IMF Working Paper

Small and Medium Size Enterprises, Credit Supply Shocks, and Economic Recovery in Europe

Nir Klein

IMF Working Paper

European Department

Small and Medium Size Enterprises, Credit Supply Shocks, and Economic Recovery in Europe

Prepared by Nir Klein[1]

Authorized for distribution by Costas Christou

June 2014

Abstract

The limited access to bank credit in recent years has increased the pressure on small and medium size enterprises (SMEs), forcing them to scale down investment plans and production. This paper, which explores the macroeconomic implications of this channel, finds evidence that countries with high prevalence of SMEs tended to recover more slowly from the global financial crisis than their peers, implying that the interaction of the economic structure and access to bank financing plays a critical role in episodes of economic recovery. This conclusion is reinforced by a VAR estimation, which demonstrates that a negative credit supply shock applied to SMEs has an adverse effect on economic activity, and this impact is amplified in countries that have a high share of SMEs.

Contents Page

I. INTRODUCTION

1.   Small and medium size enterprises (SMEs) remain the backbone of Europe's economic activity. While cross-country variation is relatively high, SMEs on aggregate account for about 99 percent of the total number of enterprises in the EU with an estimated share of 58 percent and 66 percent in the EU non-financial business sector's value added and employment, respectively (Figure 1).[2] The importance of SMEs in fostering economic development, technological innovation, and employment creation was acknowledged by many studies, including Shaffer (2002), OECD (2004), Beck et al. (2005), and Leegwater and Shaw (2008).[3]

Figure 1. SME: Shares in the Non-Financial Business Employment and Value Added, 2012

Source: European Commission's Annual Report on European SMEs, 2012/13
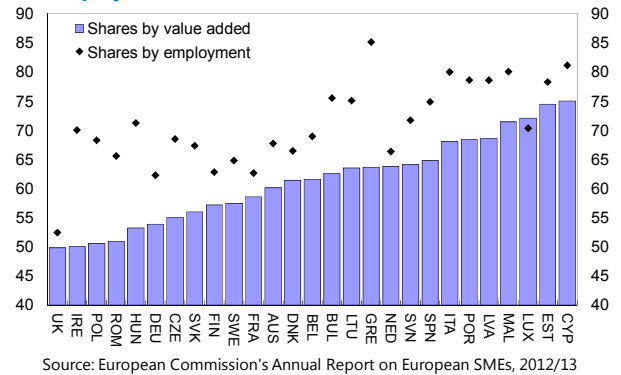
2.   In recent years, European SMEs have been under significant financial pressure due to the increasingly tight lending conditions in the region. The deterioration of banks' balance sheets in conjunction with the bleak economic outlook for Europe led many banks in the region to tighten credit supply and limit their exposure to riskier borrowers ("flight to quality") through raising credit spreads (Figure 2), and applying tighter lending requirements (Figure 3). Consequently, SMEs, which generally have fewer assets eligible as loan collateral and lack of alternative financing sources such as debt/equity issuance, access to international markets, and support from parent companies, have faced significant funding pressures with adverse repercussions for their investment plans and overall activity.

Figure 2. Spread between interest rate on new loan and policy rate Non-financial corporations, loan equal or less than 1 million, up to 1 year

Source: Haver.
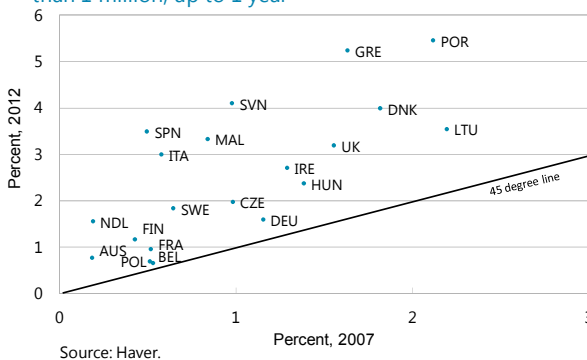
Figure 3. SMEs: Banks' Lending Standards, (Euro Area,Unweighted Net Percentage Balance)

Source: ECB.

---
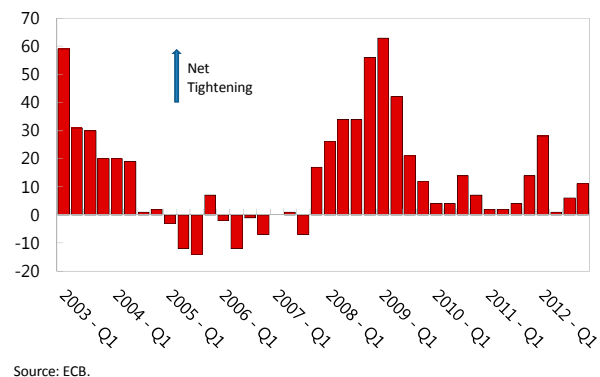
[2] The European Commission's Annual Report on European SMEs, 2012/13.

[3] This evidence, however, in not conclusive. Beck et al (2005) provide extensive literature review about some mixed results in this area.

3.   The adverse economic environment, particularly the weakness of domestic demand, which is a key market driver for the SMEs, contributed to the sector's feeble activity in the post-crisis period (Figure 4). While the SMEs' employment was more resilient than that of large companies in 2009–11, in part because of the growth of self-employment, its value added registered a sharper drop compared to large firms, thus exerting a drag on the overall economic recovery. In 2012, the SMEs sector continued to show further weakness, bringing employment and value added to 2 percent and 10 percent below their pre-crisis levels, respectively.

Figure 4. Value added and Employment by Firm Size, EU27

Source: EC's Annual Report on European SMEs, 2012/13.
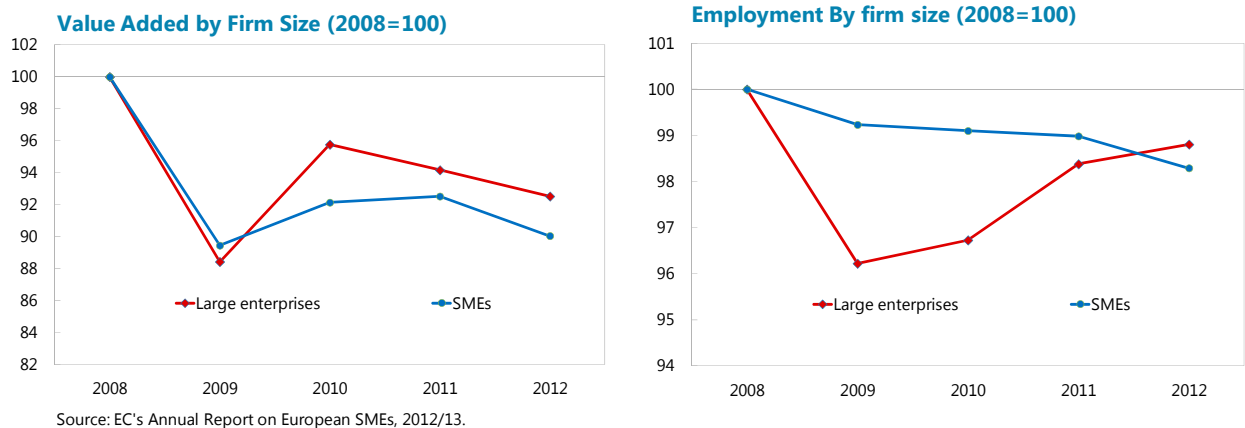
4.   At the country level, the SMEs sector has yet to return to its pre-crisis levels in most EU members. Apart from Germany, where the SMEs sector registered a prominent increase in both real value added and employment levels (compared to 2008), in most EU countries this sector has remained under pressure. As expected, the changes in value added and in employment showed a positive and strong correlation across countries; however, most of the countries (apart from Greece) are located to the left of the 45-degree line thus suggesting that the loss of value added was higher than the loss of employment (Figure 5). This pattern, which is consistent with declining labor productivity, may point to a significant decline in the capital stock due to under-investment in this sector.

Figure 5. The Change in Real Value Added and Employment, Non-Financial Business Sector, 2008-12

Sources: EC annual report on European SMEs 2012/13, and IMF staff's calculations.
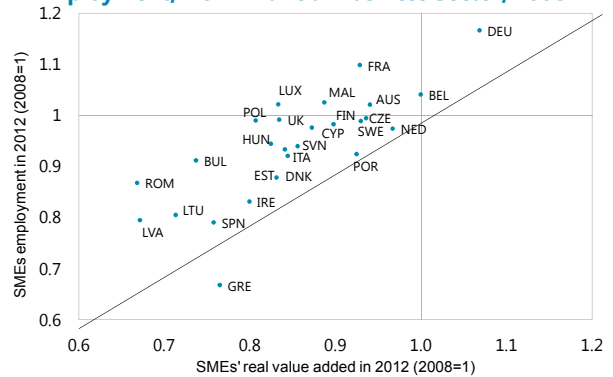
5.   The link between the financial conditions, bank dependency, and economic downturns has been extensively studied in the literature.[4] The argument essentially is that worsening financial conditions, which are reflected in higher borrowing costs and tighter lending standards, are likely to have a larger adverse effect on firms that are more reliant on external financing to fund their day-to-day operations and investment plans (as opposed to internal funds).[5] Empirical studies that looked at the differential impact of financial crises on sectoral growth broadly confirm this hypothesis. Kashyap et al. (1994), for instance, found that bank-dependent firms (having neither bond market access nor large cash reserves) tended to cut their inventory investment significantly more than their nonbank dependent counterparts during the US recession in 1982. Their main results were supported by other studies, which looked at different recession episodes in other countries (Barun and Larrain, (2005), and Kroszner et al. (2007)), some explicitly identifying bank-dependent firms as small firms (Dell'Ariccia et al., (2008)).

6.   More recently, Kannan (2010) examined the impact of unusually stressed credit conditions on economic recoveries from recessions that are associated with financial crisis. Based on a sample of 21 industrialized economies over 1970–2004, he found that industries that are populated by smaller establishments, firms with fewer tangible assets to support lender-borrower relationship, and firms that produce less tradable goods grow relatively slowly during recoveries from these episodes.

7.   Against this background, this paper seeks to examine the extent to which the tight financial conditions faced by SMEs have affected the pace of economic recovery in recent years. While closely related to earlier studies mentioned above, this paper differs in several dimensions. First, unlike previous studies that focused mainly on the manufacturing sector, this paper uses the European Commission's data on SMEs share in the non-financial business sector, thus providing a broader indication about bank dependency at the country level.[6] Second, our sample includes the recent global financial crisis and the subsequent recovery—a special case study given the coverage, depth and the duration of the crisis. Third, we assess the macroeconomic implications (unlike previous studies that focused on industry-level performance) of tight credit conditions faced by SMEs by estimating a panel VAR, which includes a measure of banks' credit supply using information from the bank lending surveys.

---

[4] This stream of studies is closely related to the seminal work of Rajan and Zingales (1998) who illustrated that the link between financial development and economic growth is also a function of the dependency on external funds. In particular, they showed that industries that are relatively more in need of external finance (measured by investment not covered by retained earnings) grow disproportionally faster in countries with more developed financial markets.

[5] The underlying assumption is that internal and external funds are not perfect substitutes, in part because informational asymmetries.

[6] The assumption that small firms are more dependent on domestic bank financing has been used in the literature. See for instance Dell'Ariccia et al. (2008).

8.   The analysis in this paper suggests that countries with higher prevalence of SMEs experienced, on average, a slower output growth during 2009–12 compared to countries with lower share of SMEs. This evidence, which is also reflected in a sluggish credit growth to the non-financial corporations in this period, seems to be linked to the tight financial conditions that prevailed in this period in many EU countries. The panel VAR estimation indeed illustrates that an adverse credit supply shock faced by SMEs has a negative effect on economic activity, and this impact is larger in countries with high SMEs sector. These results not only underline the important contribution of SMEs to economic activity in Europe, but also highlight the importance of alleviating financing constraints for SMEs to support a faster economic recovery.

9.   While the empirical results are statistically significant, it is important to note several caveats. First, the SMEs shares, which are extracted from the European Commission's database, are based on actual data for the period of 2002–2010 and on nowcasts for the period of 2011–12. The lack of actual data in the more recent period clearly poses a challenge in assessing the implications of the crisis on SMEs; however, this constraint is somewhat mitigated by using the countries' SMEs share relative to the sample's median and/or by examining the average share of the SMEs over the sample period.[7] Second, the reported SMEs shares capture the prevalence of SMEs in the formal business sector, which may be biased downwards, particularly if one assumes that SMEs are more prevalent in the informal economy. Lastly, there may be some inconsistencies in the definition of SMEs between the EU definition and the bank lending surveys at the country level.[8]

10.   The rest of the paper is structured as follows: Section II documents the link between the share of SMEs in the EU and the GDP growth since the onset of the global financial crisis, and examines whether countries with high prevalence of SME have underperformed due to adverse credit conditions. Section III develops a measure for credit supply shocks faced by SMEs from the banks lending survey and, by employing a panel VAR estimation, evaluates the macroeconomic effects of credit supply shocks faced by SMEs, including by looking at the contribution of SMEs prevalence. Section IV concludes.

II. ECONOMIC ACTIVITY SINCE 2008 AND THE PREVALENCE OF SMEs

11.   The economic recovery of many EU members from the global financial crisis has been sluggish. Despite substantial monetary easing and policy efforts to restore bank intermediation, tight financial conditions and fragile confidence continued to exert downward pressure on economic recovery. Production in many of the EU members has remained well below full capacity and some economies, including in the euro zone periphery, fell into a

---

[7] In most countries, the SMEs' share showed little variance over time.
[8] The EU classifies SMEs as firms with less than 250 employees and an annual turnover of €50 million or a balance sheet total of €43 million. In the bank lending surveys, an enterprise is normally considered large if its annual net turnover is more than €50.

second recession in 2012. A closer look at the overall pace of recovery since 2009 shows that, at end-2012, real GDP has surpassed its pre-crisis (2008) levels in only nine out of twenty seven EU members.[9]

12.   Interestingly, the pace of economic recovery exhibits a negative correlation with the prevalence of SMEs. As can be seen from figure 6, countries that have high prevalence of SMEs registered, on average, slower real GDP growth in 2008–12, thus suggesting that SMEs play an important role in constraining economic recovery when stressed financial conditions prevail.[10]

Figure 6. The Prevalence of SMEs and Economic Recovery
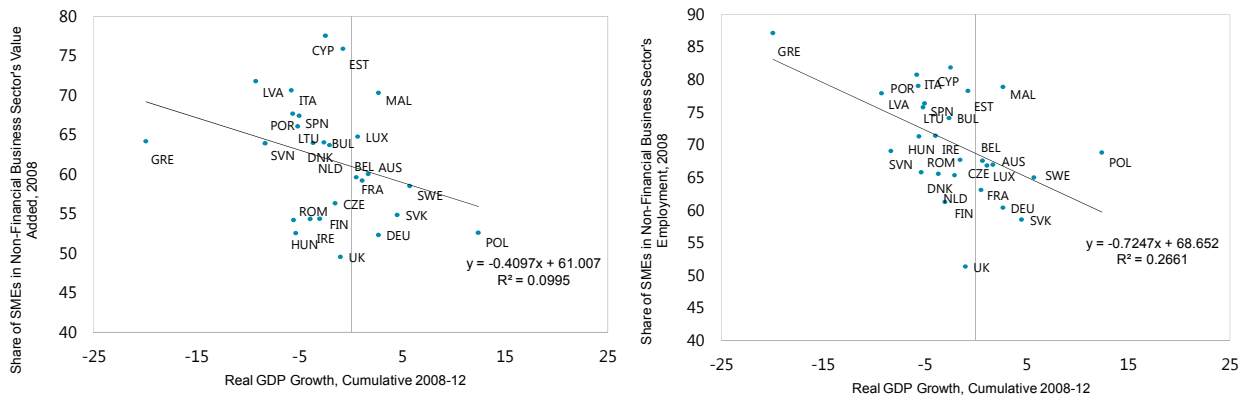
Sources: WEO and the EC's annual report on SMEs in the EU in 2012/13.

13.   To evaluate more formally whether countries with high the prevalence of SMEs registered slower GDP growth in the post crisis period (2010–12) we estimate the following simple specification:

$$(1) \ Growth_{t,i} = \beta_0 + \beta_1 * Dum\_crisis + \beta_2 * Dum\_recovery + \beta_3 * Dum\_crisis \\ * SMEs + \beta_4 * Dum\_recovery * SMEs + \beta_5 * Pub\_Debt_{t,i} + \beta_6 \\ * US\_Growth_t + \beta_7 * VIX_t + \beta_8 * Corp\_Debt_t + \varepsilon_t$$

where *Growth* is GDP growth (y-o-y) in quarter t in country i; *SMEs* is the countries' SMEs share in the non financial business sector's value added (average, 2002–2012);[11] *Dum_crisis* is a dummy variable for the initial period of the crisis (obtains a value of 1 for 2008q4-2009q4 and zero otherwise), and *Dum_recovery* is a dummy variable for the post-crisis period (obtains a value of 1 for 2010q1–2012q4 and zero otherwise). These two dummy variables separate the initial period of the shock (2008q4-2009q4) when most countries

---

[9] The analysis excludes Croatia, which officially joined the EU in July 1, 2013.

[10] Exclusion of Greece from Figure 6 does not change the slope of the trend line. See Figures 1A and 2A in the Annex.

[11] Since the focus of this work is on GDP growth, we use, from this point onward, the share of SMEs' value added in the non-financial business sector as indication for the SMEs' prevalence.

registered a contraction from 2010–12 when many countries registered a recovery (Figure 7). Since the aim is not to perfectly explain the GDP growth but only to examine whether countries with high share of SMEs experienced slower economic growth in 2009–12 we do not include all possible variables that may affect GDP growth. Instead, we control only for the global business cycles (captured by the US GDP growth, *US_Growth*), global risk aversion (captured by the implied volatility of S&P index options, *VIX*), and crisis or near-

crisis cases by including the general government debt as a share of GDP, *Pub_Debt,* and corporate debt as a share of GDP, *Corp_Debt*.[12] The impact of SMEs on GDP growth is assessed through the interaction of *Dum_crisis* and *Dum_recovery* with *SMEs*. We use quarterly data 2002q1–2012q4 taken from the World Economic Outlook and Haver. For robustness, the estimation was done by employing three methodologies: a simple OLS, Fixed effects, and dynamic panel estimation.

Figure 7. Real GDP Growth in the EU

Sources: Haver and IMF staff's calculations.
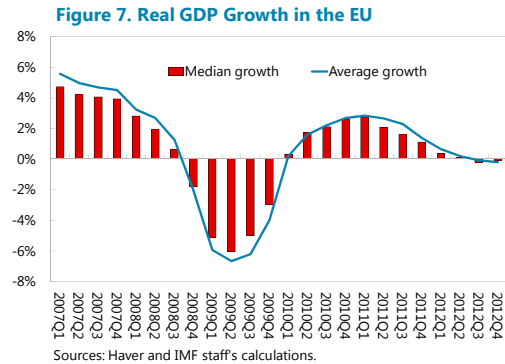
14.   The estimation results are presented in Table 1. The coefficients of the global business cycles, of the global risk aversion, and of the general government and corporate debt levels are significant with the expected signs. In addition, the interaction of *Dum_recovery* and *SMEs* yields negative and significant coefficients in all the three methodologies, thus suggesting that countries with high prevalence of SME indeed experienced a weaker growth in 2010–12 than the sample's average. Once this interaction is introduced, the coefficient of *Dum_recovery* for the overall sample becomes positive and significant (in two out of the three specifications).

Table 1. Prevalence of SMEs and Economic Recovery, 2002q1–2012q4, Specification A						
Dependent variable: GDP Growth, y-o-y						
	OLS		Fixed Effects		Dynamic Panel	
GDP Growth(-1)					0.694*	0.683*
Dum_crisis	-4.856*	-7.111*	-4.700*	-8.785*	0.049	-2.172***
Dum_recovery	-1.055*	4.039*	-0.471***	2. 516	0.182	2.233*
*Dum_crisis*SMEs*		0.037		0.069***		0.033***
*Dum_recovery *SMEs*		-0.087*		-0.051***		-0.034**
US_Growth	0.384*	0.387*	0.369*	0.369*	0.365*	0.352*
Pub_Debt	-0.042*	-0.040*	-0.071*	-0.070*	-0.028*	-0.029*
VIX					-0.035*	-0.035*
Corp_Debt	-0.007*	-0.007*	-0.007**	-0.007**		
Constant	5.530*	5.350*	7.111*	7.079*	2.270*	2.357*
# obs.	822	822	822	822	966	966
R-squared (overall)	0.570	0.578	0.535	0.543		
Significance level: * significant at 1 percent, ** significant at 5 percent, *** significant at 10 percent.						

---

[12] External debt was not found to have a significant impact in the GDP growth estimations.

15.   For robustness, we also estimate an alternative specification that, instead of the interaction with average SMEs share, includes an interaction with *SMEs_High*—a dummy, which obtains a value of one for countries with a share of SMEs above the sample's median (60 percent of the non-financial business sector's value added) and zero otherwise. The estimation results, which are presented in Table 2, are consistent with the previous set of estimations and reaffirm that countries with high prevalence of SMEs registered, on average, negative economic growth in 2010–12.

Table 2. Prevalence of SMEs and Economic Recovery, 2002q1–2012q4, Specification B						
Dependent variable: GDP Growth, y-o-y						
	OLS		Fixed Effects		Dynamic Panel	
GDP Growth(-1)					0.690*	0.686*
Dum_crisis	-4.856*	-4.653*	-4.700*	-4.649*	-0.096	-0.118
Dum_recovery	-1.055*	-0.526**	-0.471***	-0.136	0.160	0.377**
*Dum_crisis*SMEs_High*		-0.481		-0.130		-0.009
*Dum_recovery *SMEs_High*		-1.277*		-0.849**		-0.447**
US_Growth	0.384*	0.387*	0.369*	0.372*	0.350*	0.352*
Pub_Debt	-0.042*	-0.041*	-0.071*	-0.069*	-0.028*	-0.028*
VIX					-0.035*	-0.035*
Corp_Debt	-0.007*	-0.007*	-0.007*	-0.007**		
Constant	5.530*	5.372*	7.111*	7.011*	2.317*	2.317*
# obs.	822	822	822	822	966	966
R-squared (overall)	0.570	0.580	0.535	0.546		
Significance level: * significant at 1 percent, ** significant at 5 percent, *** significant at 10 percent.						

16.   The presumption that countries with high prevalence of SMEs recover more slowly in an environment of tight financial conditions also implies that credit growth to SMEs in these countries is restrained. Figure 8 below show that there is indeed a negative correlation between the cumulative growth of credit to non-financial corporates in the post crisis period and the prevalence of SMEs.[13] More specifically, countries with high (low) prevalence of SMEs registered, on average, lower (higher) credit growth (in both real and nominal terms) in 2008–12. While the observed credit growth is an outcome of both supply and demand factors, this may provide an initial indication that the prevalence of SMEs affects the pace of economic recovery through the lending channel, as was suggested in earlier empirical findings. We examine the inter-linkages between credit supply disruptions, GDP growth and other macroeconomic variables in the next section.

---

[13] Since comparable database on credit stock of SMEs is not available for all EU countries, we use BIS data on credit to non-financial corporations (from all sectors). This data does not provide a breakdown of lending by currencies, thus can lead to valuation problems for countries in which foreign currency lending is extensive (e.g. Hungary).

Figure 8. Credit to the Private Non-Financial Corporations and the Prevalence of SMEs, 2008-12

Real Credit to Non-Financial Corporations and the Prevalence of SME

Nominal Credit to Non-Financial Corporations and the Prevalence of SME
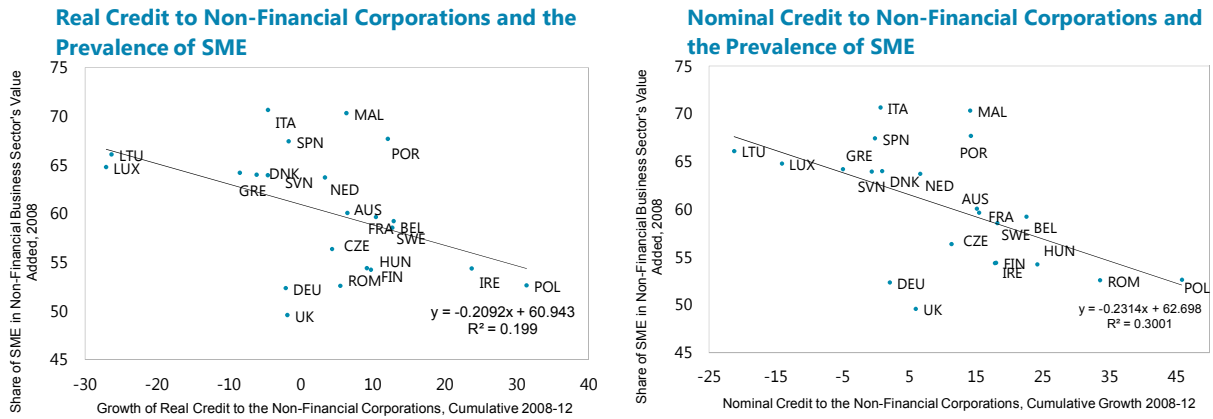
Sources: BIS, Haver, and EC's annual report on Europen SMEs2012/13.

III. THE MACROECONOMIC IMPLICATIONS OF CREDIT SUPPLY SHOCKS TO SMES

17.   In this section we examine the effects of credit supply shocks faced by SMEs on economic growth. We follow Bassett et al. (2013) and apply a two-stage estimation approach. In the first stage, we use the information in the bank lending surveys to create a measure for the supply of credit to SMEs. This is done by purging the reported lending standards to SMEs from shifts in the demand by SMEs as reported by banks. In the second stage, the credit supply measure is included in a panel VAR framework together with other macroeconomic variables such as real GDP growth in order to evaluate the macroeconomic effects of credit supply shocks to SMEs. The latter can shed light on the importance of SMEs' access to finance during episodes of economic recovery.

18.   The credit supply shocks for SMEs are extracted from the lending survey responses conducted by 15 central banks.[14] Among others, the lending surveys ask about the extent in which banks have changed their lending standards to SMEs in the past three months. The responses are then grouped and reported as the net percentage of banks (weighted by their market shares) that have tightened or loosened the credit standards.[15] It is important to note two major caveats in this approach. First, the surveys provide a qualitative assessment and do not capture the magnitude of the tightening/easing of lending standards. Therefore the financing conditions in two countries that reported the same net percentage balance may not be same. Second, there are slight differences in the surveys' questions across countries, which may lead to some inconsistency in the banks responses (see Annex for more details).

---

[14] We use bank lending surveys of the following countries: Austria, Cyprus, France, Germany, Hungary, Italy, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Slovenia, Spain, and the UK. See Annex for more details.

[15] The net percentage is defined as the difference between the sum of the percentages of banks responding "tightened considerably" and "tightened somewhat", and the sum of the percentages of banks responding "eased considerably" and "eased somewhat".

19.   Banks' responses about changes in lending standards not necessarily reflect "pure" constraints on the supply of credit such as banks' liquidity and capital, but also other factors that affect demand (for instance, those that are related to changes in borrowers' creditworthiness, the macroeconomic outlook, and economic uncertainty). To address this, we build on the methodology used by Bassett et al. (2013),[16] and regress the net percentage balance of the change in banks lending standards to SMEs on the changes in loan demand by SMEs. While this approach may not fully address the endogeneity problem, also because the firms' demand for credit may be affected by past changes in credit standards, the resulting residuals may provide a cleaner measure of movements in the supply of the banking sector's loans to SMEs.[17]

20.   We use a dynamic panel specification (Arrelano-Bond, 1991) because banks typically change their lending standards in a gradual manner (Eq. 2). The dependent variable, $\Delta S_{i,t}$, reflects the change in lending standards for SMEs at country i in quarter t (positive levels indicate that a larger proportion of banks have tightened the lending standards whereas negative levels indicate that larger proportion of banks eased credit standards); $\Delta S_{i,t-1}$ is the lagged dependent variable, and $\Delta D_{i,t}$ is the corresponding change in loan demand by SMEs (positive levels indicate a net increase in demand for loans). The latter variable was treated as endogenous and was instrumented with its lags. The estimation includes 15 countries (516 observations) and covers the period 2003q1–2012q4.[18] The estimation yields the following coefficients (z-statistics in parenthesis):

$$\Delta S_{i,t} = 4.995 + 0.643 * \Delta S_{i,t-1} - 0.092 * \Delta D_{i,t} + \varepsilon_{i,t} \qquad (2)$$
$$\quad\; (4.68) \quad\;\; (10.44) \qquad\qquad (-2.20)$$

21.   The estimation results confirm that there are mutual factors that affect both the credit demand and lending standards. As expected, periods of tighter lending standards are associated with lower demand for loans (Figure 3A in Annex). Moreover, the relatively high coefficient of the lagged dependent variable points to a high degree of persistence in bank lending standards and may suggest that banks are taking a conservative approach when changing their lending policies. The adjusted credit standards for individual countries are presented in Figure 6.A).

---

[16] Bassett et al (2013) use bank level responses and also controlled for bank-specific factors such as the bank size, stock market returns, change in loan loss provisions and change in net interest margin.

[17] IMF (2013) uses a similar approach, though it does not include the banks' responses about the change in demand for loans but variables that affect demand such as real GDP forecast, and stock market volatility.

[18] For Slovenia, Malta, Cyprus, and the UK, the sample is shorter due to data limitations. For Hungary, bank lending survey data is available in semi-annual frequency in 2003q1-2008q4 and in quarterly frequency in 2009q1-2012q4. The missing data points for 2003q1-2008q4 were populated by the average of the preceding and subsequent quarters.

22.   We use the residuals of Eq. 2 as a "cleaner" proxy for supply-driven constrains for lending to SMEs. This measure is included in a panel VAR estimation, which serves as a useful tool to evaluate the magnitude and duration of the effects. This technique also combines the traditional VAR approach, which treat all the variables in the system as endogenous, with a panel data approach, which allows for unobserved individual heterogeneity. The advantage of this methodology is that it does not require any a priori assumptions on the direction of the feedback between variables in the model. The panel VAR is computed from a program written by Love and Zicchino (2006) and is based on the following model:

$$Y_{i,t} = \delta_0 + \sum_{s=1}^{n} \delta_s Y_{i,t-s} + f_i + e_{i,t}, \ \ Y_{i,t} = \{\Delta \hat{S}_{i,t}, \Delta rgdp_{i,t}, \Delta p_{i,t}, \Delta credit_{i,t}, spread_{i,t}\} \ \ (3)$$

where $Y_{i,t}$ is a vector of five endogenous variables. The variable $\Delta \hat{S}_{i,t}$ is the residual from Eq. 2 and reflects the changes in lending standards for SMEs, $\Delta rgdp_{i,t}$ is the real GDP growth (yoy), $\Delta p_{i,t}$ is the inflation rate measured by yoy change of GDP deflator, and $\Delta credit_{i,t}$ is the real growth of credit to the non-financial corporate sector (yoy). Since lending standards can affect credit growth through both price and non-price factors we also include the $spread_{i,t}$, which is the gap between the interest rate on new loans (applied to non-financial corporations on small new loans of less than 1 million euro to better capture the rates applied to SMEs with maturity up to one year) and free-risk rate (policy rate). The countries' specifics are captured in this framework in the fixed effect variable, denoted in the model by f_i. Since the fixed effects are correlated with the regressors due to lags of the dependent variable, the analysis uses a forward mean-differencing (Helmert procedure), which removes the mean of all forward future observations available for each country-year (Arellano and Bover, 1995).[19]

23.   The dynamic behavior of the model is assessed using impulse response functions.[20] The shocks in the VAR were orthogonized using Cholesky decomposition, which implies that variables appearing earlier in the ordering are considered more exogenous, while those appearing later in the ordering are considered more endogenous. Since our objective is to assess the impact of banks' willingness to lend to SMEs on the rest of the endogenous variables, $\Delta \hat{S}_{i,t}$ is placed first in the ordering. This implies that credit supply shocks have an immediate impact on output growth, inflation, real growth of credit and interest rate spreads. This ordering can be justified by the fact that the credit supply measure is purged from demand effects, which in part capture the contemporaneous effects of macroeconomic environment. In addition, credit growth and interest spreads were ordered after output growth

---

[19] This transformation preserves the orthogonality between the transformed variables and lagged regressors. The estimation uses lagged regressors as instruments and estimate the coefficient by GMM methodology.

[20] Monte Carlo simulations are used to generate the confidence intervals.

and inflation to allow credit demand factors and monetary policy response to have a contemporaneous impact on them. We estimate the VAR over 2003q1–2012q4 using three lags of the endogenous variables.[21]

24.   The responses of banks lending survey and data on interest rate spreads were obtained from Haver; real GDP growth and GDP deflator figures were taken from the IMF World Economic Outlook (WEO) database, and credit to private non-financial corporates is obtained from BIS and Haver. Table 1A in the Annex provides summary statistics. The correlation between the five variables is broadly in line with economic theory (Table 2A in the Annex). Real GDP growth is positively correlated with inflation rate and real credit growth while negatively correlated with lending standards and interest rate spread; inflation is negatively correlated with interest rate spread while positively correlated with real growth of credit, reflecting periods of increased domestic demand; and lending standards are positively correlated with interest rate spread and real growth of credit. The latter may suggest that tighter lending standards were applied when credit expanded rapidly.
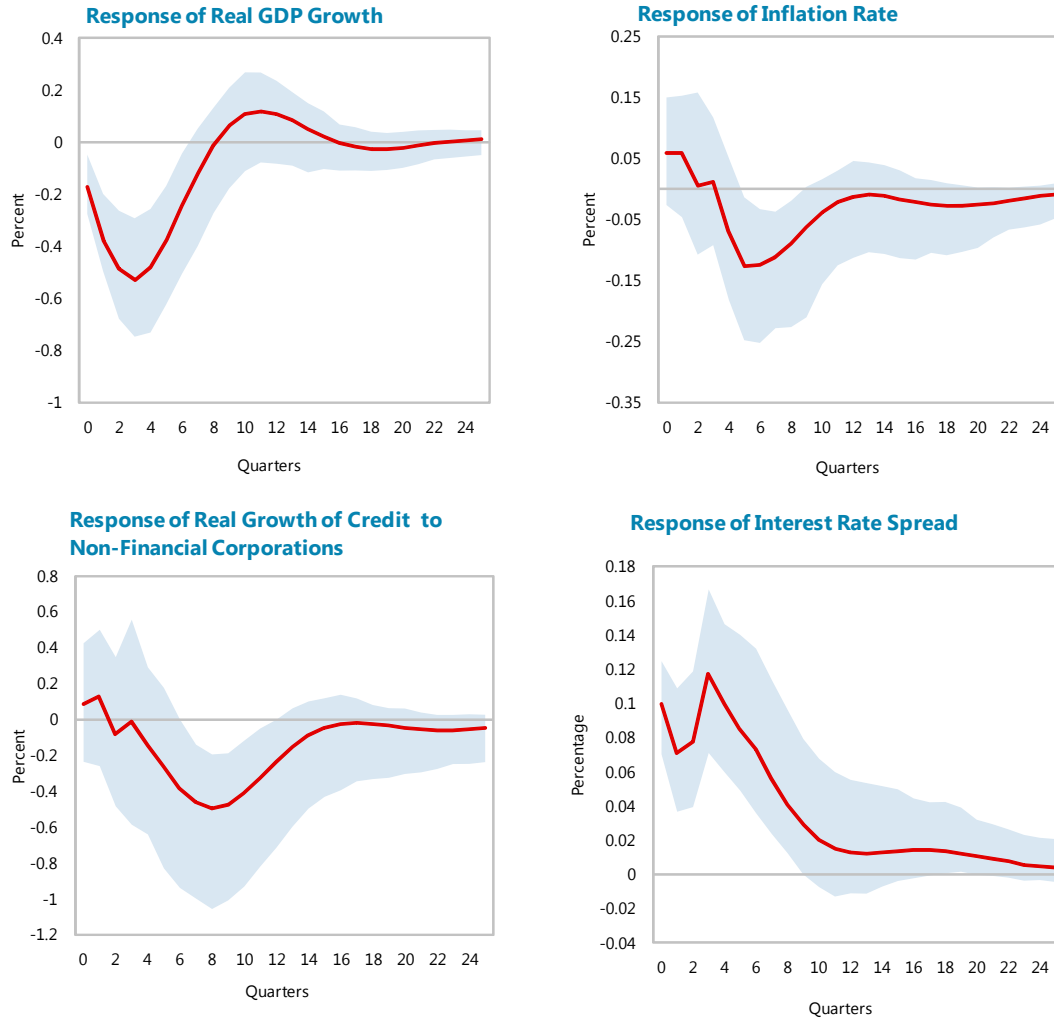
25.   Figure 9 shows the impulse responses functions (IRFs) of the key endogenous variables—real GDP growth, inflation, real growth of credit to non-financial corporations, and interest rate spread—to a one standard deviation shock to the measure of changes in the banks' credit supply. These IRFs suggest that an adverse credit supply shock applied to SMEs has significant macroeconomic implications. In particular, a shock of one standard deviation to credit supply (equal to an adjusted "net tightening" of about 18 percent) leads to a contraction lasting six quarters with a magnitude that reaches a trough of ½ percentage points in the fourth quarter.[22] In addition, it leads to a prolonged contraction in the real credit to non-financial corporations, which reaches a trough after eight quarters. The slow adjustment of credit growth in part reflects the fact that it is expressed as the growth of the stock and not of new loans, therefore even if banks curtail new lending (as expected when tighter conditions are applied) the credit stock would change more gradually according to the maturity of existing loans. The decline of real credit occurs despite the moderation of prices, which suggest that, in nominal terms, the contraction of credit is even deeper. While credit supply shock leads to wider interest rate spreads, it is worth noting that such a shock reflects also non-price factors such as collateral requirements, the size of the loan, maturity, non-interest charges and the like (Bondt et al., 2010). Therefore, the prolonged contraction of credit despite the relatively mild increase in the interest rate spread perhaps indicates that there is a large portion of loan applications that are being rejected when lending standards are tightened.

---

[21] Qualitatively, the results remain unchanged to different ordering and lags.

[22] The relatively high impact on GDP growth may result from the composition of the sample, which comprises of several crisis and near-crisis cases, and possibility that the adverse shock to SMEs may also capture the tightening of credit conditions to other segments in the economy such as households and large firms.

Figure 9. Impulse Responses to Adverse Credit Supply Shock Applied to SMEs[1,2]

Response of Real GDP Growth

Response of Inflation Rate

Response of Real Growth of Credit to Non-Financial Corporations

Response of Interest Rate Spread

[1]A shock of one standard deviation. [2] The shaded bands indicate 95 confidence intervals generated by Monte-Carlo with 300 repititions.
Source: IMF staff's estimations.

Robustness

26.   For robustness, we consider two alternative VAR specifications. In the first specification, denoted as "Alternative I", the "purged" credit standards for SMEs is replaced with the unadjusted measure, $\Delta S_{i,t}$. In the second specification, denoted as "Alternative II", we change the ordering of the VAR, such that we allow real GDP growth and inflation to have a contemporaneous effect on $\Delta \hat{S}_{i,t}$. All specifications are estimated over 2003q1–2012q4 period using three lags of the endogenous variables.

27.   Figure 10 traces the impulse responses of the endogenous variables under the two alternative specifications. It shows that, although the magnitude of the impulse responses is

somewhat different from the baseline scenario, their pattern paints a similar picture.[23] Under "Alternative I", an adverse shock to lending standards to SMEs leads to a sharper contraction of real GDP (reaching a trough of 0.6 percentage point in the 3rd quarter) and, as a reflection, the response of inflation, credit growth and the interest rate spread is somewhat stronger than in the baseline. In "Alternative II", the impact of tighter credit standards on real GDP is more moderate (reaching a trough of 0.4 percentage points in the 4th quarter), and therefore it leads to weaker feedback effects in the rest of the endogenous variables.

Figure 10. Impulse Responses to Adverse Credit Supply Shock Applied to SMEs, Alternative Specifications[1,2]
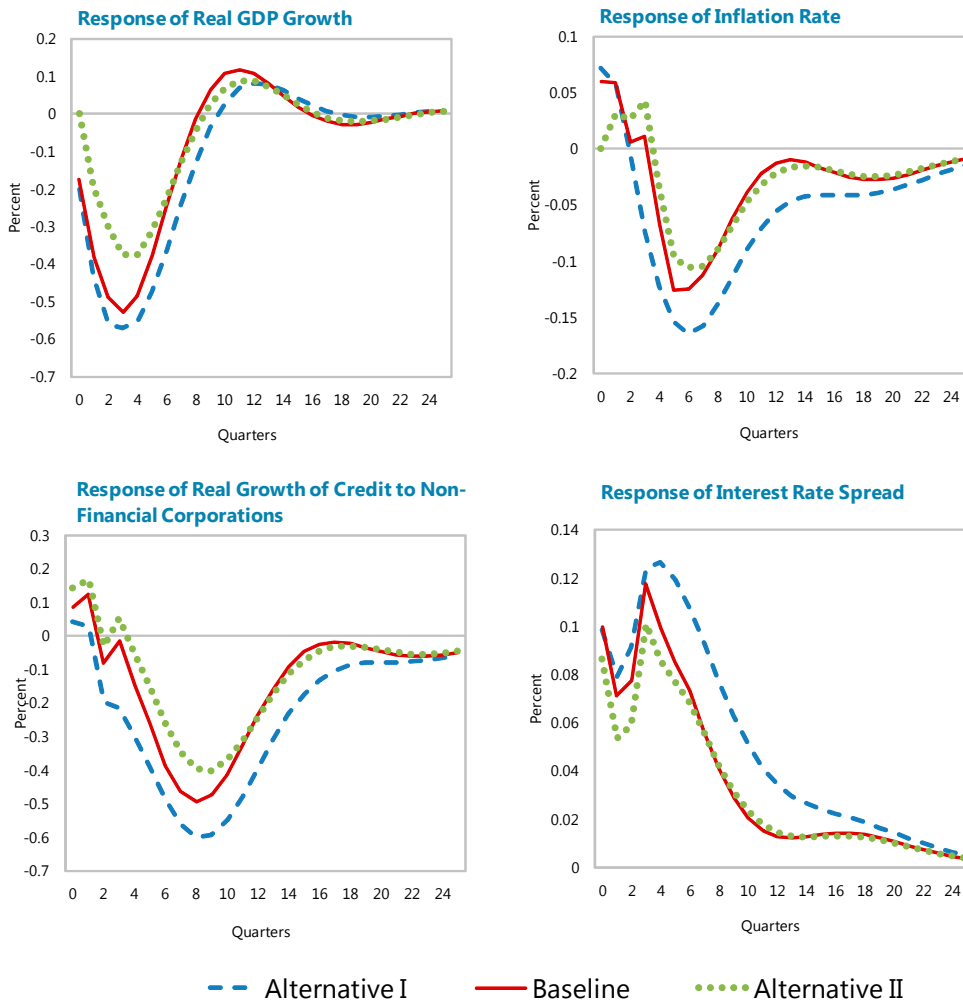
[1]A shock of one standard deviation. [2] "Alternative I" indicates responses to unadjusted credit standards applied to SMEs, and "Alternative II" indicates different VAR ordering.
Source: IMF staff's estimations.

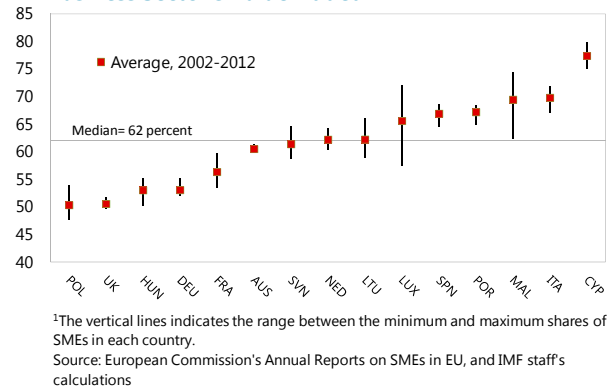[23] The shock to the credit standard under the three alternative specifications is broadly the same.

Does the prevalence of SMEs matter?

28.   The impact of credit supply shocks faced by SMEs on macroeconomic variables may depend on the prevalence of SMEs in the economy. To evaluate this presumption, we split the sample into two sub-samples according to the SMEs share in the non-financial business sector's value added. The first sub-sample (denoted as "*High share*") includes countries where the value added of SMEs is above the sample's median (62 percent) while the second sub-sample (denoted as "*Low share*") includes countries with SMEs' share below the sample's median (Figure 11). Since Lithuania, the Netherlands, and Slovenia registered an increase in the share of SMEs' value added over time from below the 62 percent threshold to above it, these observations were split between the two sub-samples.[24] Details on the breakdown of the two subsamples appear in Table 3A in the Annex.

29.   The estimation results indicate that the degree of SMEs prevalence indeed matters in periods of financial stress. While the impact of an adverse credit supply shock (standardized to be the same in both sub-samples) on GDP growth was found to be significant in both sub-samples (Figures 4A and 5A in the Annex), the IRFs suggest that the impact of the shock is much more prominent in the "*High share*" sub-sample (Figure 12). In particular, a credit supply shock (a "net tightening" by 18 percent of the banks) leads, on average, to a cumulative contraction of 2¾ percent in real output in the

Figure 11. The Share of SMEs in the Non-Financial Business Sector's Value Added[1]

[1]The vertical lines indicates the range between the minimum and maximum shares of SMEs in each country.
Source: European Commission's Annual Reports on SMEs in EU, and IMF staff's calculations

"*High share*" sub-sample compared to a cumulative contraction of 1¼ percent in the "*Low share*" sub-sample (over the medium term). This perhaps reflect stronger feedback effects from the weak economic activity to the banks' balance sheets, which prolong the tightening of the lending standards and, among others, keep the interest rate spread higher for a longer period.

30.   While these results are statistically robust, they should be treated with caution given that the "*High share*" group consists of four countries that were at the epicenter of the crisis (Italy, Cyprus, Portugal, and

Figure 12. Cumulative Response of Real GDP Growth to Adverse Credit Supply Shock Faced by SMEs

Source: IMF staff's estimations.

---
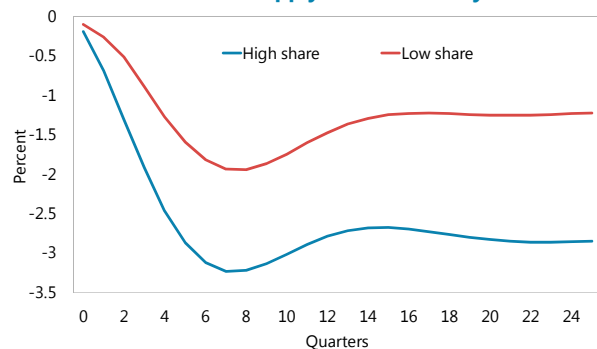
[24] Luxemburg registered a sharp decline of SMEs share in value added to below the sample median in 2004, but since it remained above the sample median for the rest of the period it is classified as a "High share" country.

Spain). Therefore, the impact of tightening lending conditions for SMEs on GDP growth may be overstated as it may capture broader problems in the domestic financial intermediation, tighter fiscal policies, and negative confidence effects.

IV. CONCLUSIONS

31.   The adverse financial conditions since the onset of the global financial crisis have increased the funding pressure on SMEs due to their heavy reliance on bank lending. Consequently, many of these firms had to scale down investment plans and cut production, therefore posing a drag on the overall economic activity. This paper aims at exploring the extent to which the tight financial conditions faced by SMEs in recent years have affected the pace of economic recovery of selected EU countries. In doing so, the paper also examines at the impact of the SMEs prevalence and credit growth across countries.

32.   The analysis shows that the pace of economic recovery and credit growth during 2010–2012 is negatively correlated with the prevalence of SMEs across EU countries. More specifically, the results indicate that countries with high share of SMEs tended to recover more slowly from the global financial crisis than countries with low share of SMEs, implying that the interaction of the economic structure and access to bank financing play a critical role during episodes of economic recovery. This conclusion is reinforced by a VAR estimation, which finds that a negative credit supply shock applied to SMEs has an adverse effect on economic activity, and this impact is greater in countries that have a high share of SMEs. The analysis results should be treated with caution given that some countries with the high prevalence of SMEs are crisis or near crisis cases where the weak economic activity was driven by factors other than tight credit conditions. However, the results are broadly consistent with earlier empirical studies that concluded that the performance of firms/industries that are heavily reliant on external financing is generally weaker than others when financial conditions are tight.

33.   Overall, the analysis' results illustrate the importance of maintaining adequate access to finance for SMEs in order to achieve a sustainable economic recovery, particularly in countries with high prevalence of SMEs. Clearly, SMEs are not a homogeneous group, and the challenge would be to differentiate between high-productivity and solvent SMEs and those that lack a sustainable business plan. Cheap long-term liquidity provision by central banks (e.g., "Funding for Lending" by the Bank of England, and "Funding for Growth" by the National Bank of Hungary), and expansion of state guarantee schemes may have some limited success, especially if they are conditional or linked to new lending to SMEs. Nevertheless, these transitional remedies should be accompanied by greater efforts to reduce the fragmentation in the credit markets and restore financial intermediation. To this end, it is imperative to strengthen banks' balance sheets through a faster cleanup of bad assets and measures to ensure that banks' capital and liquidity positions are adequate. At the same time, it is also important to increase the availability of non-bank financing sources, including through the development of securitization markets for SMEs loans.

REFERENCES

Arellano, M. and S. Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies*, 58, 277–297.

Arellano, M. and O. Bover. 1995. "Another Look at the Instrumental-Variable Estimation of Error-Components." *Journal of Econometrics*, 68, 29–52.

Barun, M. and B. Larrain. 2005. "Finance and the Business Cycle: International, Inter-Industry Evidence", *Journal of Finance*, American Finance Association, Vol. 60(3), pp. 1097–1128.

Basset, F. W., M.B. Chosak, J.C. Driscoll, and E. Zakrajsek. 2013. "Changes in Bank Lending Standards and the Macroeconomy", *Journal of Monetary Economics (forthcoming)*.

Beck, T., A. Demirguc-Kunt, and R. Levine. 2005. "SMEs, Growth, and Poverty: Cross-Country Evidence", *Journal of Economic Growth* Vol. 10, Issue 3, pp. 199–229.

Bondt, G., A. Maddaloni, J.L. Peydro, and S. Scopel. 2010. "The Euro Area Bank Survey Matters: Empirical Evidence for Credit and Output Growth", Working Paper Series No. 1160, European Central Bank.

Dell'Ariccia, G. E., Detragiache, and R. Rajan. 2008. "The Real Effect of Banking Crisis", *Journal of Financial Intermediation* 17, pp. 89–112.

IMF 2013. "Transition Challenges to Stability" World Economic and Financial Surveys, Global Financial Stability Report, October 2013, (Washington: International Monetary Fund, Washington).

Kannan, P. 2010. "Credit Conditions and Recoveries from Recessions Associated with Financial Crises", IMF Working Paper 10/83 (Washington: International Monetary Fund).

Kashyap, A., K.O. Lemont, and J. Stein. 1994. "Credit Conditions and the Cyclical Behaviour of Inventories", *Quarterly Journal of Economics* 109, pp. 565–592.

Kroszner, R.S., L. Laeven, and D. Klingebiel. 2007. "Banking Crises, Financial Dependence, and Growth", Journal of Financial Economics 84, pp. 187–228.

Leegwater, A. and A. Shaw. 2008. "The Role of Micro, Small, and Medium Enterprises in Economic Growth: A Cross-Country Regression Analysis", USAID micro report 135.

Love, I. and L. Zicchino. 2006. "Financial Development and Dynamic Investment Behaviour: evidence from Panel VAR.", The Quarterly Review of Economics and Finance, 46, 190–210.

OECD. 2004. "Promoting Entrepreneurship and Innovative SMEs in the Global Economy", Second OECD Conference of Ministers Responsible for Small and Medium Enterprises (SMEs), Istanbul, Turkey.

Rajan, R. and L. Zingales. 1998. "Financial Dependence and Growth", *American Economic Review* Vol. 88, pp. 559–586.

Shaffer, S. 2002. "Firms Size and Economic Growth", *Economic Letters* 76, 195–203.

ANNEXES

Data

Data on SMEs shares in employment and value added is extracted from the European Commission's database for its annual reports on small and medium size enterprises in the EU (http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/index_en.htm#h2-5). Data on credit to the private non-financial sector is obtained from the BIS database (http://www.bis.org/statistics/credtopriv.htm). For, Romania, Slovenia, Malta, Lithuania, and Luxemburg the data is taken from Haver. Data on real GDP, GDP deflator, and public debt, is taken from the IMF's World Economic Outlook database. Bank lending surveys and data on the VIX and interest rate spreads is taken from Haver, and Bank of Lithuania.

Bank lending survey[25]

The survey questions are phrased in terms of changes over the past three months, apart from Lithuania were the survey refers to a period of six months.

For the lending standards to SMEs, the analysis uses the responses to the following question [26, 27]: *"Over the past three months, how have your bank's credit standards as applied to the approval of loans or credit lines to enterprises changed?"*

For the UK, the analysis uses the responses to the following question (with an opposite sign): *"How has the proportion of loan applications from medium private nonfinancial corporations being approved changed?"*

For the loan demand by SMEs, the analysis uses the responses to the following question: *"Over the past three months, how has the demand for loans or credit lines to enterprises changed at your bank, apart from normal seasonal fluctuations?"*

For the UK, the analysis uses the responses to the following question: *"How has demand for lending from medium private nonfinancial corporations changed?"*

In the context of credit standards, the net percentage is defined as the difference between the sum of the percentages of banks responding "tightened considerably" and "tightened somewhat", and the sum of the percentages of banks responding "eased considerably" and "eased somewhat". Regarding demand for loans, the net percentage is defined as the difference between the sum of the percentages of banks responding "increased considerably" and "increased somewhat", and the sum of the percentages of banks responding "decreased considerably" and "decreased somewhat".
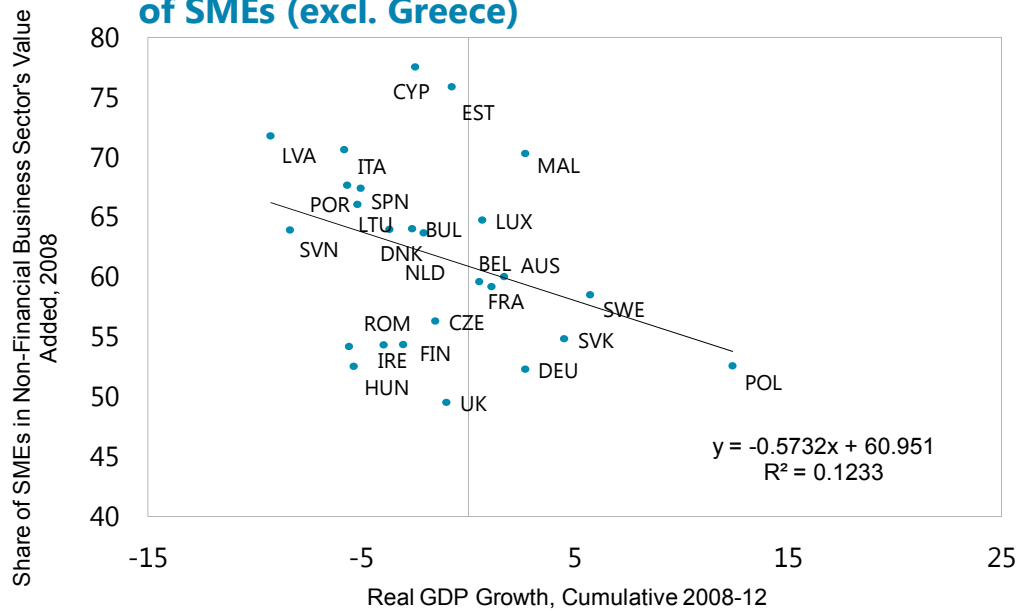
---

[25] We use the bank lending survey of Austria, Cyprus, France, Germany, Hungary, Italy, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Slovenia, Spain, and the UK.

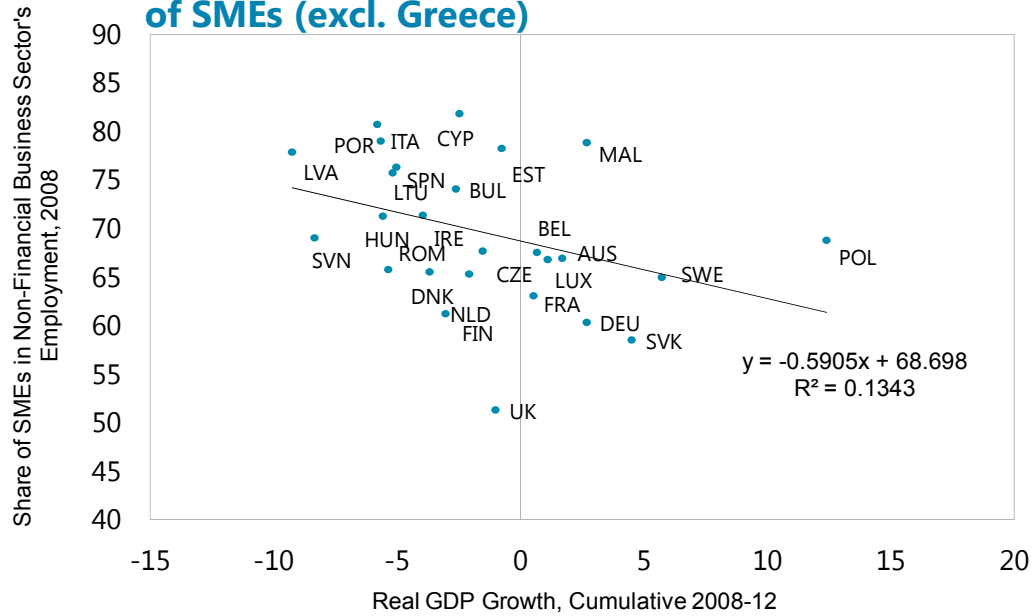[26] Responses for Lithuania were taken from the Bank of Lithuania's website.

[27] In Hungary, the responses refer to micro and small enterprises.

**Figure 1A. Economic Recovery and the Prevalence of SMEs (excl. Greece)**

Share of SMEs in Non-Financial Business Sector's Value Added, 2008

CYP · EST

LVA · ITA · MAL

POR · SPN · LUX

LTU · BUL

SVN · DNK

NLD · BEL AUS

FRA · SWE

ROM · CZE

IRE FIN · SVK

HUN · DEU · POL

UK

$y = -0.5732x + 60.951$
$R^2 = 0.1233$

Real GDP Growth, Cumulative 2008-12

Sources: WEO and the EC's annual report on SMEs in the EU in 2011/12.

Figure 2A. Economic Recovery and the Prevalence of SMEs (excl. Greece)

Share of SMEs in Non-Financial Business Sector's Employment, 2008

POR · ITA · CYP

LVA · SPN · EST

LTU · BUL · MAL

HUN · IRE · BEL

SVN · ROM · AUS

CZE · SWE · POL

DNK · LUX

NLD · FRA

FIN · DEU

SVK

UK

$y = -0.5905x + 68.698$
$R^2 = 0.1343$

Real GDP Growth, Cumulative 2008-12

Sources: WEO and the EC's annual report on SMEs in the EU in 2011/12.

Figure 3A. Banks' Lending Standards applied to SMEs and demand for credit by SMEs, Euro Area

Demand for credit by SMEss ▬ Lending standards applied for SMEs
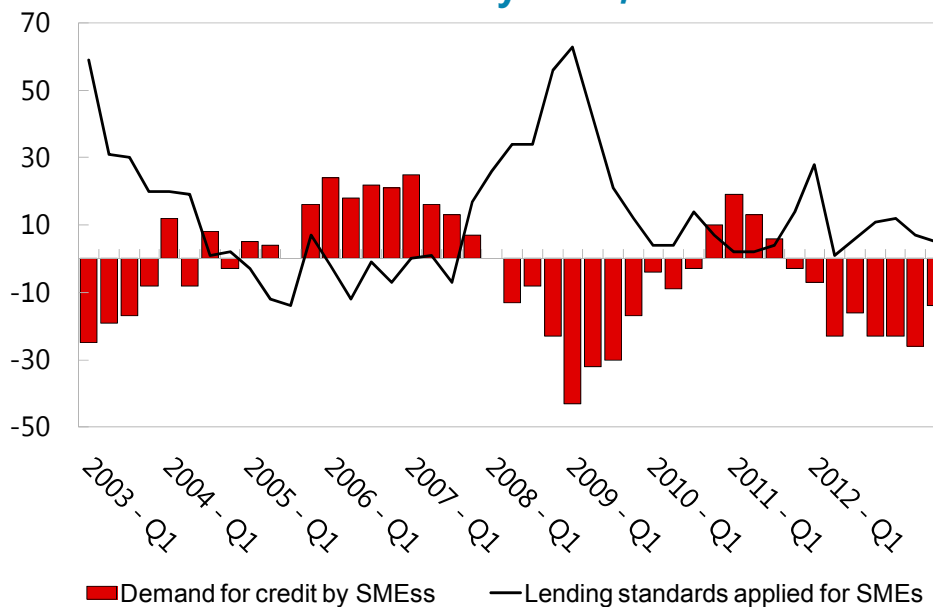
Source: ECB.

Table 1A. Summary Statistics, Panel VAR variables					
	Obs. #	Mean	Std. Dev	Min	Max
$\Delta\hat{S}$	501	0	18.917	-66.812	76.138
$\Delta rgdp$	1012	1.749	3.524	-16.840	12.531
Δp	1012	2.714	3.072	-7.790	22.221
$\Delta credit$	943	4.695	8.633	-25.005	42.409
$spread$	831	1.758	1.309	-1.39	7.58

Table 2A. Correlation Matrix					
	$\Delta\hat{S}$	$\Delta rgdp$	Δp	$\Delta credit$	$spread$
$\Delta\hat{S}$	1				
$\Delta rgdp$	-0.139	1			
Δp	0.036	0.427	1		
$\Delta credit$	0.122	0.190	0.257	1	
$spread$	0.150	-0.463	-0.181	-0.124	1

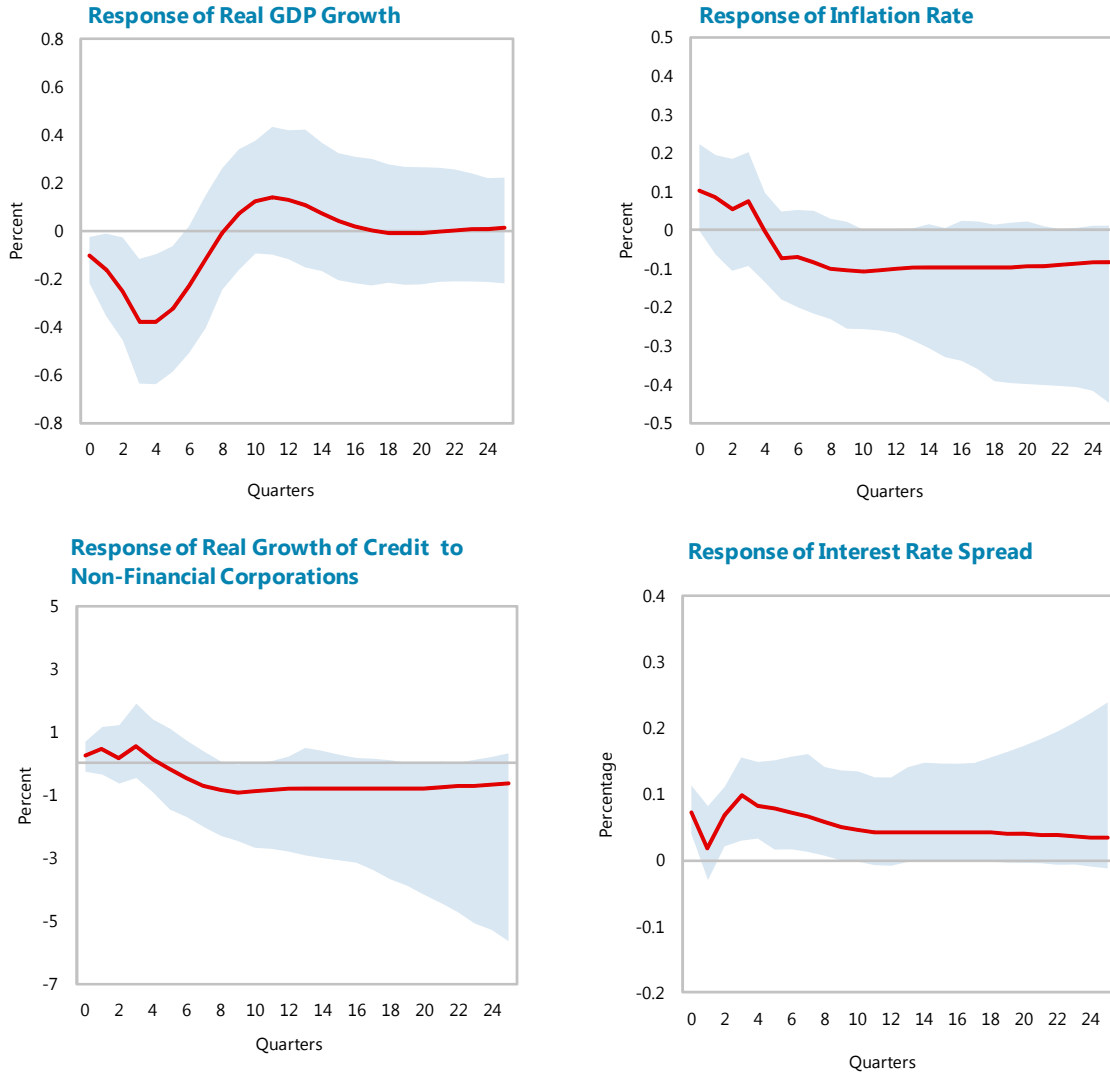| Table 3A. Composition of the two-subsamples	
High share	Low share
Cyprus, Greece, Italy, Spain, Portugal, Malta, Lithuania (2006q1–2012q4), the Netherlands (2006q1–2012q4), and Slovenia (2007q1–2012q4).	Austria, Germany, France, Hungary, Lithuania (2003q1–2005q4), the Netherlands (2003q1–2005q4), Poland, Slovenia (2003q1–2006q4), and the UK.
*The split between the two sub-samples was done according to the sample's median (62 percent) of the share of SMEs value added. The split for 2012 is based on the 2011 shares.	

Figure 4A. Impulse Responses to Adverse Credit Supply Shock Applied to SMEs,[1,2]
High share sub-sample
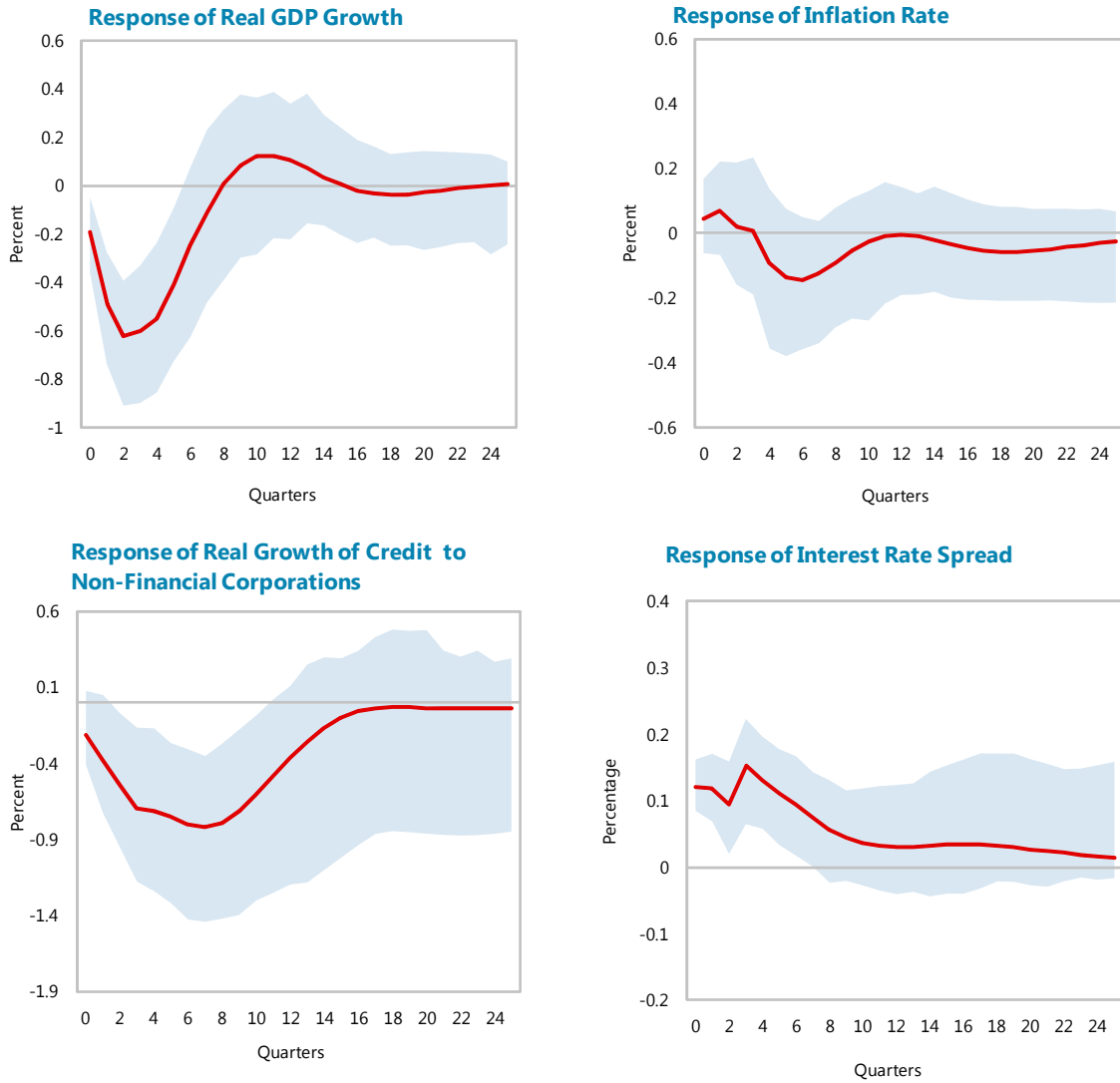
Response of Real GDP Growth

Response of Inflation Rate

Response of Real Growth of Credit to Non-Financial Corporations

Response of Interest Rate Spread

[1]A shock of one standard deviation. [2] The shaded bands indicate 95 confidence intervals generated by Monte-Carlo with 300 repititions.
Source: IMF staff's estimations.

Figure 5A. Impulse Responses to Adverse Credit Supply Shock Applied to SMEs,[1,2]
Low share sub-sample

Response of Real GDP Growth

Response of Inflation Rate

Response of Real Growth of Credit to Non-Financial Corporations

Response of Interest Rate Spread

[1]A shock of one standard deviation. [2] The shaded bands indicate 95 confidence intervals generated by Monte-Carlo with 300 repititions.
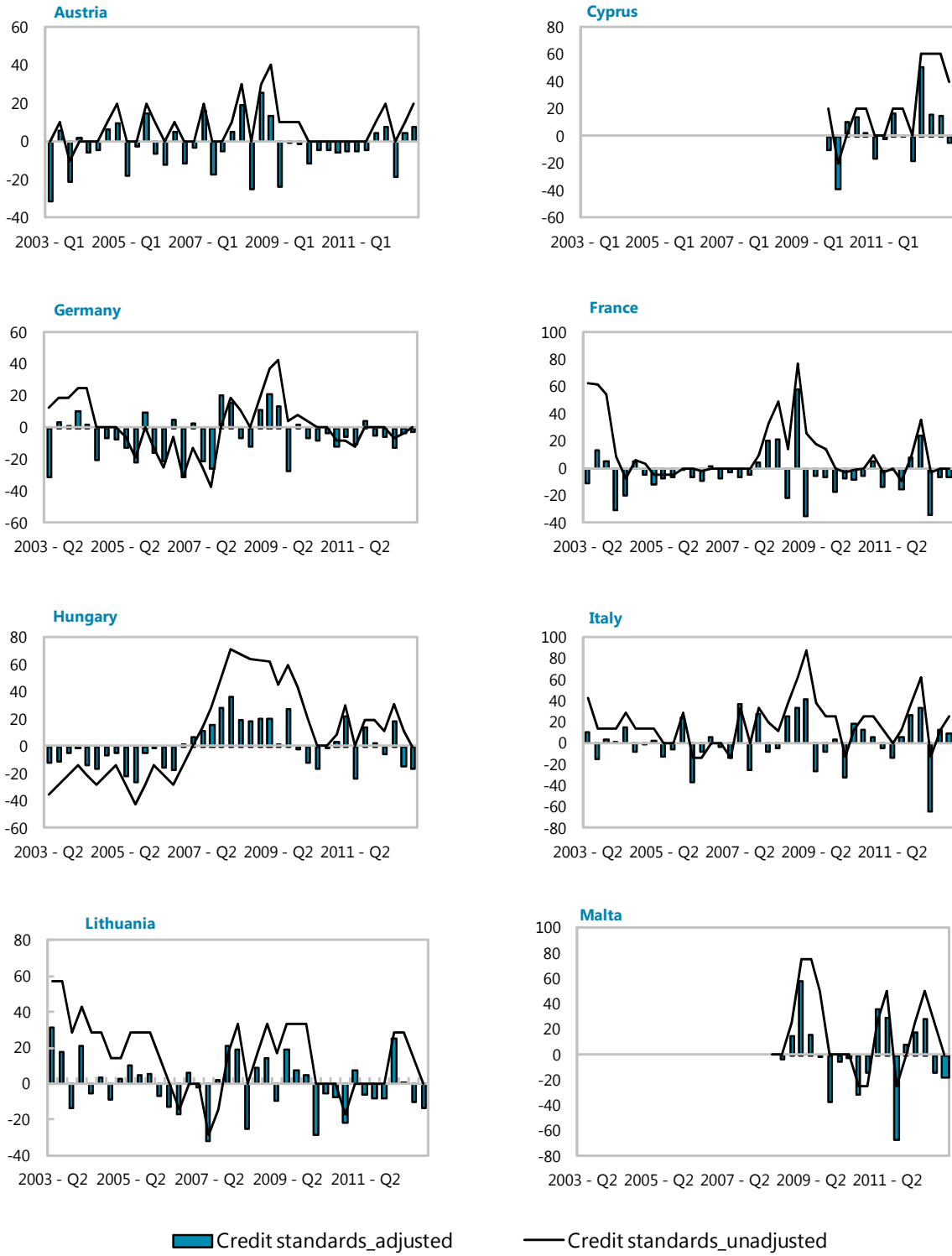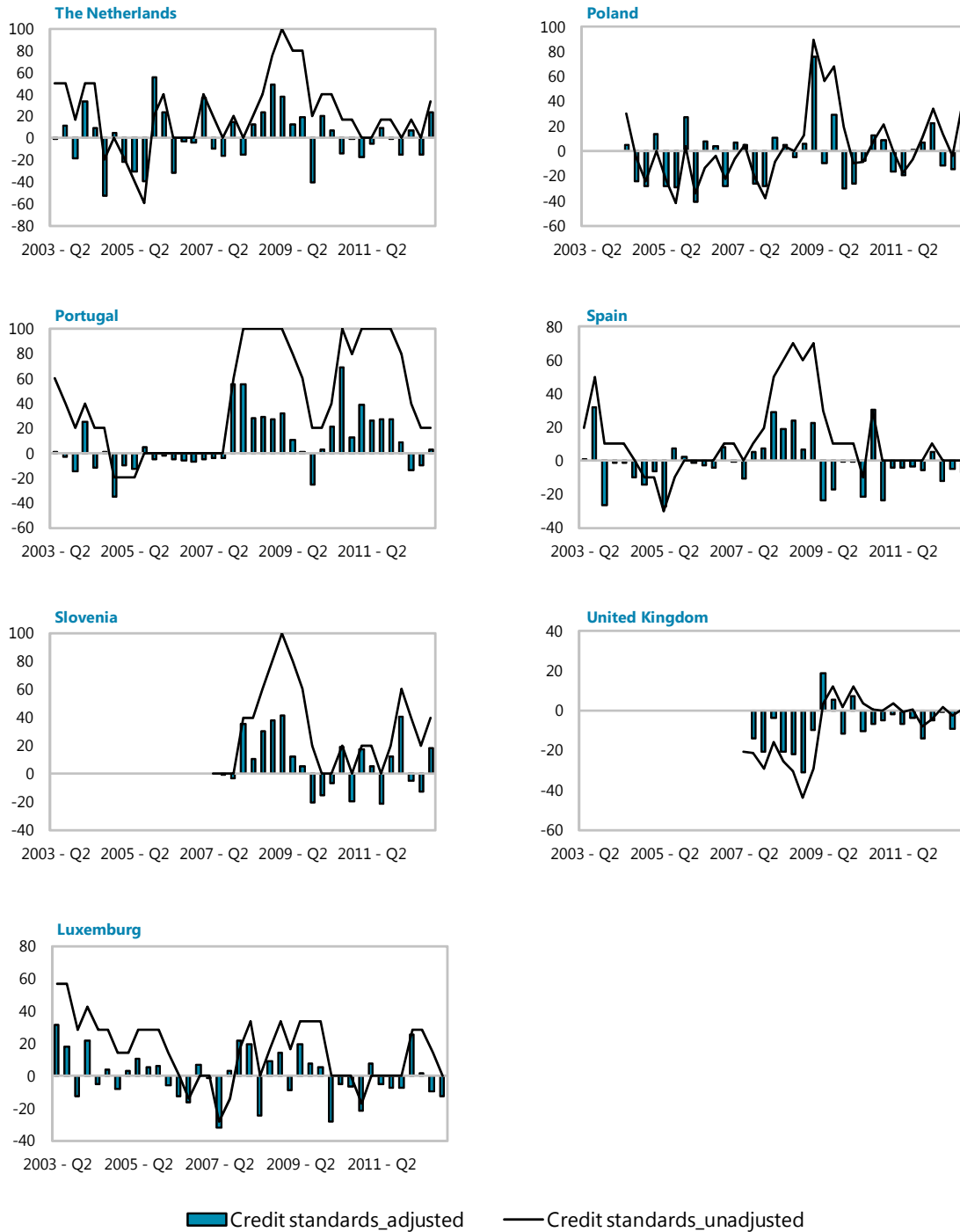Source: IMF staff's estimations.

Figure 6A. Bank Lending Surveys: Credit Standards applied to SMEs

Credit standards_adjusted   Credit standards_unadjusted

Source: Haver and IMF staff's estimations.

Figure 6A. Banking Lending Surveys: Credit Standards applied to SMEs (concluded)

The Netherlands

Poland

Portugal

Spain

Slovenia

United Kingdom

Luxemburg

Credit standards_adjusted   Credit standards_unadjusted

Source: Haver and IMF staff's estimations.