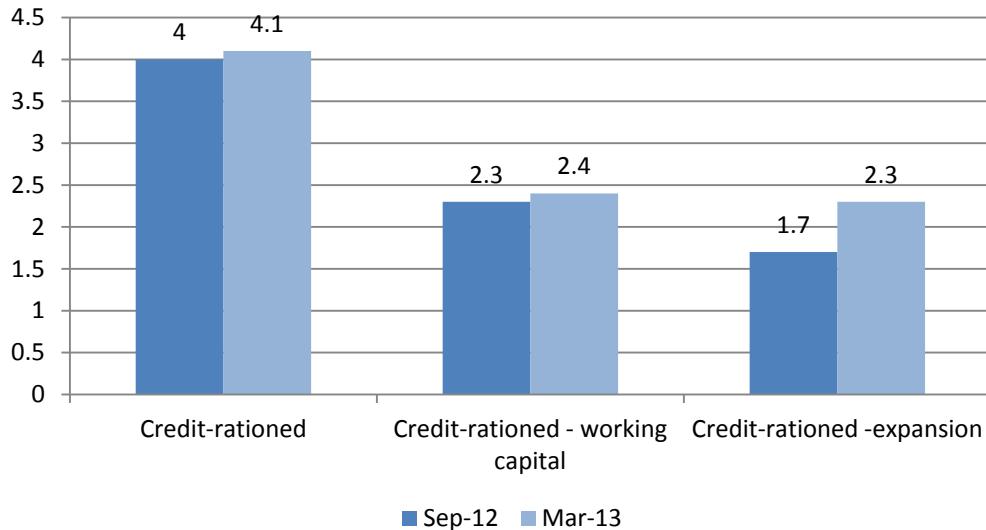
Figure 4: Overview of credit-constrained firms in the Irish economy



Source: Authors' calculations using RedC data. Sept-12 denotes the April-September 2012 survey, Mar-13 the October 2012-March 2013 survey.

Figure 5 illustrates the breakdown of credit rationing by loan application type across the two most recent survey waves. We break down the loans applications into loans for business expansion and loans to fund working capital needs. Across both waves we see that those firms applying for credit for expansion purposes appear to be less credit rationed than those applying for working capital purposes, although the difference is marginal in the most recent wave. The totals of the applications for expansion and the applications for working capital reasons do not sum to the total credit-rationed borrowers due to a proportion of firms applying for both reasons.

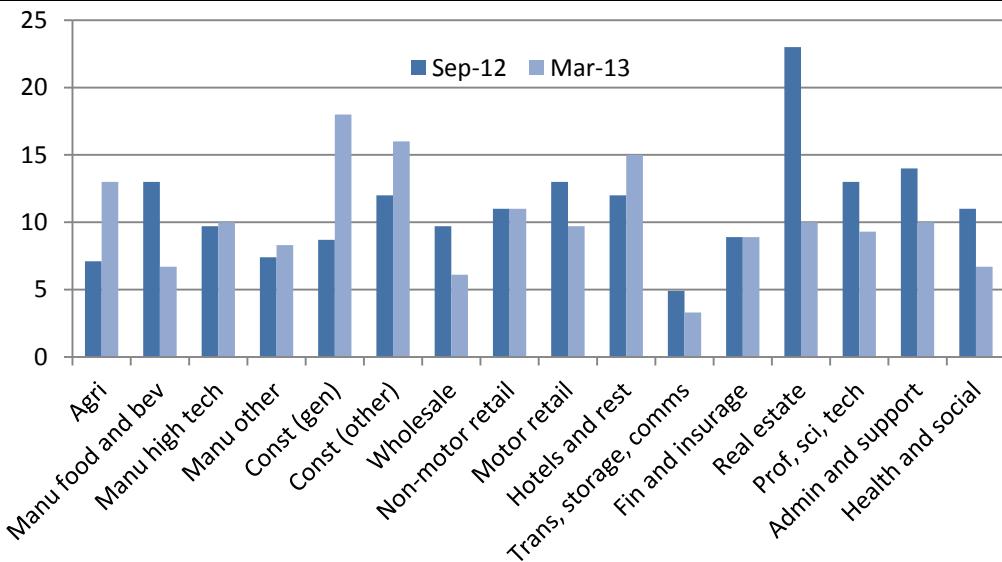
Figure 5: Credit-rationed firms by type of loan application



Source: Authors' calculations using RedC data. Sept-12 denotes the April-September 2012 survey, Mar-13 the October 2012-March 2013 survey.

Figure 6 and 7 provide a breakdown of credit constraints by firm characteristics. Figure 6 provides the information by the sector of the economy in which firms operate. We see that, as would be expected given the aftermath of the construction boom, credit constraints in the real-estate sector dwarf constraints in all other sectors while high-tech manufacturing constitutes the least constrained business sector. Other highly constrained sectors are hotels and construction (general).

Figure 6: Credit-constrained firms by sector



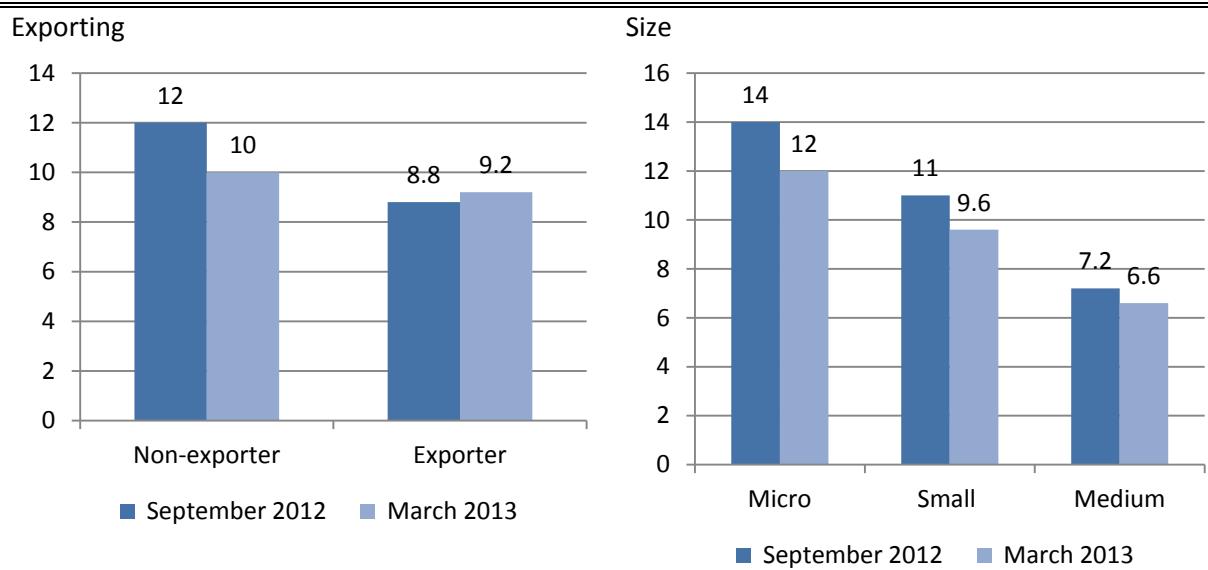
Source: Authors' calculations using RedC/Mazars data. Sept-12 denotes the April-September 2012 survey, Mar-13 the October 2012-March 2013 survey.

Figure 7 presents a breakdown by export activity and firm size. The left-hand side examines the

difference in the incidences of bank lending constraints amongst exporting and non-exporting SMEs between the two most recent survey waves. For both survey waves it appears that exporting firms are less likely to be credit constrained, although the gap between exporters and non-exporters has narrowed considerably in the most recent wave. Given the depressed state of domestic consumption it is perhaps no surprise that it is those firms with access to foreign markets that appear a superior credit risk for banks. Exporting firms may also be generally more successful and have access to capital from foreign sources which may loosen their credit constraints relative to non-exporting firms.

The right-hand panel examines and confirms the expected relationship between SME size and credit constraints. Across both of the most recent survey waves, micro-sized SMEs are the most likely to be credit constrained. Small enterprises are the next most likely to be constrained while those classed as medium sized are the least likely form of SME to be credit constrained.

Figure 7: Credit-constrained firms by export activity and size

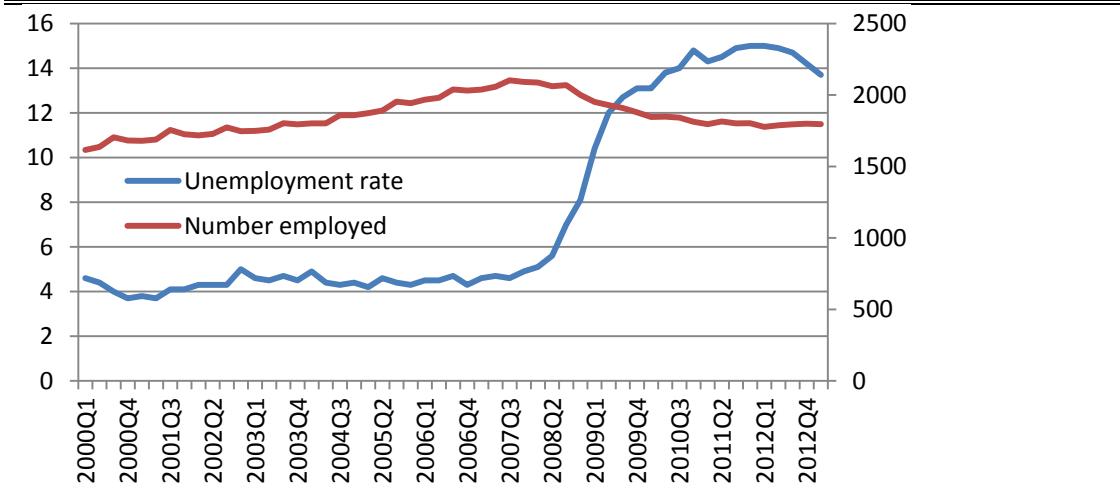


Source: Authors' calculations using RedC . Sept-12 denotes the April-September 2012 survey, Mar-13 the October 2012-March 2013 survey.

Summary statistics for employment

A well documented feature of the current economic crises in Ireland has been the considerable increase in the unemployment rate since 2008. Figure 8 presents the unemployment rate and the level of employment in Ireland over the period Q1 2000-Q3 2013. The rate of unemployment increased from 4.9 percent at the end of 2007 to a peak of 15 percent in early 2010. It has slipped back marginally to 13.7 percent in Q1 2013. While the recent decreases in the unemployment rate are positive, much has been driven by increased emigration and very little inroads have been made into the worryingly high level of long-term unemployment (FitzGerald et al., 2013).

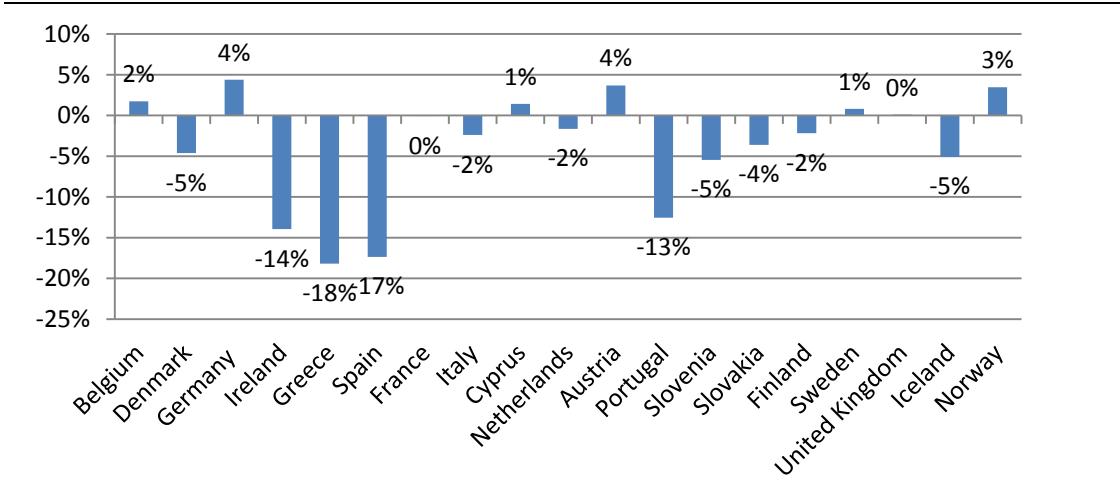
Figure 8: Quarterly trends in employment and unemployment rate – Ireland – 2000-2012



Source: Eurostat data

The scale of the employment destruction in Ireland since the onset of the financial crisis is better positioned in a comparative context. Figure 9: presents the percentage change in employment for selected European countries between Q4 2007 and Q4 2012. Employment has decreased by 14% in Ireland over the period, the third largest drop of the countries considered behind Greece at 18% and Spain at 17%.

Figure 9: Percentage change in employment Q4 2007-Q4 2012 for selected European countries



Source: Authors' calculations using Eurostat data

Our interest lies in the employment contribution of SMEs and in particular how this is affected by access to finance. Given the importance of SMEs for job creation, any sustained recovery in their operating environment should provide an important employment boost. To supplement the macroeconomic data, we consider a number of employment indicators drawn from the Department of Finance survey conducted by Mazars and RedC. These provide important insight into the heterogeneity of employment developments across firms within the economy and we draw on this

data in our econometric analysis.

We first consider in Table 2 whether firms increased, decreased or maintained employment levels for each wave of the survey. Overall, there are a higher proportion of firms reducing employment than increasing it. However, the trend, until the latest survey wave, indicated a greater number of firms increasing employment while the proportion of firms decreasing employment shrunk. The latest survey wave bucks this trend in that the number of firms increasing employment appears to have fallen but, encouragingly, the number of firms decreasing employment also appears to be smaller.

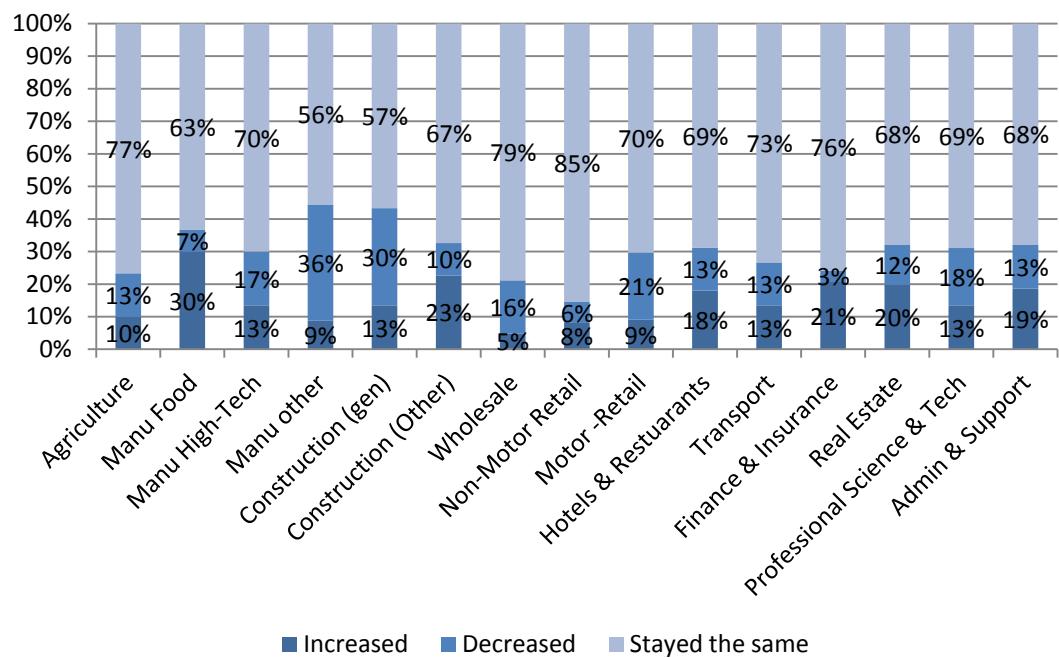
Table 2: Share of firms increasing, decreasing and maintaining employment levels – percentage of total

	Apr 2011- Sept 2011	Oct 2011- Mar 2012	Apr 2011- Sept 2012	Oct 2012- Mar 2013
Increased	15%	16%	17%	14%
Decreased	25%	21%	18%	16%
Remained the same	60%	64%	65%	70%

Source: Authors' calculations using RedC/Mazars data

Figure 10 gives a breakdown of employment changes by firm sector. Food manufacturing shows the highest proportion of firms increasing employment while wholesale and non-motor retail show the lowest levels of employment growth. The sectors with the largest proportion of firms decreasing employment are general construction and “other” forms of manufacturing.

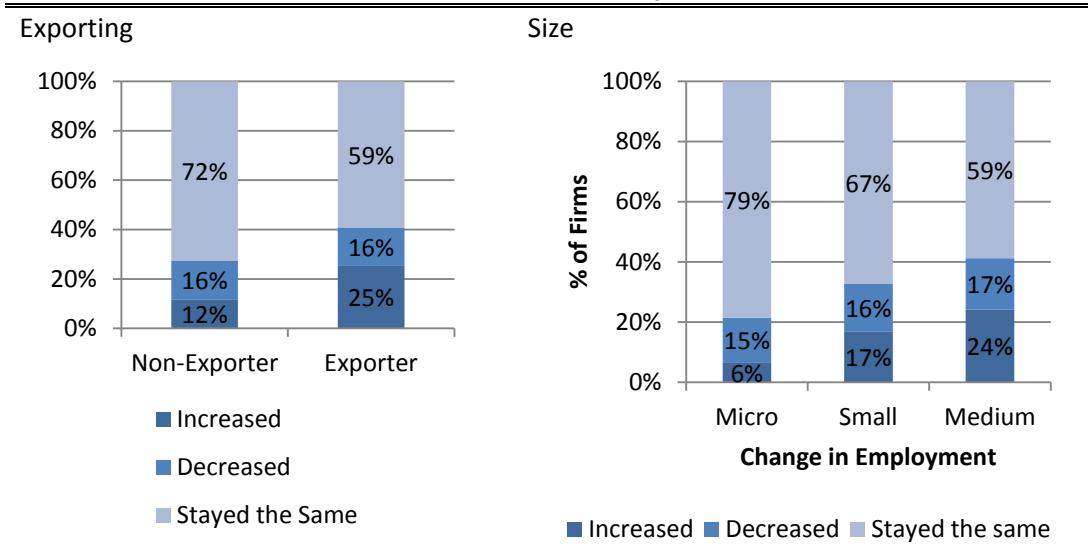
Figure 10: Employment changes by firm sector – October 2012 - March 2013 survey



Source: Authors' calculations using RedC data

The left panel of Figure 11 demonstrates the contrasting employment trends of exporting and non-exporting firms. Exporters have both a higher proportion of firms increasing employment and a lower proportion decreasing employment. The right panel provides an illustration of the changes of employment in SMEs according to firm size for the latest survey wave (October 2012 to March 2013). Micro firms have been increasing employment the least while medium-sized firms have been the primary source of employment growth in the SME sector. The statistics for small firms indicate slightly more firms are increasing employment than decreasing.

Figure 11: Employment changes by exporting activity and firm size – October 2012 - March 2013 survey

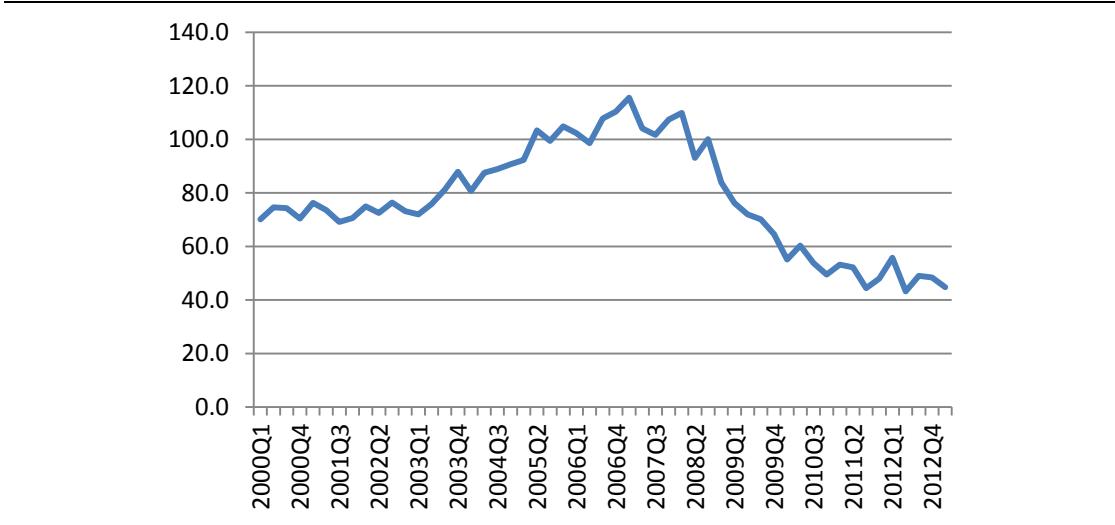


Source: Authors' calculations using RedC data

Summary statistics for investment

During the period prior to the financial crisis, Ireland experienced very considerable growth in investment. Figure 12 presents the quarterly trend in gross fixed capital formation over the period 2000-2012. The acceleration of growth in domestic construction and housing led to heightened and unsustainable levels of investment between 2002 and 2007. Following the onset of the crisis the level of investment has dropped considerably.

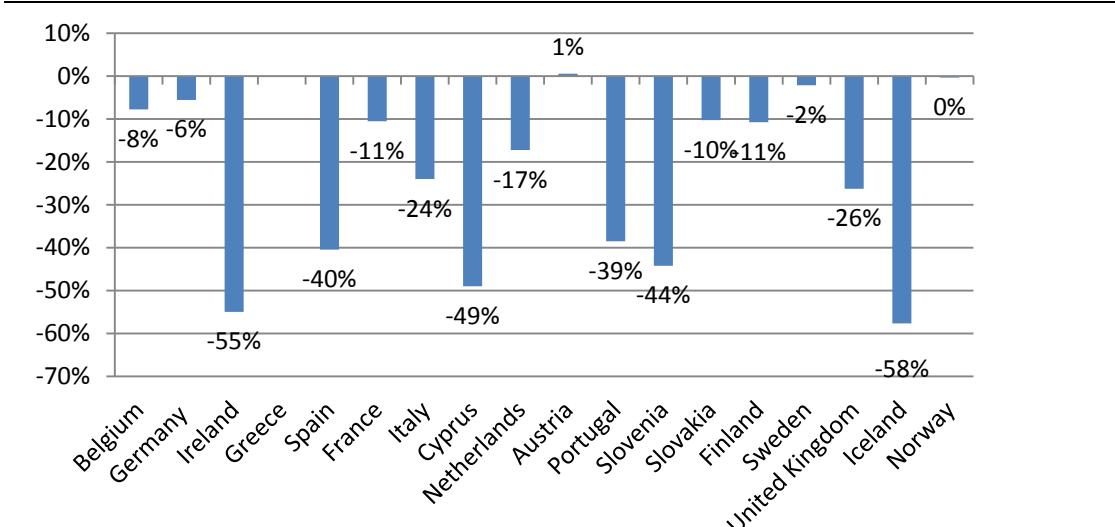
Figure 12: Quarterly gross fixed capital formation – Ireland in Q1 2000-Q4 2012 - volume index (2005 = 100)



Source: Eurostat

The scale of the decrease in investment in Ireland is considerable also in a cross-country context. Figure 13 below presents the percentage change in gross fixed capital formation between 2007 and 2012. The fall in Ireland, at 55 percent, is the second largest behind only Iceland at 58 percent, a country which suffered a similar credit and housing boom and bust. Large falls in investment were also recorded in Cyprus (49 percent), Slovenia (44 percent), Spain (40 percent) and Portugal (39 percent).

Figure 13: Quarterly gross fixed capital formation – percentage change 2007 Q1-2012 Q1 in selected European economies

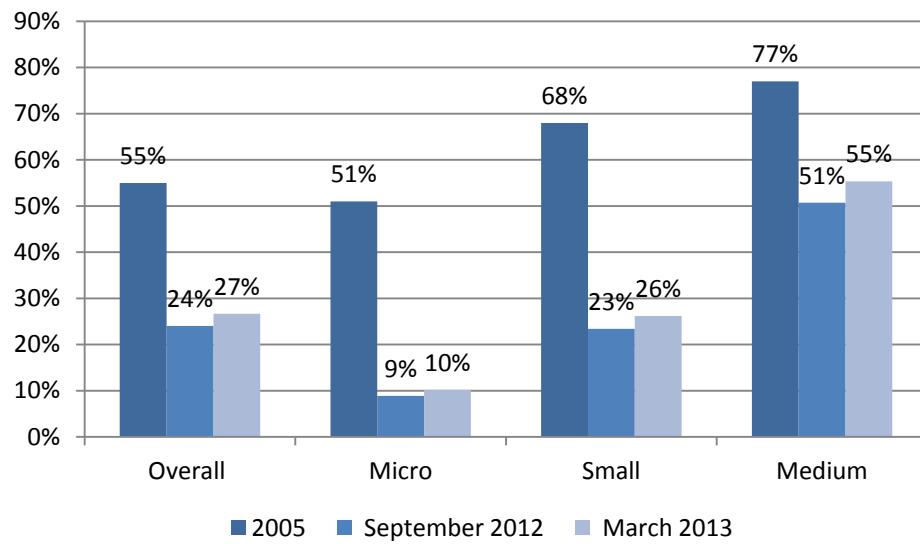


Source: Eurostat

While the aggregate charts document the investment cycle for the wider economy, it is important to

consider the within-economy variation in investment changes. In particular, we are interested in considering how investment has changed for SMEs both across firms and across time. Figure 14 compares the proportions of firms engaging in investment by firm size in the year 2005 and for the periods April to September 2012 and October to March 2013. The 2005 data come from the European Bank for Reconstruction and Development's Business Environment and Enterprise Performance Survey (BEEPS). As you would expect given the contrasting macroeconomic performance of the Irish economy in the two periods, investment is significantly lower across all firm sizes in 2012 and 2013. The trend across both periods is similar in that medium-sized firms invest the most while micro firms invest the least. The gap between levels of investment by small firms and medium firms is however much larger in the 2012 sample than was the case in the 2005 sample. Additionally, the number of micro-sized firms investing has fallen much more steeply than the number of small- and medium-sized firms.

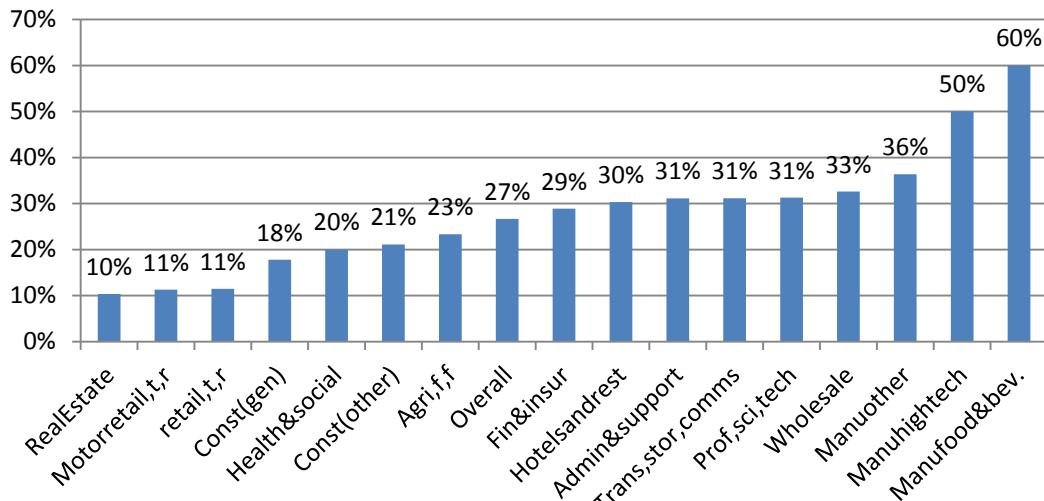
Figure 14: Share of firms Investing – pre and post-crisis



Source: Authors' calculations using RedC data and EBRD BEEPS survey data

Figures 15 and 16 present the data by firm characteristics. Figure 15 provides a breakdown of investment by the sample firms according to the sector of the economy in which they operate. The manufacturing sector (high tech, food and beverages and other) in general has the highest proportion of investing firms. The real-estate and retail sectors display the lowest proportion of firms undertaking investment. Given the reliance on real-estate and retail sectors on domestic demand, it is unsurprising that these sectors are reluctant to commit investment capital in this environment. The traded nature of manufacturing sectors provides additional sales opportunities through export markets. However, it is also the case that fixed capital investment goods are used differently in the production of manufacturing and service outputs. Therefore, we would expect some structural differences in fixed-asset demand that is not due to customer demand effects.

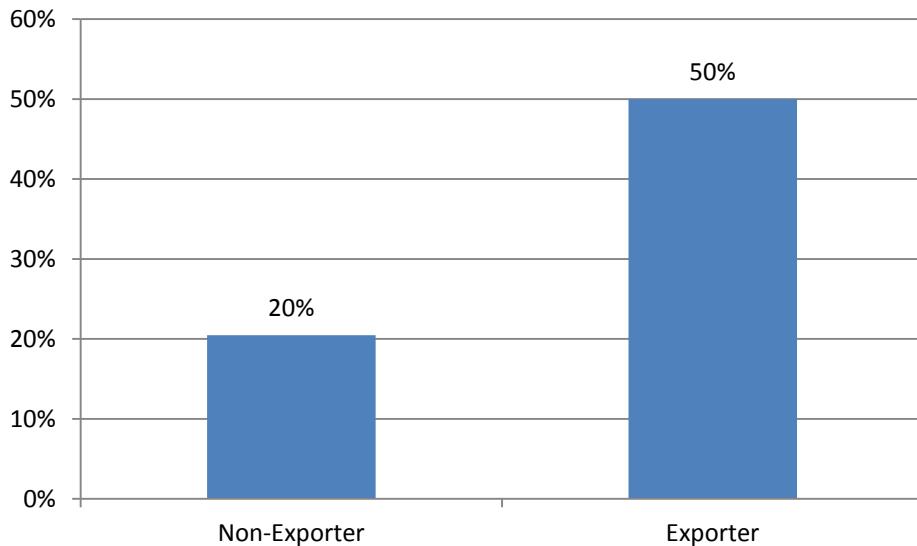
Figure 15: Breakdown of investment by sector – October 2012 - March 2013 survey



Source: Authors' calculations using RedC data

Figure 16 illustrates in the left panel the greater proportion of exporting firms which have engaged in investment in the previous six months as compared to non-exporting firms. Given the contraction in the domestic Irish economy this is to be anticipated and, given the hopes of an export-led return to growth, encouraging.

Figure 16: Investment by exporting activity – October 2012-March 2013 survey



Source: Authors' calculations using RedC data

3.2 Methodological approach

Our methodological framework is split into two main parts. First we present our methodology for estimating the determinants of credit constraints and second we present our econometric framework to link constraints to employment and investment. For our empirical estimates, we exclude firms in financial intermediation, health and social/non-profit activities and public

administration, as is standard in the literature. Many of the latter groups are not profit maximising firms thus their behaviour, in terms of standard economic rationale, is difficult to evaluate.

Determinants of constraints

Our first objective in this paper is to estimate the determinants of credit constraints in Ireland. Drawing on the existing literature, we focus on two categories of determinant: general firm characteristics and firm-bank financial factors.

As our dependent variables on constraints are binary, and our data are cross-sectional, we use a simple probit model to estimate the factors impacting constraints. Our probability model is presented as follows:

$$\Pr(CC_i = 1) = \Phi(\alpha + \beta X_i + \varepsilon_i)$$

where the dependent variables are each of the credit constraint indicators outlined in Table 1 and Φ is the standard normal cumulative distribution function. General firm-level characteristics and the firm-bank characteristics are contained in the vector X_i . In selecting these factors, we draw on existing research which suggests common indicators such as firm size, age and profitability (Ferrando & Greisshaber, 2012; Beck et al., 2006; 2008a; 2008b; Holton et al., 2012; Casey and O'Toole, 2013; Canton et al., 2012). We therefore include the following controls: continuous variables for firm age in years, size (by number of employees), by what amount the firm's turnover has increased or decreased in the previous six months and a binary variable for whether or not the firm posted a profit in the previous six months. These factors help capture the productive capacity of the firm, the scale of its operation, its risk profile and the profitability of its operations and investment opportunities. Such controls also strip out much of the firm-level heterogeneity which we are unable to explicitly deal with due to the cross-sectional nature of the data.

In relation to firm-bank financial factors, we build on existing research by focusing on two main issues: firm debt overhang and the length of the relationship between lender and borrower. The effects of debt overhang on firm performance and credit access is well established in the literature (Bernanke and Gertler, 1989; Moyen, 2007; Hennessy, 2004; Hennessy, Levy, and Whited, 2006) and is particularly interesting in the Irish context, due to the considerable property related debts that SMEs built up in the boom period (2002-2007). Higher levels of outstanding debt can pose a direct challenge to firms in terms of the direct interest cost and an indirect challenge in terms of accessing fresh capital. To capture this effect, we include a variable for the value of the firm's outstanding debt at the beginning of the six month period covered by the survey.⁹

The second firm-bank financial factor that we consider is the relationship between lender and borrower. Internationally, there is evidence that long standing borrower-lender relationships, by reducing information asymmetries, can improve the terms and conditions on lending as well as facilitate greater and more secure lines of credit (Berger and Udell, 1995). These better information efficiencies should improve the transmission of credit and better position firms to undertake investment and expansion opportunities (DeYoung, Hunter and Udell, 2002). To test lending

⁹ In our sample, we do not observe debt that a specific entrepreneur may have accumulated at a household level using the SME as collateral.

relationship effects, we include controls for the age of the relationship between the firm and the bank to which they have applied for credit. Our variable for the length of a firm's banking relationship is continuous and measured in years. If relationship lending is beneficial to firms, we would expect that the longer the relationship, the lower the probability of being financially constrained. Thus we would expect a negative and significant coefficient on this variable.

We include controls for bank ownership in an attempt to control for two effects. First, the international literature suggests a role for foreign-owned banks in improving financial intermediation and access to credit (Clarke et al., 2006). In general it finds that foreign participation in the banking sector improves credit access for firms. Secondly, given the differential effects of the financial crisis on banks and the very different responses of the financial institutions and their commitment to Irish lending, there is reason to believe that there may be differences in credit allocation by bank in Ireland.

We include as further controls variables relating to the firm's awareness of the Credit Review Office and the Code of Conduct for Business Lending to SMEs. As these policy measures are aimed at increasing SME lending and encouraging loan applications, if they are effective we would anticipate a negative coefficient when examining discouraged borrowers. We also include a binary variable examining the firm's perceptions of the lending environment due to sources of information external to the firm such as media reports and trade associations. If the firm has a negative outlook on bank lending to SMEs the variable is coded as a 1, otherwise it is 0. This variable captures the firm's outlook on the credit market independent of the interactions the firm itself has had with the banking sector and thus captures whether or not SMEs' perceptions of the credit market impact their willingness to apply for finance. We expect this variable to demonstrate a positive coefficient for discouraged borrowers. This variable is named "Negative lending perception" in the regression tables.

Finally, we also control for the seasonality of the firm's demand for credit and whether or not the firm has experienced an increase in the time taken to receive payment from customers in the last 6 months. Finally, we include sectoral controls.

Linking SME credit constraints and the macroeconomy

One of the main aims of this research is to evaluate the effect of SME credit constraints on the macro-economy. There are a number of channels through which access to finance can affect the real performance and activity of firms (see Campello et al., 2010, for discussion). We focus on testing the effect of credit constraints on employment and investment. Given the importance of employment growth to any recovery in domestic demand in the Irish economy, and its prominence in the Action Plan for Jobs, it is important for evidence based policy that we can identify if there is a link between SME credit constraints and employment. Similarly, fixed capital investment is central to long-term productivity growth and contributes directly to GDP. There is a large literature linking access to finance to investment activity and our research fits within this space (see Chirinko, 1993; Hubbard, 1998; Guariglia, 2008 for reviews of the literature).

Credit constraints and employment

Existing research suggests a number of channels through which access to finance can impact the

employment decisions of firms (Nickell & Nicolitsas, 1999; Spaliara, 2009). The first direct channel is through access to working capital finance which can directly determine firms' labour input choices. The second channel works through the firm's choice of capital inputs and their optimal capital labour ratio (Spaliara, 2009). If a firm cannot access credit to invest in capital goods, assuming that the capital is not completely labour substituting, this may curtail any plans they have to augment their labour force to complement the new fixed assets. In this case, we assume that firms potentially augment both inputs to production and hold the capital labour ratio relatively constant. However, Spaliara (2009) argues that, as long as there is some substitutability between capital and labour, firms that cannot access investment capital may increase employment activity as an alternative thus altering the capital labour ratio. Given this ambiguity, estimating the direction of the relationship is an empirical question.

To link credit constraints to employment, we draw two particular questions from the Department of Finance survey. Respondents are asked whether in the last six months they increased, maintained or decreased employment levels. If they indicated increased or decreased, they were asked into which of the following categories the percentage change fell: 0-9%, 10-19%, 20-29%, 30-39%, 40-49%, 50%+. Combining these data provide 13 categories of information on the percentage change in employment. In many settings, such a model would be estimated using ordinal probability models (such as an ordered probit or logit model), however research by Ferrer-i-Carbonell & Frijters (2004) indicates that there is no benefit to using such an approach when the number of categories is 10 or greater. For each of the categories, we take the mid-point of the growth rates and include this as the value for each group.¹⁰

In addition, we have the added concern that constraints and employment decisions are potentially contemporaneously endogenous i.e. it might be the case that a firm would lay off workers because it did not get funding or alternatively firms might apply for credit giving consideration to changes in labour inputs. To treat this potential endogeneity, we draw on additional data that were collected only in the latest survey wave. Firms were asked to provide information on whether or not they applied for credit in the six months prior to the latest survey wave. Using these data, we calculate credit constraints for the period before the survey information. This provides historical information that is not contemporaneously correlated with the information provided on employment growth, which allows a clean identification of the effect of credit constraints on employment.

We estimate the following simple econometric model using OLS methods with cluster robust standard errors¹¹:

$$E_i = \alpha + \phi CC_i^{lag} + \beta X_i + \varepsilon_i$$

where E_i contains the categories of employment growth as described, CC_{it-1} is our binary indicator of credit constraints¹² and X_i is the vector of firm controls outlined above. Given the theoretical

¹⁰ For the 50%+ category, we use the value of 75% in the base regression. However, we have done sensitivity tests using a range of additional values for this category from 50% to 99% and our main results are unchanged. The regression output is available on request from the authors.

¹¹ Clustering groups are specific to each regression and a number of robustness checks are completed. For each regression, the clustering group is identified.

¹² While the CC variable is denoted lag, we do not have panel data. We just have one variable which provides historical information. We therefore do not estimate our model using panel data techniques.

ambiguity relating to the direction of the effect, we establish the sign of the relationship empirically and test the hypothesis that SME credit constraints affect firms' employment decisions, i.e. that $\phi \neq 0$. The results for this test are reported in Section 4.

To ensure that our estimates are robust to model selection, we re-estimate the model using a cross-sectional ordered-outcome model on the categories of employment change. This model can be described as follows:

$$E_i^* = \alpha + \phi CC_i^{lag} + \beta X_i + \varepsilon_i$$

where the m alternative outcomes are defined as $E_i = j$ if $\alpha_{j-1} < E_i^* \leq \alpha_j, j = 1, \dots, m$. The probability that E_i is equal to a specific outcome j is:

$$\Pr(E_i = j) = \Pr(\alpha_{j-1} < E_i^* \leq \alpha_j)$$

Substituting for E_i^* and rearranging gives:

$$\Pr(E_i = j) = F(\alpha_j - \phi CC_i^{lag} - \beta X_i) - F(\alpha_{j-1} - \phi CC_i^{lag} - \beta X_i)$$

where $F(\cdot)$ is the cumulative density function. In our case, we assume this follows a normal distribution and estimate an order probit model with maximum likelihood to obtain the parameters ϕ, β and the m group specific coefficients α . This model provides a robustness check on our main OLS estimates.

Credit constraints and investment

When testing the relationship between financing and the real economy, one of the most well established links is through firms' access to external finance to fund capital investment expenditures. There exists a well developed literature which documents how improved access to finance, or greater financial development in general, can foster growth through higher volume and more efficient capital investment (Chirinko, 1993; Bond & Meghir, 1995; Gilchrist and Himmelberg, 1995; Hubbard, 1998; Wurgler, 2000; Love, 2003; Galindo et al., 2007; Guariglia 2008). If external finance is unavailable to firms looking to fund capital expenditures, this can impact economic activity by reducing the productive capacity of firms and restraining potential output.

To test the effect of credit constraints on investment, we draw on information in the last wave of the Department of Finance survey. Firms were asked, if they purchased fixed assets, what their total expenditure was. Using these data, we are able to identify whether or not a firm actually purchased capital assets and the level of such investment.

We model the probability that a firm decides to invest using a dummy variable I_{1i} ,

$$I_{1i} = \begin{cases} 1 & \text{if } I_{1i}^* > 0 \\ 0 & \text{if } I_{1i}^* \leq 0 \end{cases}$$

We model the decision to invest as a function of historical credit constraints and firm controls:

$$I_{1i}^* = \alpha + \phi CC_i^{lag} + \beta X_i + \varepsilon_i$$

Our working hypothesis that we wish to test is that SME credit constraints are negatively related to investment in the Irish economy, i.e. that $\phi < 0$. These baseline results are presented in Section 4.

We also address the fact that, in many years, firms may decide not to invest. This can be purely a demand effect but SMEs may also follow multi-year investment plans and, in a specific year, not invest as they have just finished an investment cycle. In both of these cases, a high frequency of zero values for investment for a particular year may be observed.

This type of pattern, which results from a two-stage process (first, the decision to invest and second, the decision on the volume of investment), can be dealt with using “infrequency of purchase techniques” (Jones and Labeaga, 2003). The behavioural process can be described using a bi-variate sample-selection model. The firm participation equation is:

$$I_{1i} = \begin{cases} 1 & \text{if } I_{1i}^* > 0 \\ 0 & \text{if } I_{1i}^* \leq 0 \end{cases}$$

The binary variable I takes the value of 1 in the case where firms report positive fixed-asset purchases and zero otherwise and the resultant outcome (level) equation is:

$$I_{2i} = \begin{cases} I_{2i}^* & \text{if } I_{1i}^* > 0 \\ \text{NA} & \text{if } I_{1i}^* \leq 0 \end{cases}$$

where

$$I_{1i}^* = \alpha + \phi CC_i^{lag} + \beta X_i + \gamma Z_i + \varepsilon_{1i}$$

and

$$I_{2i}^* = \alpha + \phi CC_i^{lag} + \beta X_i + \varepsilon_{2i}$$

Assuming joint normality for ε_{1i} and ε_{2i} , these equations can be solved simultaneously using maximum likelihood estimation where an appropriate exclusion criterion (vector of variables Z_i) is available.¹³ The first equation, where the dependent variable is (1,0), a nonlinear probability functional form is modelled while the second equation is linear.

We perform a second robustness check that relates to the fact that in our data we only observe gross positive investments and do not observe the net investment flow of the firms. If firms are actually selling fixed assets, the net investment flow would be negative. In our data however, we only observe a zero value, so that our data are censored at zero. We use a standard tobit model approach where the investment equation I^* can be described by the following behaviour:

$$I_i = \begin{cases} I_i^* & \text{if } I_i^* > 0 \\ 0 & \text{if } I_i^* \leq 0 \end{cases}$$

and report the results also in Section 4.

4. Results

In this section, we present the results of our empirical analysis. We first analyse what drives credit

¹³ We discuss our use of exclusion criteria in the empirical results section. Alternatively the model can be estimated using a Heckman two stage model where the Inverse Mills ratio is included in the level equation. While we do not report this model, our results are unchanged using this approach and are available on request from the authors.

constraints. Since we coded as credit constrained those firms that were given a bank-related reason for the rejection of their loan application, our hypothesis is that firm characteristics should not matter. Generally, the data seem compatible with this hypothesis, with the exception of firm debt. It seems that banks, rather than charging firms that have their collateral bound up in earlier loans a higher interest rate for new loans, instead reject their applications.

In a second step, we study how credit constraints impact firms' employment and investment decisions. It seems that credit constraints reduce employment but there is no statistically significant effect on investment.

4.1 Determinants of constraints

Table 3 reports what factors drive the rejection of loan applications and firms' discouragement. Column (1) looks at all rejections. These are split into firm-based rejections in column (2) and bank-based rejections in column (3). We count the latter as credit rationing, while we think of the former as rejections that are part of efficient credit allocation. Columns (4) and (5) split the bank-based rejections by whether the application was for working capital or investment. Column (6) shows regression for discouraged borrowers, and column (7) combines discouraged borrowers and credit rationed borrowers to analyse what drives credit constraints generally. The values reported in the table are probit marginal effects.¹⁴

Focussing on firm-level characteristics first, we find that larger firms are less likely to be rejected.¹⁵ The firm size, for which we use the log of the number of employees of the firm, is significant in columns (1), (3) and (4), i.e. for overall rejections, rejections for bank-based reasons and rejections of working capital applications due to bank-based reasons. Moreover, large firms also seem less likely to be discouraged borrowers. An increase in firm size by one percent suggests that the firm is 1.5% less likely to be discouraged.

For the sectoral dummies, the omitted category is manufacturing. SMEs in the hotels sector seem to differ systematically from manufacturing firms in that they are more often rejected both for firm- and bank-based reasons and also tend to be more discouraged. Construction and real-estate SMEs appear more credit constrained in column (7). Specifically, we find that firms in the hotels sector are more likely to be credit constrained by 7%, and construction and real estate by 7.3% relative to manufacturing firms. Professional services seem to be frequently rejected for firm-based reasons, and agricultural firms appears more prone to discouragement (though it must be said that we have few observations in this category).

Older firms appear to face rationing of their working-capital loan applications. We find that firms that reported an increase in turnover in the previous six months are nearly 5% less likely to be discouraged borrowers. Turnover does not appear to have an effect in any other category of credit constraints. The effect of recording a profit is insignificant across all the components of credit constraints which we consider. That profit is insignificant is important for our determination of constraints. Our definition for credit rationing assumes that banks are blanket rationing without

¹⁴ See Annex A1 for a full list of variables included in our analysis.

¹⁵ This finding is in line with the international literature, see Beck (2006 and 2008a,b).

recourse to firm fundamentals. If profit mattered in this regression, this would suggest that our definition is picking up bank rejections based on firm-specific reasons. This finding therefore supports our definitions. We find profit to be highly significant in the determinants of firm-based reasons for rejections for finance. We estimate that firms recording a profit in the previous 6 months are 5% less likely to be rejected finance for a firm-based reason.

One final test on the firm-level characteristics is whether discouraged borrowers developed their negative views in relation to the banking sector due to the environment external to the firm. Firms may form their views not only on personal experience, but potentially due to the external media, industry associations or peers. In this context, we included the variable “Negative lending perception”. The coefficient on this variable is positive and highly significant. This provides strong evidence that firms’ discouragement is influenced externally and the perception of the credit market generated by media reports and business associations does affect the number of discouraged borrowers amongst SMEs.

Turning to firm-bank characteristics, we find that foreign banks seem to ration credit for expansion applications. “Foreign bank ownership” is a binary variable coded 1 if the firm applied for finance from a bank which was not covered by the Eligible Liabilities Guarantee Scheme implemented in Ireland in 2009, the variable is coded 0 otherwise. “Other bank ownership” is coded 1 if the firm indicated option 12 to question 10 in the Department of Finance / RedC survey. This option indicates that the firm applied for finance from a financial institution not listed as an option in the survey. The coefficients on these variables thus provide the probability of firms being credit constrained when applying to these financial institutions relative to applying to domestically owned banks.

Our finding that firms applying to foreign-owned institutions are nearly 4% more likely to be credit rationed might be due to foreign lenders deleveraging more aggressively in the wake of the crisis or a sizable proportion of foreign lenders preparing to leave the Irish market and are thus less willing to engage in new lending. It may also be due to the main Irish banks being subject to the SME lending targets and so being relatively more lax with their lending practices in their attempts to fulfil these targets.

We also test whether firm debt overhang is restricting access to credit. We use the log of the debt of the firm at the beginning of the 6 month survey period as our debt variable. We find a positive and significant result for this debt variable in all the constraint metrics apart from the likelihood of being a discouraged borrower. The results suggest that an increase in existing debt of 1% makes firms 0.5% more likely to be credit constrained. This finding supports the work of Holton et al (2012) and suggests debt overhang is affecting SME access to credit in Ireland.¹⁶

Finally, the length of the relationship between the bank and the firm does not appear to impact on rejections and discouragement.

Overall, we find credit rationing for small firms, firms that are customers of a foreign-owned bank and firms with high debt levels. Discouragement is most pronounced among small firms, firms in the

¹⁶ It should be noted that this finding does not depend on the fact that we count as credit rationing rejections where the bank says that the available collateral was insufficient. In fact, the main results reported in Table 3 are robust to an alternative definition of credit constraints that excludes those cases.

hotel and agriculture sector (with the caveat of few observations for agriculture), firms with low turnover and firms that have negative lending perceptions.

Table 3: Determinants of bank rejections and credit constraints

	Rejected for any reason (1)	Rejected for firm-based reason (2)	Credit rationed (=rejected for bank-based reason) (3)	Credit rationed - Working Capital (4)	Credit rationed – Expansion (5)	Discouraged Borrowers (6)	Credit constrained (7)
Firm-level characteristics							
Log Firm Size	-0.014**	-0.007	-0.008*	-0.009**	-0.001	-0.015**	-0.022***
Construction & Real Estate	0.010	0.000	0.023	0.023	0.014	0.046*	0.073*
Wholesale & Retail	0.007	0.033	-0.018	0.009	-0.022	0.014	0.000
Hotels	0.058**	0.052*	0.018	0.020	0.010	0.049*	0.070**
Professional Services	0.046	0.053**	0.006	0.011	-0.003	0.014	0.024
Other	-0.026	0.027	-0.044*	-0.019	-0.029	0.005	-0.031
Agriculture	0.000	0.000	0.000	0.000	0.000	0.083**	0.059
Log Firm Age	0.011	-0.008	0.018	0.017**	0.006	-0.002	0.011
Profit	-0.026	-0.046***	0.009	-0.001	0.001	-0.020	-0.014
Turnover	0.007	-0.002	0.007	0.006	0.034	-0.055*	-0.059
Seasonal Demand for Credit	0.017	0.011	0.008	0.011	-0.004	0.004	0.008
Code of Conduct Awareness	-	-	-	-	-	-0.003	-
Awareness of CRO	-	-	-	-	-	0.002	-
Negative Lending Perception	-	-	-	-	-	0.057***	-
Firm-bank characteristics							
Foreign Bank Ownership	0.030	-0.014	0.036**	0.011	0.023**	-0.015	0.034
Other Bank Ownership	-0.006		0.027		0.028	0.00	0.036
Log Debt	0.006***	0.003***	0.004***	0.002**	0.002**	0.001	0.005***
Log Length of Bank Relationship	-0.017	-0.003	-0.012	-0.006	-0.007	-0.009	-0.019

Notes: Probit marginal effects, left-hand side is a dummy variable. Standard errors are robust to heteroscedasticity and clustered at sector level. We exclude firms in financial intermediation and health and social sectors and remove outliers from continuous variables. */**/** denotes significance at the ten/five/one percent level. Age marginal effects presented in this table include but linear and squared terms.

4.2 SME credit constraints and employment

To test the effects of SME credit constraints on employment, we regress employment on historical constraints and a number of firm controls. As we use historical constraint information, we do not have data on whether the loan application purpose was for working capital or capacity expansion, therefore these categories are not included in the regressions. We control for sector, size¹⁷, whether the firm reported positive turnover, reported making a profit in the last six months, "Negative lending perception", the firm age and age squared (in log years), and the log of the total value of loans outstanding in the preceding six months. In all cases, the standard errors are clustered at sector and county level and robust to heteroskedasticity.¹⁸ We also include a control for whether or not the firm's turnover is seasonal. As in Chaddad et al. (2006) and O'Toole et al. (2013), we remove outliers from the continuous data by dropping observations that are outside three standard deviations above and below the mean. This led us to drop 83 firms (6%) from our original sample.

As discussed in Section 3, a successful loan application may raise or lower employment, depending on the substitutability of labour and capital. For each firm, we include in the regression one dummy capturing whether there has been a loan rejection, and an additional dummy capturing if that rejection was for bank-related reasons and thus represent credit rationing. This second dummy allows us to test whether there is an effect of credit constraints on employment over and above the effect of loan rejections in general.

The results are presented in Table 4. We find no impact of loan rejections on employment. This could be interpreted to suggest that firms in our sample make employment decisions independently of capital availability. They might also turn to alternative funding sources when a bank loan application has been rejected. Turning to the effect of credit constraints, we see that in column (1), credit constraints appear to have a negative and significant effect on employment. In columns (2) and (3) we split the constraints down by credit rationed and discouraged borrowers respectively and also find a negative and significant effect for discouraged borrowers at the 5% level. This would suggest that the dynamic present in the Irish economy is that firms who are discouraged from applying for credit have lower employment than other firms. Credit constraints thus seem to have contributed somewhat to the rise in Irish unemployment. However, due to the fact that only 5.9 percent of firms are constrained in this manner, the overall magnitude of this effect is marginal.

In relation to the other control variables, we do not find any statistically significant variation in our employment growth variable by sector, nor do we find any difference across firm size. It appears that firms that report positive turnover tend to raise employment, and that younger firms hire more staff than older firms. As the square term is also significant, it suggests this effect is dampening with age. We find no relationship between firm debt and employment growth. This would suggest that debt overhang is not reducing employment.

¹⁷ We use turnover brackets to indicate if firms are sized small and medium. This is due to the fact that using employment size categories would be endogenous if employment is the dependent variable.

¹⁸ There are 26 counties in our sample and 14 sectors. The total number of clusters in our analysis is circa 160.

Table 4: Effect of credit constraints on employment

	Overall constraint	Credit rationed	Discouraged
	(1)	(2)	(3)
Refused credit _{t-1}	-0.011	-0.028	-0.032
Credit constraint _{t-1}	-0.038 *	0.001	-0.046 **
Construction and real estate	-0.020	-0.021	-0.020
Wholesale and retail	-0.013	-0.014	-0.013
Hotels	-0.022	-0.026	-0.022
Professional services	-0.008	-0.010	-0.008
Other	0.006	0.005	0.005
Agriculture	-0.023	-0.023	-0.022
Small	0.003	0.003	0.002
Medium	-0.003	-0.003	-0.004
Turnover increase	0.056 ***	0.055 ***	0.056 ***
Profit	0.036 ***	0.038 ***	0.036 ***
Negative lending perception	-0.011	-0.016	-0.011
Log Age	-0.036 ***	-0.035 **	-0.040 ***
Log Age ²	0.005 **	0.005 *	0.005 **
Log Debt _{t-1}	0.000	0.000	0.000
Seasonal Demand for Credit	-0.003	0.003	0.000
N	1,104	1,104	1,104

Notes: OLS estimates, left-hand side is % change in employees. Standard errors are robust to heteroscedasticity and clustered at the county-sector level. Controls included for firm turnover seasonality. We exclude firms in financial intermediation and health and social sectors and remove outliers from continuous variables. */**/** denotes significance at the ten/five/one percent level.

As is noted in Section 3 above, the data we use to construct our dependent variable are obtained using categorical information on employment changes. Although Ferrer-i-Carbonell & Frijters (2004) suggest that there is no benefit to using an ordered probability model with greater than 10 categories, we do so as a robustness check to ensure that our results are not dependent on the model selection. We estimate an ordered probit as described and the results are presented in Annex 1. The findings of this model support our main results and indicate that discouraged borrowers tend to reduce employment.¹⁹

4.3 SME credit constraints and investment

To evaluate whether bank lending constraints reduce SME investment, we first present a simple probability model for the decision to invest and then present two robustness checks to control to

¹⁹ As an additional robustness check, we re-estimate the model omitting sole traders from the analysis. If these individuals do not have employees, then their behaviour can be expected to differ from other SMEs. Our main results do not change.

the infrequency of investment and the censoring of our investment variable at zero.

As is the case in the employment regressions, we include a control for overall bank credit rejections and firm characteristics when evaluating the impact of credit constraints. Table 5 first presents the estimation results for the tests of constraints on the probability of a firm investing. In column (1), we test the relationship between the general SME credit constraint and investment, column (2) presents the results for credit-rationed firms and column (3) presents the results for discouraged borrowers.

Surprisingly, there seems to be neither an effect of overall credit rejections or credit constraints on investment decisions. One possible explanation is that when the data were collected, firms were very much in survival mode. Most applications (61%) were for working capital rather than investment related to expansion plans.²⁰

In relation to the sectoral control variables, we find that firms in the construction sector are 7.5 percent less likely to invest than those in the base category of manufacturing. The corresponding figures for wholesale and retail and hotels are 7.3 percent and 12.5 percent respectively. These sectors are particularly dependent on domestic economic conditions and, given the very challenging operating environment in Ireland, it is not surprising that investment rates are lower than for firms in manufacturing (whose products can trade internationally).

When examining firm size, we use micro-sized firms as the base category and we find that small firms are 15 percent more likely to invest while medium-sized firms are nearly 50 percent more likely to invest than micro-sized firms. We also find that firms reporting increased turnover are 9 percent more likely to invest but we do not find any effect of whether or not firms make a profit. Firms who believe the banks are not lending are 5 percent less likely to invest. We do not find any effect of age, and total outstanding loans on investment.

²⁰ We do not present a separate analysis for working capital and expansion credit constraints since the data set does not provide information on lagged constraints by loan purpose.

Table 5: Effect of credit constraints on investment decision

	Overall constraint (1)	Credit rationed (2)	Discouraged (3)
Refused credit t_{-1}	-0.045	-0.047	-0.043
Credit constraint t_{-1}	0.028	0.035	0.024
Construction and real estate	-0.075 **	-0.075 **	-0.075 **
Wholesale and retail	-0.073 **	-0.072 **	-0.072 **
Hotels	-0.125 ***	-0.123 ***	-0.125 ***
Professional services	0.007	0.009	-0.008
Other	-0.026	-0.026	-0.026
Agriculture	-0.019	-0.019	-0.020
Small	0.148 ***	0.148***	0.148 ***
Medium	0.517 ***	0.515***	0.517 ***
Turnover increase	0.093 ***	0.093 ***	0.094 ***
Profit	0.014	0.013	0.014
Negative lending perception	-0.050 **	-0.048 **	-0.050 **
Log Age	-0.014	-0.014	-0.014
Log Debt t_{-1}	-0.001	-0.001	-0.001
Seasonal demand for credit	-0.004	-0.004	-0.003
N	1,123	1,123	1,123

Notes: Probit marginal effects, left-hand side is a dummy variable. Standard errors are robust to heteroscedasticity and clustered at the county-sector level. Controls included for firm turnover seasonality. We exclude firms in financial intermediation and health and social sectors and we remove outliers from continuous variables. */**/** denotes significance at the ten/five/one percent level. Marginal effects include both linear and squared terms for firm age.

We now estimate the model controlling for the infrequency of investments to see if this helps identify a significant impact of general credit refusal and credit constraints on investment decisions. To do so, a probability model on whether or not the firm invests is estimated simultaneously with a linear model on the level of investment. As an exclusion criterion, we use the variable “Negative lending perception”. We include this variable in only the first stage since it should only affect a firm’s decision to invest (or apply for credit), but not the level of investment. The results for both the first and second stage estimates are presented in Table 6.²¹

²¹ In an additional robustness check, we follow Cameron and Trivedi (2005) and exploit the fact that the model is theoretically identified without exclusion restriction through the functional form assumptions. The results of this test are included in Annex 1 and the findings are identical to those presented here.

**Table 6: Effect of credit constraints on investment decision and level
Heckman bi-variate model controlling for infrequent investments**

	Overall constraint		Credit rationed		Discouraged	
	Stage 1: Probit	Stage 2: OLS	Stage 1: Probit	Stage 2: OLS	Stage 1: Probit	Stage 2: OLS
Refused credit t_{-1}	-0.288*	-0.332	-0.295*	-0.329	-0.268*	-0.335
Credit constraint t_{-1}	0.151	-0.125	0.171	0.167	0.130	-0.279
Construction and real estate	-0.271 **	-0.819 **	-0.266 **	-0.872 **	-0.268 **	-0.813 **
Wholesale and retail	-0.276 **	-1.058 ***	-0.275 **	-1.049 ***	-0.273 **	-1.061 ***
Hotels	-0.470 ***	-1.791 ***	-0.463 ***	-1.756 ***	-0.470 ***	-1.789 ***
Professional services	0.044	-1.422 ***	0.050	-1.413 ***	0.046	-1.416 ***
Other	-0.057	-1.282 ***	-0.058	-1.268 ***	-0.056	-1.276 ***
Agriculture	-0.064	0.241	-0.068	0.262	-0.064	0.238
Small	0.650 ***	1.557 ***	0.644 ***	1.541 ***	0.650 ***	1.556 ***
Medium	1.626 ***	3.634 ***	1.619 ***	3.574 ***	1.626 ***	3.638 ***
Turnover increase	0.331 ***	0.201	0.333 ***	0.188	0.332 ***	0.199
Profit	0.073	0.342*	0.069	0.357**	0.071	0.335*
Negative lending perception	-0.187 **	-	-0.176 **	-	-0.188 **	-
Log Age	0.030	0.664	0.015	0.693	0.033	0.644
Log Age ²	-0.016	-0.101	-0.013	-0.104	-0.016	-0.097
Log Debt t_{-1}	-0.003	0.007	-0.003	0.009	-0.003	0.008
Seasonal demand for credit	0.003	-0.056	0.004	-0.050	0.005	-0.060
N	1,118	1,118	1,118	1,118	1,118	1,118

Notes: Left-hand side is a dummy variable in stage 1 and the investment amount (in logs) in stage 2. Standard errors are robust to heteroscedasticity and clustered at the county-sector level. Controls included for firm turnover seasonality. */**/** denotes significance at the ten/five/one percent level. Regression excludes firms in financial intermediation. Outliers from continuous variables.

Again we find no effect of credit constraints, for either discouraged borrowers or credit-rationed firms, on either the probability of investing or the level of investment. Interestingly we do find some evidence that overall bank rejections reduce investment propensity, however, these are only significant at the 10 percent level. We find that both the probability of investing and the level of investment are lower for firms in construction and real estate, wholesale and retail and hotels, while the level of investment is lower also in professional services and other sectors. Small- and medium-sized firms are more likely to invest and invest higher volumes than micro-sized firms. We find moreover that firms who reported increasing turnover were more likely to invest but that turnover growth did not affect the level of investment. It may be the case that the level of investment chosen is dependent on the specific project that is being evaluated and the expenditure volume is chosen dependent on this project's specifications and its effect on future, not current, revenues.

Table 7 reports the analysis that takes the censoring of investment in our dataset at zero into account. We find that overall bank rejections seem to reduce investment, but no additional effect of credit constraints.

Table 7: Effect of credit constraints on investment decision
Tobit model controlling for censoring at zero

	Overall constraint	Credit rationed	Discouraged
Refused credit t_{-1}	-3.068 *	-3.149*	-2.942*
Credit constraint t_{-1}	1.249	1.625	1.004
Construction and real estate	-3.011 **	-2.984 **	-2.944 **
Wholesale and retail	-3.465 ***	-3.426 ***	-3.453 ***
Hotels	-5.324 ***	-5.238 ***	-5.329 ***
Professional services	-0.423	-0.385	-0.420
Other	-1.314	-1.290	-1.302
Agriculture	-0.735	-0.739	-0.753
Small	7.766 ***	7.729 ***	7.773 ***
Medium	18.124 ***	18.095 ***	18.142 ***
Turnover increase	3.352 ***	3.353 ***	3.362 ***
Profit	1.077	1.034	1.052
Negative lending perception	-2.008 **	-1.943 *	-1.983 *
Log Age	0.330	0.194	0.329
Log Age ²	-0.151	-0.128	-0.152
Log Debt t_{-1}	-0.038	-0.037	-0.037
Seasonal demand for credit	0.093	0.082	0.092
N	1,118	1,118	1,118

Notes: Tobit estimates, left-hand side is the investment amount (in logs). Standard errors are robust to heteroscedasticity and clustered at the county-sector level. Controls included for firm turnover seasonality and we exclude firms in financial intermediation and health and social sectors. We remove outliers from continuous variables. */**/** denotes significance at the ten/five/one percent level. 826 censored, 292 uncensored observations.

Our findings in relation to the sectoral differentials are identical to the estimates for the probability of investment. We find that the domestically-oriented sectors, construction, hotels and wholesale and retail have lower levels of investment than manufacturing. Investment is increasing with firm size, firms with positive turnover, and decreasing if the firms believe the banks are not lending. Again we find no effect of age on investment levels. We do not find any direct effect of debt overhang on investment. The likelihood is that this effect is indirectly coming through the access to finance channel as our results above suggest that debt overhang has a negative impact on credit access.

Overall, we find some evidence that bank loan rejections reduce investments. Such rejections are an essential part of a functioning and efficient capital allocation process when they reflect the poor quality of the project for which the firm wanted to use the loan. We find no role of credit constraints.

5. Conclusions

While undoubtedly aggregate demand in the domestic and international economies is the single most important determinant of SME success, access to funding is crucial for firms. Given the scale of the banking crisis in Ireland, it is not surprising that much attention has focussed on the difficulties SMEs have in accessing credit.

Our research attempts to shed light on two particular questions of importance to the success and development potential of SMEs: a) what factors drive SME credit constraints in the Irish economy, and b) what is the impact of SME credit constraints on the macro-economy.

A number of findings emerge from our analysis. We find that both younger and smaller enterprises are more likely to be constrained. This may be due to the opacity and information asymmetries between such firms and traditional lenders. Such an effect can be heightened during periods of financial crisis which makes it even more difficult for financial institutions to evaluate the market prospects of borrowers. From a policy perspective, these results would suggest that targeted policy measures, such as the recently established Microenterprise Loan Fund scheme or campaigns to increase awareness, financial literacy and organisational capacity among micro-sized firms might help reduce asymmetric information between financial institutions and these categories of borrower. Additionally, the commitment in the *Action Plan for Jobs 2013* to increase the prevalence of venture capital and other non-bank forms of finance in the Irish SME financing mix could also serve to loosen the credit constraint faced by smaller and younger SMEs. However, a proper evaluation of the effect of non-bank financing on SME performance is outside the scope of this paper and would require further research.

In relation to the sectoral variation in constraints, we find that, relative to the manufacturing sector, firms in the construction & real estate and the hotels sector are 7% and 6%, respectively, more likely to be constrained. This is not surprising given the large exposure banks had built up to this sector during the boom years.

On the bank-borrower relationship, we find that the shorter the firm's relationship with its bank, the greater the probability of the firm being credit constrained. This concurs with the international literature which suggests more developed banking relationships should facilitate credit access. We also find that those firms applying to foreign-owned credit institutions are 4% more likely to be subject to credit rationing than those firms that apply to domestically-owned banks.

We find that our measure of profitability in the last 6 months has no effect on any facet of credit constraints other than discouraged borrowers. We find that profit-making firms are 3% less likely to be discouraged borrowers. We also find that firms with a negative perception of the lending environment developed through factors external to the firm like media reports and trade associations are 5% more likely to be classified as discouraged borrowers. This finding highlights the need to disseminate information to SMEs on the true lending environment and encourage these firms to apply for finance.

Testing the effect of debt overhang on access to finance, we find that the higher a firm's existing level of debt at the beginning of the 6-month survey period, the more likely that the firm will be credit constrained during this period. Outstanding debt level appears to have no impact on the likelihood of being a discouraged borrower and the effect appears to be coming purely through the credit-rationing side. This result suggests that solutions to deal with debt overhang can facilitate better access to credit in the economy. The commitment of NPRF funds through the SME Equity Fund and SME Turnaround Fund has the potential to play a positive role here. The *Action Plan for Jobs 2013* explicitly states that these funds will aim to invest in SMEs with overleveraged balance sheets and those in need of financial restructuring. Investment of this type could help firms with debt overhang issues restructure their commitments and consequently loosen the credit constraints under which they operate.

We also evaluate the effect of credit constraints on the macro-economy, in particular on employment and investment. We find a negative and statistically significant effect of discouragement on employment growth. Policy measures that encourage discouraged borrowers to apply for credit and use such capital productivity should be supportive of employment.

On the link between SME credit constraints and investment, we are not able to identify an effect of credit constraints. This is somewhat surprising. However, it must be noted that this finding is established using data for a period in which firms are very much in survival mode and the majority of credit applications are for working capital purposes. In the context of a recovery, SMEs will inevitably require additional expansion capital. A lack of credit allocated to these projects could pose an impediment to firm growth in cases where reductions in installed capacity can restrict production, and careful monitoring of the prevalence and impact of credit constraints is therefore crucial going forward.

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A.1 Summary Statistics

Table 8 outlines the variables we utilise in our analysis. Our sample consists of roughly 1400 observations. All the variables listed below are dummy variables unless clearly named as continuous and thus consist of values of one or zero. The table also displays the mean and standard deviation of each variable. The below variables relate to the age of the firm, the sector in which the firm operates, the profitability of the firm, the firms outstanding debts and the length of the firm's relationship with their bank, amongst other variables.

Table 8: Variables

Variable	Mean	Std. Dev.
Age < 5	0.05	0.21
Age 5 -10	0.14	0.34
Age 11 – 20	0.28	0.45
Age 20 plus	0.53	0.50
Continuous Age	29.10	26.80
Log Continuous Age	3.04	0.86
Manu - Food	0.02	0.15
Manu - High Tech	0.02	0.15
Manu - Other	0.09	0.28
Hotels	0.12	0.32
Agriculture	0.02	0.14
Construction & Real Estate	0.12	0.32
Wholesale / Retail	0.34	0.47
Other	0.06	0.25
Transport	0.04	0.21
Professional Services	0.16	0.37
Micro	0.39	0.49
Small	0.39	0.49
Medium	0.22	0.42
Exporter	0.22	0.42
Profit	0.39	0.49
Turnover	0.25	0.43
Continuous debt	775962.4	2102915.0
Log Continuous debt	6.99	6.42
foreign owned	0.17	0.38
domestic owned	0.02	0.13
Bank rel < 5 years	0.04	0.20
Bank rel 5-10 years	0.20	0.40
Bank rel 11-20 years	0.29	0.45
Bank rel age > 20 years	0.41	0.49
Continuous Bank Rel Age	21.83	16.40
Log Continuous Bank Rel Age	2.77	0.90
Discouraged Environment	0.40	0.49

Source: Authors' calculations using Department of Finance / RedC data.

Table 9 provides an overview of the proportion of firms in each wave which applied for finance and were rejected. All the figures in the table are report as a percentage of the total number of firms surveyed in each wave. The table also breaks down the proportion of applications by type of financial product. The trend is generally for lower rejection rates for all applications and a higher overall application rate over time.

Table 9: Applications and rejections as a percentage of total firms

	Apr-Sept 2012	Oct 2011-Mar 2012	Apr-Sept 2011
Applied	35.9%	37.7%	39.4%
Rejected	13.9%	14.2%	13.1%
New Overdraft			
Applied	8.1%	6.9%	7.1%
Rejected	3.7%	3.6%	1.9%
Re-new Overdraft			
Applied	14.8%	15.3%	18.0%
Rejected	6.0%	5.2%	3.7%
New Loan			
Applied	10.4%	11.0%	9.9%
Rejected	3.3%	4.1%	2.9%
Re-new Loan			
Applied	5.3%	9.0%	8.9%
Rejected	3.1%	3.2%	2.2%
Invoice Discounting			
Applied	1.3%	2.3%	3.4%
Rejected	1.0%	0.9%	0.7%
Leasing/Hire Purchase			
Applied	4.3%	10.8%	7.5%
Rejected	1.4%	1.6%	1.1%
Bonds			
Applied	0.4%	1.0%	0.9%
Rejected	0.3%	0.2%	0.2%
Other			
Applied	0.2%	0.3%	0.7%
Rejected	0.2%	0.3%	0.6%

Source: Authors' calculations using RedC/Mazars data. Note: These figures differ from those reported in Holton and McCann (2012) due to our focus on firm level success and failure in applications as opposed to their focus on application by application successes and failures. Holton and McCann consider only full rejections in their estimates of rejection while we consider partially successful firms as rejected. Holton and McCann also exclude all "don't know" responses in calculating their percentages. We incorporate these answers.

A.2 Additional regression output

Table 10: Determinants of constraints (using categorical variables)

Variable	Rejected for any reason (1)	Rejected for firm-based reason (2)	Credit rationed (3)	Credit rationed - Working Capital (4)	Credit rationed – Expansion (5)	Discouraged Borrowers (6)	Credit constrained (7)
Firm-level characteristics							
Size - Small	0.011	-0.001	0.010	0.005	0.010	-0.023	-0.016
Size - Medium	-0.052*	-0.024	-0.030*	-0.031	-0.003	-0.043**	-0.078***
Construction & Real Estate	0.008	0.000	0.023	0.026	0.014	0.047	0.073***
Wholesale & Retail	0.006	0.032	-0.017	0.012	-0.021	0.020	0.005
Hotels	0.049*	0.045	0.017	0.017	0.013	0.051*	0.069**
Professional Services	0.039	0.045**	0.005	0.015	-0.002	0.018	0.024
Other	-0.025	0.023	-0.042	-0.012	-0.029	0.008	-0.026
Agriculture	0.000	0.000	0.000	0.000	0.000	0.088**	0.059
Age 5-10 years	0.058	0.008	0.049	0.019	-0.014	-0.021	-0.010
Age 11-20 years	0.070	0.030	0.038	-0.002	-0.008	-0.039	-0.038
Age 20+ years	0.041	-0.022	0.057	0.017	0.000	-0.039	-0.025
Profit	-0.028	-0.045***	0.008	-0.005	0.002	-0.018	-0.013
Turnover	0.006	0.006	-0.001	-0.006	0.032	-0.072**	-0.079*
Seasonal Demand for Credit	0.017	0.012	0.006	0.011	-0.007	0.008	0.008
Code of Conduct Awareness	-	-	-	-	-	-0.001	-
Awareness of CRO	-	-	-	-	-	0.004	-
Negative Lending Perception	-	-	-	-	-	0.055***	-
Firm-bank characteristics							
Foreign Bank Ownership	0.033	-0.013	0.037**	0.013	0.024*	-0.010	0.039
Other Bank Ownership	-0.011	-	0.030	-	0.032	0.007	0.044
Log Debt	0.006***	0.002***	0.004***	0.002**	0.002**	0.001	0.005***
Bank relationship 5-10 years	-0.020	-0.003	-0.008	-0.012	-0.008	-0.047*	-0.052
Bank relationship 11-20 years	-0.056*	-0.023	-0.031	-0.015	-0.024	-0.038	-0.066*
Bank relationship 20+ years	-0.033	0.002	-0.023	-0.010	-0.021	-0.042*	-0.058*

Notes: Probit marginal effects, left-hand side is a dummy variable. Standard errors are robust to heteroscedasticity and clustered at sector level. We exclude firms in financial intermediation and health and social sectors and remove outliers from continuous variables. */**/** denotes significance at the ten/five/one percent level. Age marginal effects presented in this table include but linear and squared terms.

Table 11: Effect of credit constraints on investment decision and level
Heckman bi-variate model controlling for infrequent investments, using nonlinear exclusion criteria

	Overall constraint		Credit rationed		Discouraged	
	Stage 1: Probit	Stage 2: OLS	Stage 1: Probit	Stage 2: OLS	Stage 1: Probit	Stage 2: OLS
	0.152	-0.120	0.172	0.172	0.131	-0.274
Constraint _{t-1}						
Refused _{t-1}	-0.287*	-0.328	-0.294*	-0.326	-0.268*	-0.332
Construction and real estate	-0.271 **	-0.819 **	-0.265 **	-0.826**	-0.268 **	-0.813 **
Wholesale and retail	-0.276 **	-1.060 ***	-0.275 **	-1.053 ***	-0.273 **	-1.063 ***
Hotels	-0.468 ***	-1.792 ***	-0.463 ***	-1.757 ***	-0.467 ***	-1.790 ***
Professional services	0.044	-1.421 ***	0.050	-1.412 ***	0.047	-1.415 ***
Other	-0.056	-1.282 ***	-0.057	-1.269 ***	-0.055	-1.277 ***
Agriculture	-0.063	0.242	-0.068	0.263	-0.064	0.238
Small	0.649 ***	1.560 ***	0.644 ***	1.547 ***	0.650 ***	1.559 ***
Medium	1.625 ***	3.644 ***	1.618 ***	3.590 ***	1.626 ***	3.646 ***
Turnover increase	0.331 ***	0.203	0.333 ***	0.191	0.331 ***	0.201
Profit	0.073	0.343 *	0.069	0.358**	0.071	0.336*
Negative lending perception	-0.193 *	-0.025	-0.183 *	-0.033	-0.192 *	-0.019
Log Age	0.029	0.660	0.015	0.686	0.032	0.641
Log Age ²	-0.016	-0.101	-0.013	-0.104	-0.017	-0.097
Log Debt _{t-1}	-0.003	0.007	-0.003	0.009	-0.004	0.008
Seasonal demand for credit	0.003	-0.057	0.004	-0.051	0.006	-0.061
N	1,118	1,118	1,118	1,118	1,118	1,118

Notes: Left-hand side is a dummy variable in stage 1 and the investment amount (in logs) in stage 2. Standard errors are robust to heteroscedasticity and clustered at the county-sector level. Controls included for firm turnover seasonality. */**/** denotes significance at the ten/five/one percent level. Regression excludes firms in financial intermediation. Outliers from continuous variables.

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