Foreign Monetary Policy and Firms' Default Risk

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Abstract

This study documents the relationship between foreign and domestic monetary policy and firms' *ex-ante* forward-looking default probability measures. We analyze market based measures of default for large non-financial firms in the US and the EMU area. We show that foreign monetary policy influences firms' default probability and such influence depends on firms' degree of internationalization. These results highlight the need for macro-prudential authorities to pay attention to foreign policies in the struggle against large default events.

Keywords: Foreign Monetary Policy, Default Probability, Unexpected Monetary Policy

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Is there a relationship between foreign monetary policy and the default risk of domestic firms? The current economic landscape characterized by a globalized economy and the active use of monetary policy instruments highlights the need of an answer to such question. Unlike the comprehensive literature analyzing the impact of domestic monetary policy on the economy, which we briefly review in our related literature section, the crossover effects of foreign monetary policies on the stability of domestic firms have not received such ample attention.[1] The main goal of this study is to analyze from an empirical perspective such relationship.

This study documents how the stability of (large) firms in an economy is, among other factors, related to the rates that foreign monetary authorities set. We show how this relationship is not homogenous across firms, being firms' degree of internationalization a key element determining such relationship. Although this study wants to highlight the influence of foreign monetary policy in firms' default, it should be noted that during all of our analysis we also take into consideration domestic monetary policy. In line with previous studies, we find that domestic monetary policy is related to domestic firms' default risk.

In order to conduct our study we focus on the relationship between the United States and European Monetary Union during the years 2000 to 2009. Our first goal is to obtain market based measures of default that can serve as a forward looking indicator of firms' default. To do so we use information from Credit Default Swaps (CDS), a derivative instrument whose liquidity has increased during recent years, which allows us to back out market implied probabilities of default.[2] The nature of non-financial firms for which CDSs are available and liquid allows this study to document how monetary policy is related to default in firms with ample market based finance and that are less bank dependent than those analyzed in previous studies. The relationship between

[1]It should be highlighted that already Mundell (1968) models the international impact of monetary policy in a two country setup.

[2]This allows to have forward looking measures of default instead of using historical accounting-based measures or default history of firms in order to measure the firms' probability of default

these firms and monetary policy can in principle be different from those firms that receive loans from banks. As we will argue in our literature review section, this allows to have a more complete understanding of the relationship between monetary policy and firms' default risk.

Our main contribution is to document the influence of foreign monetary authorities on the default risk of (large) non-financial domestic firms using market based information. We first undergo an analysis of the relationship between target monetary rates and firms' default risk.[3] We show that when foreign monetary rates are higher, the default probability of domestic firms are higher. We highlight that the influence of foreign monetary rates on firms' default risk is not homogenous and depends on firms' characteristics. For example, larger firms (measured by their total assets) show a lower increase in their probability of default when foreign monetary rates increase. We provide evidence on the foreign exposure of a given firm being a key characteristic driving this relationship, as firms with higher foreign exposure (measured by the ratio of foreign to total income for example) show a lower increase in their probability of default when foreign monetary rates increase. This evidence is robust to controlling for business cycles, exchange rates, or idiosyncratic firm characteristics.

The relationship we document is economically meaningful. As an example an average EMU firm, which in our sample has a 5-year implied default probability of 5.7% and an average US-to-total sales ratio of 23.84%, would decrease its probability of default to 4.96% when the foreign interest rate decreases by 2%, the sample standard deviation. However the same firm, decreases its probability of default to 4.34% if it does not have any US sales. Hence, in this example, a foreign monetary policy decrease of short term interest rates is related to a 13.02% decrease of the default probability if the firm has the average US-to-total sales ratio, and to a decrease of 23.90% for a

[3]For the EMU we use the Main Refinancing Operations (ECBMRO), which is the target rate for the Eonia (Euro OverNight Index Average) rate. In the US case, the Federal Reserve publishes a target rate (FEDTRG) for the Effective OverNight Federal Funds rate.

firm without US sales.

Once the previous relationship is established we turn to analyzing the role of tighter monetary policy on firms' default risk. We do so by analyzing the impact of the Taylor residuals, which have been argued to measure the stance of monetary policy (see Maddaloni and Peydró, 2011, for example), on firms' default risk. We show how a tighter foreign monetary policy, measured by higher Taylor residuals, leads to lower default probabilities the higher the foreign exposure of a firm.

Finally, in order to have a cleaner measure of the informativeness provided by monetary rates we resort to analyzing situations in which there was a "surprise" in the announcement of the target rate. This allows to better identify days in which the CDS evolves due to unexpected announcements in the target rates. By focusing on surprise events we are able to determine that the change in the CDS that firms experience in the day of the analysis is linked to the new information revealed. In line with previous results, we find that days in which there is an unexpectedly high change in the foreign monetary rate result in a lower increase in the default probability of firms that have higher foreign exposure.

Overall, the identification of a relationship between domestic firms' risk and foreign policy rates can be of special interest to macro-prudential authorities in their recent efforts to sustain financial stability. The financial crisis that started in August 2007 revealed the significant role that monetary policy can play in the stability of the financial system in particular, and the economy in general (see Rajan, 2006). This situation lead to the fact that, in addition to the historical major goals of monetary policy – stable prices, growth, and unemployment (Friedman, 1968) –, the interaction between monetary policy and default risk is predominant in the current research and policy debate. On these lines, two new institutions, the Financial Stability Oversight Council (FSOC) and the European Systemic Risk Board (ESRB), were recently created to address potential risks to the stability of the economies.[4] We argue that, in light of the results we present, the monitoring (and possible coordination) of foreign monetary policies can be a relevant action to ameliorate threats to systemic stability.[5] From a pure predictive non-causal approach, macro-prudential authorities that observe an increase in the foreign monetary policy rate should take into account that (some) domestic firms are more prone to default, which can allow for pre-emptive measures to be taken.

The remainder of the paper is structured as follows. Section 1 discusses the related literature. Section 2 presents the data used to measure firm specific default risk and foreign exposure. Section 3 addresses monetary policies' effect on firms' default probabilities. Section 4 studies unexpected policy shocks and their effect on the default probability. Section 5 summarizes and concludes the paper.

1. Related literature.

Our paper contributes to the literature analyzing the impact of monetary policy on default risk. In this section we will highlight those studies that are closer to our results. The interested reader can see Adrian and Liang (2014) and references therein for a more in depth review of the literature tackling this issue. Our main contribution to this strand of literature is that we focus on analyzing the impact of foreign (and not domestic monetary policy) on default of firms that are not bank

[4] In the US, the Dodd-Frank Wall Street Reform and Consumer Protection Act of July 21, 2010, established the Financial Stability Oversight Council (FSOC) to identify risks to financial stability, promote market discipline and respond to threats to the stability of the United States financial system. This regulation is available at http://www.gpo.gov/fdsys/pkg/PLAW-111publ203/pdf/PLAW-111publ203.pdf . Similarly, in Europe, Regulation (EU) No 1092/2010 of the European Parliament and of the Council of November 24, 2010, established the European Systemic Risk Board (ESRB) to monitor, assess and mitigate exposure to systemic risk. This regulation is available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:331:0001:0011:EN:PDF .

[5] The thought of joining efforts in monetary policy has been gaining importance recently (see 'Central banks must co-ordinate policy', *Financial times*, February 3, 2014). Examples of coordinated actions by central banks to solve specific issues already exist. For instance, on October 8th, 2008, the Bank of Canada, the Bank of England, the ECB, the Federal Reserve, Sveriges Riksbank and the Swiss National Bank simultaneously announced reductions in policy interest rates. Announcement available at http://www.federalreserve.gov/newsevents/press/monetary/20081008a.htm . Additionally, in September 2011, the ECB, the Federal Reserve, the Bank of England, the Bank of Japan and the Swiss National Bank announced three-month dollar loans to banks due to the difficulties European banks had in obtaining dollar funding. Announcement available at http://www.ecb.int/press/pr/date/2011/html/pr110915.en.html

dependent. We do so by taking into account market based information steaming from CDSs.

The first strand of research related to our paper is those studies analyzing monetary policy effects on firms using market based information. Recently, there is an increasing attention on the effects of monetary policy on the liability side of firms and on financial markets. As it has been suggested by Bernanke and Gertler (1995) and Bernanke and Kuttner (2005) tight money can increase a firm's risk due to high interest costs or a weakened balance sheet. The study of Ammer, Vega and Wongswan (2010) focuses on analyzing firms equity prices and finds evidence of a demand channel of international US monetary policy transmission, as the equity prices of foreign firms with a large degree of foreign sales are more sensitive to US monetary policy. Regarding monetary policy's influence on firms' default, two main direct channels stand out: (i) inflation and (ii) leverage. Bhamra, Fisher and Kuehn (2011) note that corporations that issue fixed rate debt have incentives to default through the influence of monetary policy on a decrease in expected inflation. González-Aguado and Suarez (2015) relax the rigidity of the capital structure and build a model in which the policy rate changes the firms' target leverage and, as a result, the aggregate default. Our contribution is that we are able to directly measure the influence of monetary policy on firms' default risk. Although our present setting shares with Ammer et al. (2010) the idea that foreign operations are a source of foreign monetary policy exposure, we focus on the default probability of firms and not the value of equity, and also we take into account the effect of foreign monetary policies in US firms showing that firms' degree of internationalization is a key factor that exposes their default risk to foreign monetary policy. Additionally, we use geographic sales to construct a measure that allows us to better identify the exposure to a specific foreign monetary policy.

Our focus on firms' default risk relates our results to those studies analyzing the effect of monetary policies on the default risk of loans. This related literature has (mainly) focused on how banks' willingness to take on risk is affected by monetary policy, see for example Jiménez, Ongena, Peydró and Saurina (2014) or Maddaloni and Peydró (2011). It should be highlighted that, although banks' risk taking incentives are an important channel that determines the overall risk of an economy, non-financial market financed firms are a non-negligible part of the productive sector of countries (especially in the US) and, therefore, also play a role in the aggregate risk of the economy. Hence, we view our results as complementary to those of the literature focusing on the bank risk taking channel. Some of these studies have addressed the effect of default risk on the supply of lending.[6] Altunbas, Gambacorta and Marques-Ibanez (2010) and Gambacorta and Marques-Ibanez (2011) find that banks with higher default risk have supplied fewer loans during periods of rising interest rates. On the other hand, Jiménez et al. (2014) show with bank-firm level data that a lower overnight rate induces less capitalized banks to grant loans to riskier firms with a worse credit history. Within the risk-taking literature, Ioannidou, Ongena and Peydró (2015) and Paligorova and Santos (2013) focus on loan pricing. Ioannidou et al. (2015) study risk pricing by banks from a dollarized country exogenously exposed to the foreign policy of the Federal Reserve, and find that when there is a decrease in the federal funds rate banks lend to riskier firms and underprice the additional risk that they take. Similarly, Paligorova and Santos (2013) show evidence that US banks lower the loan spread difference between riskier and safer Canadian firms during periods of low US policy rates. As previously argued, our paper differs from these studies by analyzing firms that are not bank dependent and in which bank risk taking decisions might be less relevant and by allowing for foreign monetary policy effects. This allows obtaining a more complete picture of the relationship between monetary policy and firms default as we provide evidence of big corporations which are not at the core of the analysis in previous studies. More specifically, the

[6] It has been widely documented that monetary policy may influence the bank lending supply (Bernanke and Gertler, 1995). This lending channel of monetary transmission has been empirically tested using aggregate (Bernanke and Blinder, 1992; Kashyap, Stein and Wilcox, 1993) and bank specific (Kashyap and Stein, 2000; Jiménez, Ongena, Peydró and Saurina, 2012) measures of lending.

paper further complements Ioannidou et al. (2015) and Paligorova and Santos (2013) by studying the influence of foreign monetary policy on firms' default risk and differs from Altunbas et al. (2010), Gambacorta and Marques-Ibanez (2011), and Paligorova and Santos (2013) by using the credit derivatives market to obtain forward-looking market-based measures of default risk. Our set of large non-bank-dependent corporations with access to the public debt markets (see Kashyap, Lamont and Stein, 1994; Chava and Purnanandam, 2011) allows us to draw attention away from bank loan supply frictions under a monetary policy change and focus on the international channel of policy transmission.

2. Data

Our empirical analysis involves the matching of several data sources to address monetary policy's influence on individual and aggregate default risks. This section presents and describes in detail the set of variables employed (see Appendix A for a detailed summary of all the variables).

2.1. The sample

Our study is based on two representative developed monetary regions: the US and the Economic and Monetary Union of the European Union (EMU), which issue the dollar and the euro currencies, respectively.[7] They are two of the world's major economies; according to the IMF, between 2000 and 2009, the US and the Eurozone accounted for 27% and 21% of the world GDP, respectively. They are also large trading partners. For example, US exports to EMU countries represent 19% of total exports, and US imports from EMU countries represent 17%.[8] This economic integration is

[7]The countries member of the EMU and the Eurozone are: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain.

[8]The Bureau of Economic Analysis of the United States Department of Commerce provides detailed information for each country on exports, imports and foreign direct investment (FDI) made by multinational corporations. More information is available at http://www.bea.gov/international/index.htm

mutual, and multinational firms in one region are likely to make investments in the other region. This economic integration allows for a plausible cross effect of monetary policies.

Our sample consists of firms with corporate default swap contracts that belong to the US and the EMU monetary regions. In particular, we select the constituents of the CDX and iTraxx investment grade indexes, two standardized portfolios that comprise the most liquid corporate CDS contracts from the US (CDX) and Europe (iTraxx). This selection offers three primary advantages. First, firms belonging to those indexes are the most liquid in the CDS market, so our conclusions are less likely to be biased by liquidity frictions. Second, the index constituents correspond to large and internationalized non-bank-dependent firms, which usually present a large debt outstanding in the market. Third, these firms do not depend on bank lending and therefore the monetary policy effect is not likely to be primarily driven by the bank supply channel of monetary policy which has already been analyzed in the literature.

The dataset comprises a full spectrum of CDS spreads with maturities ranging from 6 months to 30 years. Our analysis primarily focuses on the probabilities extracted from the 5-year CDS spreads – the most liquid maturity – but we also extend our estimations to other maturities for robustness. The period under study comprises from Jan/2000 to Dec/2009. The first CDS spread observation is available in Jan-2001, as the credit derivatives market has only been recently developed.[9] We use end-of-month observations of CDS spreads. For US firms, we use CDS contracts denominated in US dollars with the Modified Restructuring clause, and for European firms, we use CDS contracts denominated in Euros with the Modified-Modified Restructuring clause.[10] Once we exclude financial corporations, we have data for 184 corporations from the US and the Eurozone,

[9] It should be noted that we can use EDFs instead of CDS implied probabilities of default. For the sake of brevity we do not show the results of such regressions in this version of the paper. In such case for EDFs we have information since 2000 and the qualitative results do not change.

[10] The restructuring clause defines the credit events that trigger settlement. The primary difference is the maximum maturity of the deliverable obligation in the case of a restructuring: 30 months in the Modified Restructuring clause and 60 days in the Modified-Modified Restructuring clause.

of which 146 are investment grade.

2.2. Firm specific measures of default risk

Traditionally, the literature analyzing the relationship between monetary policies and risk has measured firms' specific default risk by means of historical accounting information (see, for example, Altunbas et al., 2010; Gambacorta and Marques-Ibanez, 2011). An important caveat of these measures is that they reflect ex-post default risk and past credit histories (e.g. Delis and Kouretas, 2011; Jiménez, Lopez and Saurina, 2013, among others). In order to prevent some of the shortcomings arising from using historical data, we introduce information from the credit market that reflects ex-ante the forward-looking probabilities of default with different time horizons (from 6 months to 30 years ahead). Such information from the credit market has the advantage of being tightly related to the default risk of a firm. Moreover, the premium paid in credit markets not only includes compensation for default risk, but also rewards the expected future changes in the creditworthiness of the issuer (Jarrow, Lando and Yu, 2005; Berndt, Douglas, Duffie, Ferguson and Schranz, 2005; Díaz, Groba and Serrano, 2013). On these lines, Gilchrist, Yankov and Zakrajšek (2009) and Gilchrist and Zakrajšek (2012) find that credit spreads are a robust predictor of future economic activity. They also show that much of the predictive ability of credit spreads primarily comes from the price of the default risk.

We employ information from the credit derivatives market to obtain measures of firms' default probabilities.[11] In particular, we use the credit default swap (CDS) contract, a credit derivative

[11] Alternatively, we also employ actual default probabilities from the Expected Default Frequency (EDF) estimates of Moody's KMV. The EDF data are forward-looking default probability measurements built with a version of the Merton (1974) model that combines accounting and stock market information. The EDF default probabilities are comparable to credit ratings. The literature suggests that EDFs are a relevant measure of default probability and provide a higher predictive power than credit ratings (Kealhofer, 2003; Vassalou and Xing, 2004; Korablev and Dwyer, 2007; Bharath and Shumway, 2008; Campbell, Hilscher and Szilagyi, 2008). EDFs have already been used in some related studies like those of Altunbas et al. (2010) and Gambacorta and Marques-Ibanez (2011). Bharath and Shumway (2008) and Campbell et al. (2008) argue that the default prediction can be improved by using a reduced-form econometric approach, although they still stress the high default predictive power of measures based on the Merton (1974) model.

that provides insurance against the default of a reference entity. The CDS spread is the amount paid (in basis points) on a quarterly basis by the protection buyer to the protection seller. CDSs are traded in a market with lower frictions than the bond market, and the CDS spreads have already been used in the literature as measures of default risk (e.g. Longstaff, Mithal and Neis, 2005). To build a simple estimator of the default probabilities from CDS spreads, we follow Berndt and Obreja (2010), where the conditional probability of default ($\lambda_t^{\mathbb{Q}}$) in a small time interval Δt results in

$$\lambda_t^{\mathbb{Q}}(T) = 4log\left(1 + \frac{CDS_t(T)}{4LGD_t}\right) \tag{1}$$

with $CDS_t(T)$ as the CDS spread with maturity T and LGD_t as the loss given default, both obtained from Markit. To translate these conditional default probabilities into cumulative (risk-neutral) default probabilities we just replace the default intensity estimates in the following formula

$$Q_t(T) = 1 - e^{-\lambda_t(T)\times T}$$

where the default probability depends on the constant default intensity of a homogeneous Poisson process. Figure 1 displays the median 5-year default probability. We can observe a comovement between US and EMU firms' default probabilities. We also observe default probabilities reaching their highest levels during the financial crisis, with US firms experiencing higher default risk than their European counterparts.

[INSERT FIGURE 1 ABOUT HERE]

2.3. Monetary policy variables

The primary monetary policy tool used by Monetary Authorities is the short-term interest rate market. This market is a conventional mechanism to affect the cost of external financing for all of the agents in the economy. The policy rates represent the general stance of monetary policy.

The general functioning of the short-term interest rate is the following. The monetary authority sets the nominal or target interest rate, and then, the effective interest rates at which participant banks borrow will be close to the target rate. The ECB considers the following to be key rates: the interest rates on the Main Refinancing Operations (ECBMRO), deposit facilities and marginal lending facilities. Marginal lending facilities and deposit facilities determine the range within which the effective overnight reference rate for the euro (EONIA) moves. The ECBMRO interest rate is the target rate for the EONIA.[12] In the US case, the Federal Reserve publishes a target rate (FEDTRG) for the Effective OverNight Federal Funds rate (FEDON).[13]

The ECBMRO and the FEDTRG represent the general stance for monetary policy in Europe and the US. For a more detailed description of these two markets, refer to Benito, León and Nave (2007) and Piazzesi (2005). Figure 2 summarizes the general stance of the Federal Reserve and the ECB during the 10 years of our sample period. We can see how the FEDTRG and the ECBMRO are not in perfect sync during this period. This could be because both monetary authorities pursue different economic targets of inflation, growth and unemployment. The policy rate reached the lowest levels in both regions after the financial crisis, and remained consistently near the zero boundary until December 2015.

[INSERT FIGURE 2 ABOUT HERE]

2.4. Firm level control variables

We control for observable firm characteristics that can affect firms' sensitivity to monetary policies. In particular, we use three main firm characteristics, similar to Jiménez et al. (2012):

[12] For more information, go to http://www.ecb.int/stats/monetary/rates/html/index.en.html and http://www.euribor.org

[13] For more information, go to http://www.newyorkfed.org/markets/omo/dmm/fedfundsdata.cfm

asset liquidity, measured as Cash and Receivables over Total Assets; capital ratio, measured as Shareholders' Equity over Total Assets; and asset size, measured as the natural logarithm of the Total Assets. These controls capture stylized ideas about demand related factors – the balance sheet channel. Firms may hold liquid assets to face future adverse shocks (Kashyap et al., 1994; Holmström and Tirole, 2000). Poorly capitalized firms are the first to lose their financing under a reduction of the lending supply (Holmstrom and Tirole, 1997). The size of firms proxies for credit constraints and access to external funds (Perez-Quiros and Timmermann, 2000; Ehrmann and Fratzscher, 2004), and under monetary tightening, Gertler and Gilchrist (1994) show that small firms' sales decline faster than large firms' sales.

On top of these controls we also analyze the exposure of firms to a given monetary region by analyzing their activities in such region. We know resort to explaining such measures.

2.4.1. Measuring exposure to foreign monetary policies

To empirically analyze exposure to foreign monetary policies, we first identify the firms' degree of internationalization. The most common measure of internationalization is Foreign Sales as a Percentage of Total Sales (TFSALEP). This variable measures the exposure to foreign sources of income, and it is available in Compustat for US firms.[14] The external sources of costs might offset and reduce the foreign exposure of the firm because the TFSALEP variable only includes foreign sales. To control for this issue, we define the variable FORINC as the ratio of foreign income (or loss) over the total amount of domestic plus foreign income (or loss). To construct the variable FORINC, we use domestic and foreign pre-tax income.[15]

[14]Since 1997, firms are required to disclose this information by the Statement of Financial Accounting Standards (SFAS, 131). This regulation is available at http://www.fasb.org/pdf/fas131.pdf . The Compustat database keeps track of the last 7 years, and thus we can only obtain the size of foreign sales since 2005.

[15]$FORINC = (|\text{Foreign Pretax Income}|)/(|\text{Domestic Pretax Income}| + |\text{Foreign Pretax Income}|)$. We employ absolute values because firms could have negative domestic and/or foreign income, which complicates the construction of a simple measure of foreign exposure for firms. It is mandatory for firms to report the foreign and domestic components of pre-tax income according to SEC Regulation §210.4-08(h). This regulation is available at

Similar variables to measure foreign exposure have been previously employed in the literature. For example, Sullivan (1994) created an aggregate measure of the degree of internationalization of a firm based on five different ratios.[16] Bodnar and Weintrop (1997) demonstrate the importance of foreign earnings for multinational firms because domestic and foreign earnings changes have significant positive associations with excess stock returns. Other literature links foreign operations with currency exposure. Jorion (1990) and Pantzalis, Simkins and Laux (2001) find that firms' stock returns' currency exposure is related to the fraction of total sales made overseas by US multinationals. For this reason, other research, such as Geczy, Minton and Schrand (1997) and Allayannis and Weston (2001), use foreign operations (measured by foreign sales or foreign pre-tax income) as proxies for foreign exchange-rate risk. In more detail, they find that firms using currency derivatives have greater foreign operations; the use of foreign currency derivatives is positively associated with firm market value in firms with foreign operations, and it is not associated with firm market value for firms without foreign operations. Moreover, firms with larger foreign operations are more likely to issue foreign currency debt to hedge their exposure (Kedia and Mozumdar, 2003).

The degree of foreign sales allows us to measure foreign exposure. However, identifying the influence of a specific foreign monetary policy on a firm is a challenge. This paper takes a step further by measuring the direct exposure to a specific monetary policy using geographic sales. For this purpose, we create the proportion of US sales over total sales (USSALEP) and the proportion of European sales over total sales (EURSALEP) to better identify exposure to the Federal Reserve's and the ECB's policy changes, respectively. We construct these two variables with the geographic segments information extracted from Compustat Historical Segments available in the Wharton Research Data Services (WRDS) database. We build USSALEP and EURSALEP by adding the

http://www.gpo.gov/fdsys/pkg/CFR-2011-title17-vol2/pdf/CFR-2011-title17-vol2-sec210-4-08.pdf .

[16] Unfortunately, this procedure is not suitable for us. The information needed to construct the measure of Sullivan (1994) is not available for our entire sample.

US- and EMU-related segment sales, respectively, as reported by US firms and European firms that list American Depositary Receipts (ADRs) on US exchanges.[17] To the best of our knowledge, this paper is the first to use geographic sales to uniquely identify the exposure to a specific monetary policy.

2.5. Aggregate control variables

We also include some control variables that potentially might affect the default risk of firms. For example, the dollar-euro exchange rate (USD-per-EUR) is a standard control for the possible currency exposure of firms. Within the context of our analysis, we consider the exchange rate to be an exogenous variable. Although this issue could be controversial in the case of a currency crisis; Kaminsky and Reinhart (1999) do not find a clear causal link between currency crises and banking crises. Both causal directions are possible between the two types of crises. These authors find that, in general, the banking crises begin before the currency collapses, and that the consequences are more severe when a currency crisis and a banking crisis happen together than when they are isolated.

Another common macroeconomic control is the term spread, measured as the difference between the 10- and 2-year government bond yields, as an indication of overall economic health (Collin-Dufresne, Goldstein and Martin, 2001; Ericsson, Jacobs and Oviedo, 2009). More precisely, we employ US and German government bonds (TERM-US and TERM-EMU, respectively). The reason behind this choice is that in times of low short-term interest rates, when new stimuli are needed, central banks proceed with unconventional policies to facilitate government borrowing.

[17] We manually consider whether each segment name can be considered US- or EMU-related. Our firms have reported 78 different EMU-related segment names and 18 different US-related segment names. For instance, we consider that the following segment names measure EMU exposure: 'Central and Eastern Europe', 'Euro Denominated', 'Continental Europe', 'Denmark', 'Europe,Germany', 'Europe,Great Britain', 'European Markets', 'Finland', 'France', 'Germany', 'Spain', or 'The Netherlands'. For example, we consider that the following segment names measure US exposure: 'America', 'CIS & North America', 'North America', 'U.S.', 'United States', 'United States & Canada', or 'United States & Puerto Rico'.

For example, on November 3rd, 2010 the Fed announced the purchase of $600 billion of Treasury securities to avoid deflation risk.[18] Krishnamurthy and Vissing-Jorgensen (2011) and Gilchrist and Zakrajšek (2013) use an event study approach to analyze the channels through which the Federal Reserve's announcements of long-term bond purchases – known as Quantitative Easing – lower long-term interest rates and corporate rates. On September 21st, 2011, the Fed announced the purchase of $400bn in long-dated Treasuries financed with the sale of short-term securities. This move was nicknamed as 'Operation Twist' because it sought to change the shape of the yield curve.[19] Similar policies were conducted by the ECB to calm the bond markets of the weakest countries. Central banks are able to affect the shape of the term structure through unconventional purchases of long-dated securities. However, most of these policies took place outside of our sample period.

2.6. Sample descriptive statistics

Table 1 provides detailed information on the country of origin for the firms that appear in the most popular rankings of largest foreign investments: the Forbes and UNCTAD rankings. Forbes magazine has a raking of the top 100 largest foreign investments in the US.[20] By 2002, out of these 100 firms, 43 belonged to the Eurozone, and 22 of them are in our sample. With respect to the UNCTAD ranking, our sample includes 51 out of the 100 top non-financial corporations by absolute total foreign assets from 2000 to 2008.[21] Not surprisingly, our sample is composed of large firms as the total asset value of the US firms in the sample was estimated at $3.900 trillion during 2007, representing 27% of the GDP of the United States. In the European case, our sample was worth €3.064 trillion during 2007, representing approximately 33% of the GDP of the Eurozone.

[18] See the announcement on: http://www.newyorkfed.org/markets/opolicy/operating_policy_101103.html

[19] See the announcement on: http://www.newyorkfed.org/markets/opolicy/operating_policy_110921.html

[20] Forbes magazine ranks foreign firms by the absolute amount of revenue they receive from US investments. This information is available at http://www.forbes.com/free_forbes/2002/0722/foreign.html

[21] The UNCTAD classification ranks the world's top transnational corporations (TNC). The ranking is included in the World Investment Report and is available at http://unctad.org

[INSERT TABLE 1 ABOUT HERE]

Table 2 summarizes all of the firm-level accounting information that collected from Compustat Global Vantage, Compustat North America, Compustat Historical Segments and UNCTAD's rankings. Unfortunately, the variables TFSALEP and FORINC are only observable for 63% of the original sample of US firms. For EMU firms, we only have at our disposal the information in the UNCTAD rankings about the foreign-to-total Sales (TFSALEP), foreign-to-total Assets (FORASS), and foreign-to-total Employment (FOREMP), and this information is only available for 60% of the EMU firms in our sample. When we also consider the information in UNCTAD on FORASS and FOREMP for US firms, we only have information on 17 US companies. In our sample, an average firm has a foreign-to-total Sales ratio of 32% in the US and 60% in EMU countries. This result means that it is likely that our EMU sample is more biased toward more international firms than the US sample.

Our two measures of specific foreign exposure reveal a comparable crossover exposure of the two samples as the 24% of sales to US by EMU firms (USSALEP) is closer to the 19% of sales to Europe by US firms (EURSALEP). This large percentage of sales between the two regions highlights that there exists a high level of economic integration that can potentially expose the firms to the foreign US and Eurozone monetary policies. Whereas we argue that USSALEP and EURSALEP are more suitable variables for measuring specific foreign exposure, the question remains as to what extent all the measures of foreign dependence provide similar information.

[INSERT TABLE 2 ABOUT HERE]

The high degree of correlation observed in Table 3 between the aggregate measures of foreign exposure is in agreement with the previous findings of Sullivan (1994) and Kedia and Mozumdar (2003). In our empirical findings these variables are going to cause a potential multicollinearity problem as they do not provide additional information by themselves regarding the level of internationalization or foreign operations. However, the high degree of correlation between the geographic sales and TFSALEP, especially in US firms, helps to validate the use of TFSALEP as a measure of exposure between the two countries and to overcome the problem of smaller sample size when using EURSALEP and USSALEP in the empirical analysis.

[INSERT TABLE 3 ABOUT HERE]

The accounting information obtained from Compustat and UNCTAD's rankings is scarce; it is not available for all firms and certainly not available for every year. For each firm, the variables LIQ, CAP and SIZE are transformed from annual to monthly frequency using linear interpolation for the years 1999 to 2010.[22] Regarding the proxies for foreign exposure, the variables TFSALEP, FORINC, FORASS, FOREMP, USSALEP and EURSALEP are unobserved for many years and interpolation is not possible. For that reason, we only use the sample average from 2000 to 2009 as a measure of the degree of internationalization.

3. The Crossover effects of monetary policies: a firm level approach

Theoretical studies focusing on monetary policy and its relation to firms risk have mainly focussed on the impact of domestic monetary policy. Bhamra et al. (2011) explain that fixed-income corporate obligations with a fixed nominal coupon increase the incentives of firms to default due to the monetary policy influence on expected inflation. In the dynamic model of González-Aguado and Suarez (2015), the effect of monetary policy on default rates is heterogeneous across firms in the short-term. A positive shift in the risk-free rate leads all firms, especially more indebted firms,

[22] The results of our empirical findings remain regardless of the type of interpolation and even if we only use the sample average because the accounting characteristics are important sources of firm information in the cross-section but not in the time dimension.

to default in the short-term because they need to adjust to the lower target leverage. Instead, a negative shift in the risk-free rate allows more indebted firms to reduce the default risk in the short-term but makes firms at their target leverage riskier as they can increase their leverage right away. In the long-term, the model predicts a decrease (increase) of the aggregate default following an increase (decrease) in the interest rate. Although these studies focus on domestic monetary policy we conjecture that foreign monetary policy can also be a relevant factor determining firms' default probability.

We suggest that firms with more foreign operations can be more exposed to foreign monetary policies. Our primary assumption, therefore, is that the degree of internationalization enables a risk transmission channel from external monetary policies to national firms: the larger the foreign business is, the higher the possible transmission of foreign policy. It should be noted that this higher exposure could also lead to firms hedging their exposure more. Hence, in general we are agnostic about the overall effect of foreign policy on firms with higher foreign business.

Although the view that foreign monetary policy can affect domestic economies is not new, we depart from previous literature by extending this idea to the corporate sector and by studying the effect on the default risk. One example of this possible link is that banks and firms hold an important amount of their assets and liabilities in foreign currencies (Grammatikos, Saunders and Swary, 1986; Kedia and Mozumdar, 2003; Lane and Milesi-Ferretti, 2007; Tille, 2008). Foreign holdings are exposed to exchange rate risk and interest rate risk, and even if the currency exposure is hedged, foreign interest rate risk arises whenever a firm mismatches the maturities of its foreign currency assets and liabilities (Grammatikos et al., 1986). Monetary policy can affect this interest rate risk and by doing so affect firms' default probability.

In this section we document the relationship between domestic and foreign short term interest rates and a firm's default risk. Following the importance of firm heterogeneity highlighted by

González-Aguado and Suarez (2015), we introduce cross-sectional variables in our empirical approach. We provide evidence that the degree of international operations for our set of large and international firms influences their exposure to foreign monetary policy. Once we determine that such relationship is heterogeneous and depends on firms characteristics, we stress the role of firm internationalization as a key characteristic that determines the relationship.

In order to analyze the validity and robustness of our main specification and results we undergo a series of robustness checks which are: (i) measuring the relationship between Taylor residuals, instead of short term rates, and firm default risks, (ii) varying the time horizon of our analysis from monthly to quarterly results and (iii) using alternative estimation procedures.

3.1. The relationship between short term rates and firms' default

As we have previously argued our main hypotheses is that monetary policy rates can be related to default probabilities of domestic and foreign firms. In this section, we empirically study which types of firms are more likely to be affected by foreign monetary policy – what we call the crossover effect. In order to do so, we empirically analyze the influence of short-term monetary policy on firms' default risk using information from credit markets. Among the different heterogeneous firms characteristics, we are especially interested in identifying how the default probabilities of firms with different degree of foreign operations are related to foreign monetary policy.

Our empirical strategy is based on running panel regressions for each monetary region with the following general specification

$$
\begin{aligned}
logit\,(PD_{it}(M)) \quad = \quad & \beta_1 \text{STrate}_{t-1} + \beta_1' \text{Firm}_{it-1} \times \text{STrate}_{t-1} + \beta_1'' \text{DOI}_i \times \text{STrate}_{t-1} \qquad (2)\\
+ \quad & \beta_2 \text{Foreign STrate}_{t-1} + \beta_2' \text{Firm}_{it-1} \times \text{Foreign STrate}_{t-1} + \beta_2'' \text{DOI}_i \times \text{Foreign STrate}_{t-1}\\
+ \quad & \text{CONTROLS}_{t-1}(\text{USD/EUR, GDP growth, Inflation, LTrate, Term Spread})\\
+ \quad & \beta_0 + \beta_0' \text{Firm}_{it-1}(\text{Firm Dummy, LIQ, CAP, SIZE})\\
+ \quad & \beta_0'' \text{DOI}_i(\text{TFSALEP, FORINC, EURSALEP, USSALEP, FORASS, FOREMP}) + \varepsilon_{it}
\end{aligned}
$$

where $logit\,(PD_{it}(M))$ is the logistic transformation $ln\,(PD_{it}/(1 - PD_{it}))$ of the probability of default measure $PD_{it}(M)$ for firm i at month t for the horizon M. This logistic transformation ensures that the probability of default is defined in the zero-one interval. The error term ε_{it} captures all other factors not captured by the macroeconomic variables used that affect the firms' default probability. We cluster the standard errors by firm and month in case the residuals are correlated across firms or along time. In order to check the robustness of these results, we also use GLS estimation and the dynamic model of Arellano and Bond (1991). These further results can be found in our robustness section.

The variables $STrate_{t-1}$ and $Foreign\ STrate_{t-1}$ are the domestic and foreign short-term interest rates at time $t - 1$. We use the target interest rate as a measure of short-term monetary policy. It should be noted that in the following subsection we also analyze a very similar specification in which the measure of monetary policy will be the Taylor rule residuals in order to, in the spirit of Maddaloni and Peydró (2011) and others, capture the stance of monetary policy. It is important to highlight that although we present our main specification with the control variables and short term variables lagged one period (month) $t - 1$, the results are qualitatively robust in doing the analysis with current variables at t. Section 4 analyses the instantaneous effect of unexpected changes in short term rates on CDSs. Hence, we prefer to report in this section the lagged results but the same analysis with current variables can be found in the appendix and does not change our main findings.

To identify the type of firms that are more exposed to monetary policy, we interact the short-term interest rates with the variable $Firm_i$ that represents firm characteristics of firm i. First, we use the capital ratio, the liquidity ratio and the firms' size, as done in Jiménez et al. (2012), as basic and aggregate firm-risk characteristics. Second, we use measures for the degree of internationalization or the degree of foreign operations (DOI) for every firm. The use of DOI variables reduces the sample substantially. For instance, the foreign-to-total sales ratio is only available for half of the original sample. Notice that the capital, liquidity and size have been interpolated to monthly frequency, and for the DOI variables, we only use the sample average due to a lack of data. It is important to highlight that the results do not change due to the interpolation or the interpolation methodology because the firm characteristics primarily provide cross-sectional information and not time-series information.

To isolate the effect of short-term interest rates on bank loans' lending standards from other macroeconomic variables, Maddaloni and Peydró (2011) use the 10-year long-term government bond interest rate (LTrate), GDP growth, and the inflation rate. In our study, the business cycle is a relevant control because the rate of default tends to increase with poor economic conditions. To obtain a monthly measure of the business cycle, we use the annual growth on quarterly nominal GDP and interpolate it to monthly frequency, as done by Jiménez et al. (2012). The results are unaffected if we do not interpolate. In the baseline model, we consider both the domestic and the foreign macroeconomic controls. As a robustness check, we have included only the foreign macroeconomic controls, and the primary findings remain.

Our empirical strategy consists of initially performing the panel regression with foreign monetary policy and adding stepwise the different DOI measures to test the existence of the crossover effect.

3.1.1. Empirical results

The main results that we find in our study are summarized in Tables 4, 5, and 6. These tables display different specifications for the 5-year risk-neutral default probability as a function of the target monetary policy rates FEDTRG and ECBMRO. We proceed by adding stepwise the DOI controls.

[INSERT TABLE 4 ABOUT HERE]

Models I-II in Table 4 show the most naive specification with only domestic and foreign target monetary policy interest in our two monetary regions, the US and the EMU. In model I, we include firm dummies that proxy for unobservable time-invariant firm specific characteristics, such as risk management ability. To control for other missing variables, we include the macroeconomic controls. A lower USD/EUR exchange rate, lower domestic GDP growth, higher domestic inflation rate, and lower long-term interest rates lead in general to higher default probabilities, although their statistical significance depends on the specification. These results for the macroeconomic controls can be found in the appendix.

We interact the foreign short-term rate – ECBMRO in the case of US firms, and FEDTRG in the case of EMU firms– with firm characteristics to study the source of foreign policy exposure. The estimations show that an increase in the foreign rates increases the default probabilities. This very general empirical finding is widely observed throughout different models, but it will tend to become insignificant as we add further controls.

Although we want to highlight the relevance of foreign monetary policy on firms default risk, we also acknowledge the role of domestic monetary policy. Hence, we include in model II the domestic monetary policy interacted with the firm characteristics, and, although the value of the coefficient changes, the sign of foreign monetary policy remains.

Model II includes the capital, liquidity and size controls and their interactions with the short-term rates to identify plausible heterogeneous effects. Size appears to be a relevant characteristic related to foreign exposure, however this finding will often lose significance once we include DOI variables. It is likely that in our setting the size not only captures credit constrains, as it may also be capturing foreign exposure. We can already see in Table 3 that size and the DOI variables are largely correlated.

Models III-IV in Table 5 feature the same regression as models in Table 4, but include the variables that measure the firms' degree of internationalization and their interaction with short-term interest rates. The disadvantage is that by including DOI variables, our sample decreases by approximately 40%. The firm controls reported in the appendix show, as expected, that the market assigns higher risk to firms with lower liquidity and capital. Based on the interaction of firm controls with short-term interest rates, we can identify which types of firms are more exposed to monetary policy.

[INSERT TABLE 5 ABOUT HERE]

In the case of US firms, model III yields an interesting result: a loosening of foreign monetary policy decreases the default probability of firms, but firms with higher foreign-to-total sales show a lower decrease in such probability. In model IIIb we repeat the estimation, but instead of the foreign-to-total sales ratio, we use our measure of foreign income or loss (FORINC). The variable FORINC measures the degree of internationalization for a firm, taking into account the foreign expenses. Similarly, the effect of foreign monetary policy is stronger for firms with higher FORINC.

The variables TFSALEP and FORINC measure foreign exposure without specifying the origin of the exposure, which could lead to incorrectly concluding that US firms are exposed to the ECB's decisions on rates. For this reason we have constructed the variable EURSALEP that specifically measures the percentage of sales to Europe. In model IIIc, the interaction of Euro-related sales with ECB's rate maintains a highly statistically significant negative coefficient and reassures that the empirical relation is due to the exposure to ECB's interest rates.

In general, US firms with a higher degree of foreign sales or income increase – with respect to firms with no foreign dependence – their default probability when the foreign monetary authority loosens the interest rates. Model IV includes the interaction with the variables FORASS and FOREMP, which we were able to collect for a few firms from UNCTAD rankings, but they are not highly significant, and the negative sign of the interaction with TFSALEP remains.

In the case of EMU firms, models III-IV repeat the same specifications. We cannot obtain a general conclusion regarding liquidity, capital, or size being a relevant source of foreign monetary policy exposure. In models I-IV these controls do not keep a consistent sign and are not systematically significant across all specifications. Model IIIc displays similar results found for US firms as European firms with a larger percentage of sales to US experience larger increases of default probability following a decrease in the Federal Reserve's rates than European firms without sales to US. Contrary to the US, the variable FOREMP – which proxies the structural costs that a firm faces abroad – is also a highly significant source of exposure to the Federal Reserve short-term interest rates. The sign of the interaction is the opposite of the interaction between TFSALEP and foreign MP interest rates. Both variables TFSALEP and FOREMP are a measure of DOI, but their nature differs. The former proxies for foreign resources, and the latter proxies for foreign obligations. This different nature explains the opposite signs of their interactions with foreign monetary policy.

[INSERT TABLE 6 ABOUT HERE]

Finally, Table 6 repeats model III but includes the interaction between growth and DOI measures. The purpose of this interaction is to test whether the monetary policy effect remains once we take into account the foreign growth effect on firms with a large DOI. The interaction of TFSALEP with foreign monetary policy remains a significant source of foreign monetary policy exposure.

The magnitude of the estimated coefficients implies a reasonably economically significant relationship between the default probability and the interaction of foreign monetary policy with the degree of foreign operations. For example, based on specification IIIc of Table 5, an average EMU firm with a cumulative 5-year market implied default probability of 5.7%, a liquidity ratio of 24.78%, a capital ratio of 27.60%, a log-size of 10.30, and a ratio of US-to-total sales of 23.84% during a period of average Fed interest rates of 3% would decrease its default probability to 4.96% if monetary policy decreased 2% (the sample standard deviation) to 1%.[23]

On the contrary, an identical firm without US sales, would decrease its default probability to 4.34% if monetary policy decreased from 3% to 1%.[24] In this example, a foreign monetary policy shock leads only to an 13.02% decrease in the default probability if the firm has the average US-to-total sales ratio, and to a decrease of 23.90% for a firm without US sales.

3.1.2. Robustness checks

In this section, we conduct a series of robustness checks. First, we check other definitions of monetary policy. Second, we reduce the frequency from monthly to quarterly. Third, we test other estimation methodologies.

The target interest rates are partially determined by other macroeconomic variables. In the simplest monetary policy rule, the Taylor rule, the monetary authority sets the target interest rates depending on the levels of GDP growth and inflation (Taylor, 1993, 2009). Figure 3 plots the residuals of the Taylor rule. The residuals of this regression have been argued to represent how tight or how loose monetary policy is. As an example, Table 7 displays the same specification as in

[23]The calculation for an average EMU firm with average US sales is $1/(1+exp(-(ln(0.057/(1-0.057))+(165.50-54.46*0.2478-4.20*0.2760-13.25*10.30-29.39*0.2384)*(-0.02)))) = 4.96\%$

[24]The calculation for an average EMU firm without US sales is $1/(1+exp(-(ln(0.057/(1-0.057))+(165.50-54.46*0.2478-4.20*0.2760-13.25*10.30-29.39*0)*(-0.02)))) = 4.34\%$

Table 6, but we use the Taylor rule residuals as a measure of tightness in monetary policy instead of focusing on short term interest rates. The results show that a tightening of the foreign monetary policy under the Taylor rule results in firms with a higher proportion of foreign sales having lower probabilities of failure than their counterparts which have lower proportion of foreign sales. These results are widely robust across all maturities and default measures employed (see the Appendix).

[INSERT FIGURE 3 ABOUT HERE]

[INSERT TABLE 7 ABOUT HERE]

There are two other plausible concerns to the results shown so far. To begin, if the errors are autocorrelated, the estimated parameters might not be appropriate. We reduce the frequency from monthly to quarterly to alleviate both the possibility of autocorrelated errors and the importance of the interpolation applied to some variables that are not observed at high frequencies. Lastly, there might be unobservable or omitted time-variant macroeconomic variables; hence, we will perform the regressions including a quarter dummy.

Table 8 reports GLS coefficients imposing heteroscedastic errors across firms and a firm-specific AR(1) structure. The GLS estimates are known to be more efficient, but efficiency comes at the price of imposing an error structure. The results strengthen our previous findings as the ratio of foreign sales and the geographic sales EURSALEP and USSALEP are strongly influencing the relationship between the foreign Taylor residuals and the default probability.

[INSERT TABLE 8 ABOUT HERE]

The models in Table 9 directly measure the persistence of the log odds ratio transformation of market implied default probabilities and assumes contemporaneous shocks from exogenous variables. Jiménez et al. (2013) estimated a similar dynamic model in which their dependent variable is the log odds transformation of the non-performing loans ratio, an ex-post measure of bank risk-taking. Delis and Kouretas (2011) estimated a similar dynamic model and used the ratio of risk assets to total assets and the non-performing loans ratio as dependent variables that measure bank risk-taking. In our dynamic model, the firm characteristics and their interactions with domestic monetary policy (x_{it}) can be endogenous if they respond to past shocks in the firms' specific default probabilities. Technically, variable x_{it} is endogenous if $E[x_{it}\varepsilon_{is}] \neq 0$ for $s \leq t$ and $E[x_{it}\varepsilon_{is}] = 0$ for all $s > t$. We apply the estimation methodology of Arellano and Bond (1991) and use up to four lags of the firm characteristics and their interactions with domestic monetary policy to instrument for these potentially endogenous variables.

[INSERT TABLE 9 ABOUT HERE]

In the US monetary region, model I confirms that the degree of foreign sales is a source of foreign monetary policy exposure. In the Eurozone, the model I again identifies the proportion of foreign sales as a relevant source of exposure to the US Taylor residuals. In comparison, model II substitutes the proportion of foreign sales for EURSALEP and for USSALEP to capture the specific exposure to the foreign monetary policy in the US and in the EMU. The results provide strong evidence for crossover effects because firms with a large percentage of geographic sales in a foreign region are subject to the specific monetary policy of that region.

Hence, after our robustness checks we can conclude that, using the CDS prices to construct a measure of market implied default probabilities, we find evidence that foreign monetary policy is a good predictor of domestic firms default risk. We can also claim that firms' default risk exposure to foreign monetary policy depends on the firms' degree of internationalization. This statements are robust to numerous macroeconomic controls (exchange rate, business cycle, inflation, long-term interest rates, term spread), firm controls (liquidity, capital ratio, size, firm fixed effects), unobservable time-varying factors (time dummies), geography (US or EMU), frequency (monthly or quarterly), the definition of monetary policy (target interest rate, or Taylor-rule residuals), the measure of foreign exposure (foreign or geographic specific sales), the type of forward default probability (market implied or real default probability), the horizon of the default probability (from 6 months up to 30 years), and the methodology (pooled panel data regression and dynamic panel data with endogenous domestic monetary policy).

4. Unexpected monetary policy shocks: an event level approach

So far, we have focused on the relationship between (foreign) monetary policy and the level of firms' default probability. This section focuses on analyzing the novel informative content that short term interest rates have for the probability of default of a firm. This allows for a better understanding of the direct links between monetary policy and asset prices, which as Bernanke and Kuttner (2005) argue, is important for the understanding of the policy transmission mechanism.

The empirical approach summarized in equation (2) presents some obstacles to safely concluding that foreign monetary policy indeed affects international firms' default probabilities. Asset markets are forward looking and tend to incorporate information about future monetary policy (Bernanke and Kuttner, 2005). If the short term interest rate is expected then its information should already be included in the market expectations of a firm's probability of failure.

Recent studies try to circumvent these concerns by measuring unexpected changes in the monetary authorities' target rate. These studies use the overnight interest rate futures market forecast errors as measures of exogenous, unforeseeable changes in the stance of monetary policy (Piazzesi and Swanson, 2008). To construct unexpected changes in US and European monetary policy, we need futures contracts based on effective short-term interest rates. For the US, we use the 30-Day Federal Funds Futures from the Chicago Board of Trade, and for the Eurozone, we use the EU-

REX One-Month EONIA Futures.[25] We follow the approach of Kuttner (2001) to construct the unexpected changes from futures on the interest rates controlled by the monetary authorities.[26] Assuming that no further monetary policy changes are expected within the month and that the premium embedded in the futures market does not change from one day to the next in the event of a monetary policy change, this method provides a good gauge of a 1-day surprise target change (see Kuttner, 2001). Because the risk premia embedded in the futures change at business-cycle frequencies, one-day changes in near-term futures on the day of a monetary policy announcement can be safely interpreted as a measure of monetary policy shock robust to the presence of risk premia (Piazzesi and Swanson, 2008; Hamilton, 2009).

The majority of the empirical research on the reaction of financial markets to policy surprises is focused on the stock market. Bernanke and Kuttner (2005) document that an unanticipated 25-basis-point cut typically leads to a 1% increase in the stock market index. They hypothesize that there might be two primary causes behind this phenomenon. First, tight money could increase the risk-aversion of investors. Second, that tight money increases the firm's riskiness due to higher interest costs or weaker balance sheets. To identify the source of the reaction, Ehrmann and Fratzscher (2004) and Basistha and Kurov (2008) study the cross-sectional reaction of stocks that belong to the S&P500. These authors find that firms with higher credit and financial constraints are more affected by domestic monetary policy. Our empirical approach focuses on the default risk

[25] More information is available at http://www.cmegroup.com/trading/interest-rates/stir/30-day-federal-fund_contractSpecs_futures.html and http://www.eurexchange.com/exchange-en/products/int/mon/14664/

[26] The policy surprise is defined as $\Delta i^u = D/(D-d)\left(f^0_{m,d} - f^0_{m,d-1}\right)$ where $f^0_{m,d}$ is the current-month futures rate. The change in the futures price on day d is scaled by the number of days $D-d$ remaining in month m. Similar to Kuttner (2001) and Bernanke and Kuttner (2005), we use the unscaled change in the futures rate to calculate the funds rate surprise when the change occurs within the last 3 days of the month. Additionally, in the case of an event occurring on the first day of the month, we use the 1-month futures rate from the last day of the previous month $f^1_{m-1,D}$ instead of $f^0_{m,d-1}$. Monetary policy changes by the Fed, ECB and other central banks on September 17th, 2001, after the twin towers attack, have been removed from the sample. We also exclude from the analysis October 8th, 2008, because the Bank of Canada, the Bank of England, the ECB, the Federal Reserve, Sveriges Riksbank and the Swiss National Bank simultaneously announced reductions in policy interest rates.

channel of monetary policy transmission using ex-ante measures of default risk to better identifying cross-sectional effects on credit risk.

The related literature has also studied foreign stock market reactions to decisions by the Federal Reserve (e.g. Wongswan, 2006; Ehrmann and Fratzscher, 2009). Wongswan (2009) and Hausman and Wongswan (2011) find that the cross-sectional response of foreign equity indexes to surprise changes in the federal funds rate depends on the degree of financial integration with the United States, measured as the percentage of each country's equity market capitalization owned by US investors. At the firm level, Ammer et al. (2010) study foreign stocks and find stronger stock price reactions to US monetary policy surprises for firms with a higher ratio of foreign sales to total sales.

Following a similar approach to the literature on monetary policy surprises, we estimate the firms' default risk response to surprises in monetary policy rates as described in equation (3). More specifically, we conduct a study where the daily change in the log-odds ratio reacts to unexpected changes in monetary policy on the days that the Federal Reserve or the ECB decide to change interest rates.

$$
\begin{aligned}
\Delta logit\left(PD_{i,t}(M)\right) &= \beta_0 + \beta_1 FedEvent + \beta_2 Surprise_{j,t} \\
&+ \beta_3 Surprise_{j,t} \times FedEvent \\
&+ \beta_4 Surprise_{j,t} \times \text{Firm}_{i,t} \text{ (LIQ, CAP, SIZE)} \\
&+ \beta_5 Surprise_{j,t} \times \text{Firm}_{i,t} \text{ (LIQ, CAP, SIZE)} \times FedEvent \\
&+ \beta_6 Surprise_{j,t} \times \text{DOI}_{i,j} \text{ (SALEP)} \\
&+ \beta_7 Surprise_{j,t} \times \text{DOI}_{i,j} \text{ (SALEP)} \times FedEvent \\
&+ \beta_8 \text{Firm}_{i,t} + \beta_9 \text{DOI}_{i,j} \\
&+ \varepsilon_{it}
\end{aligned} \tag{3}
$$

Related research, such as Cenesizoglu and Essid (2012) and Zhu (2013), found that corporate bond yield indexes widen (narrow) following an unexpected tightening (easing) in monetary policy during periods of distress. In equation (3), we pool together domestic and foreign monetary policy shocks and measure their effect on firm level measures of default risk. The surprises of both the Fed and the ECB that occur at disjointed events are included in the variable $Surprise_{j,t}$ where j represents the monetary region.[27] Next, we introduce two types of cross-sectional reaction in the default probabilities. First, the variable $\text{SALEP}_{i,j}$ introduces the different reactions depending on the firm's degree of exposure to monetary region j. Second, the dummy variable $FedEvent$

[27] Gürkaynak, Sack and Swanson (2005) provide evidence that aside from the target surprise introduced by Kuttner (2001), surprise deviations from the expected path of future monetary policy (path surprise) are also needed to fully capture monetary policy surprises. For example, Wongswan (2009), Ammer et al. (2010) and Hausman and Wongswan (2011) measure the path surprise by running a regression of the daily change in 1-year-ahead Eurodollar interest rate futures and the target surprise around the FOMC's change in the target rate. However, we do not include the path surprises because they rarely exert a significant impact on credit spreads (Zhu, 2013). Moreover, due to data limitations, we can only measure 17 ECB surprises, and the small sample would not allow us to construct the path surprises in the Eurozone.

distinguishes the Fed changes from the ECB changes in interest rates.

We use the variable $\text{SALEP}_{i,j}$ to measure the percentage of sales of firm i to the monetary region j that suffers a policy shock at time t. This variable is measured as one minus the foreign-to-total sales ratio in the case of firms experiencing a shock in domestic monetary policy. The variable is measured as EURSALEP in the case of US firms experiencing an ECB surprise and is measured as USSALEP in the case of EMU firms experiencing a Fed surprise. This definition of SALEP allows us to pool all of the surprises into one single regression and accurately measure the effect of a policy surprise, as opposed to doing the analysis separately for the Federal Reserve and the ECB announcements.

The results of this analysis, which are shown in Table 10, reinforce our statement that foreign monetary policy is related to default risk of firms and that this relationship depends on the degree of foreign exposure of firms. Our triple iteration term captures how the effect of a surprise of foreign short term rates depends on the level of foreign sales. We can see how US (EMU) firms with greater exposure to Europe (US) experience a decrease in their default probability when facing an unexpected tightening event by the ECB (Fed). This effect is stronger during the financial crises period of 2007-2009 when the default probabilities were at their highest and credit risk was a major concern.

[INSERT TABLE 10 ABOUT HERE]

5. Conclusions

This study documents the relationship between foreign and domestic monetary policy and firms default risk. We use information from the CDS market in order to obtain ex-ante forward-looking default probabilities of firms. In doing so we focus on larger and non-bank-dependent firms. We show how the influence of foreign monetary policy on a firm's default risk depends on firms' characteristics.

Our results highlight how firms' default depends on the state of foreign monetary policy. We show how, in general, high foreign rates are related to an increase in the default probability of domestic firms. Moreover, we document that foreign monetary policy can have different effects depending on firms' characteristics. Our findings indicate that, in general, foreign monetary policy's influence on firms' default risk depends on the firms' degree of foreign operations. This result is quite robust to the definition of monetary policy, the type of default probability, the type of foreign operations, the horizon of cumulative default probability, the frequency, macroeconomic controls, unobservable firm and time effects, geography (US and EMU), firm controls, and the empirical model. Interestingly, we find that firms with foreign exposure facing surprise loosening of the foreign monetary policy experience higher default probabilities than firms with lower foreign exposure.

This paper should be of interest for the newly created systemic risk supervisors and the findings presented could open an interesting debate about whether the international authorities should agree to oversee foreign policies to circumvent large credit market disruptions.

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Figure 1: Median default probabilities implied from CDS spreads

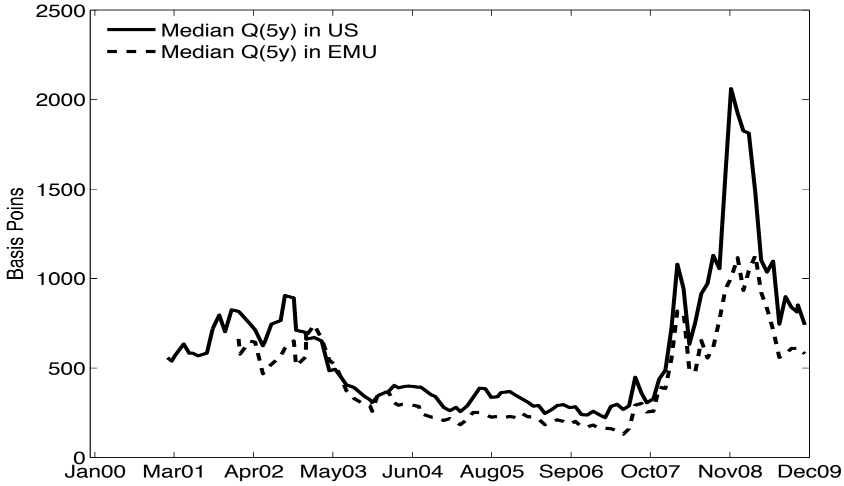

Figure 2: Monetary Policy Rates

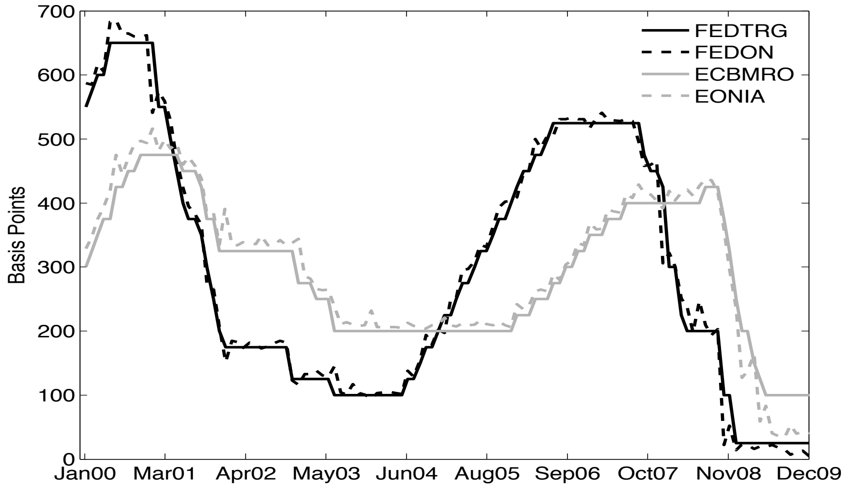

Figure 3: Taylor rule residuals

The graph shows the Taylor rule residuals at monthly frequency. Taylor rule residuals are the residuals of the regressions of US and Eurozone short term rates on their respective GDP growth and inflation over the period Jan/2000 to Dec/2009. The annual GDP growth has been linearly interpolated from quarterly to monthly frequency.

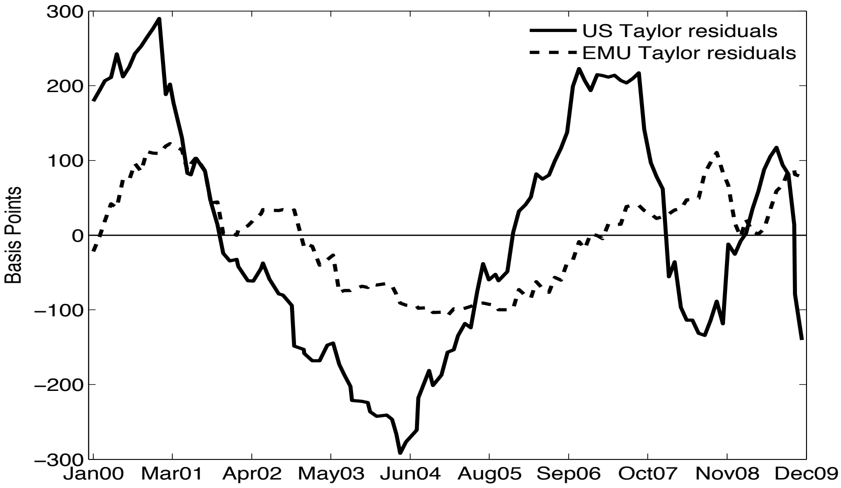

Table 1: Number of largest foreign firms by ranking

Each row is related to a ranking made by Forbes or UNCTAD. The first row is the 2002 Forbes' ranking titled "The Largest Foreign Investments In The US". It is a ranking of the 100 largest investments in the US from foreign firms by the revenue they make in the US. The second row summarizes the 2000-to-2008 UNCTAD's annual rankings of "The world's top 100 non-financial Transnational Corporations" by the size of the foreign assets. The columns represent the number of firms that belong to the regions where the firm is headquartered (US, Europe, or EMU), and the number of firms that belong to our US or EMU sample.

	US	US sample	Europe	EMU	EMU sample
Largest foreign investments in US			65	43	22
World's top 100 non-financials (2000-2008)	39	17	85	61	34

Table 2: Accounting numbers

This table summarizes annual corporate information for the firms in our sample during the period 2000-2009. The data are mainly obtained from Compustat Global Vantage. The Compustat Mnemonics are between brackets. For US firms, the variables SALE, TFSALEP, PIDOM and PIFO are obtained from Compustat North America. EURSALEP and USSALEP are manually constructed from Compustat Historical Segments. For EMU firms, the variables TFSALEP, FORASS and FOREMP are obtained from the 2000-to-2008 UNCTAD's annual rankings of "The world's top 100 non-financial Transnational Corporations". The accounting numbers are reported in millions of US dollars for US firms and in millions of Euros for EMU firms. The variables LIQ, CAP, TFSALEP, FORINC, FORASS, FOREMP, EURSALEP and USSALEP are ratios between 0 and 1.

	US (millions of US dollars)				EMU (millions of Euros)			
Variable	# Firms	Obs. (firm-year)	Mean	Std. Dev.	# Firms	Obs. (firm-year)	Mean	Std. Dev.
Panel A.- Annual Reports								
Total Assets (AT)	127	1254	25854.37	34079.3	57	566	48396.67	47930.41
Equity (SEQ)	125	1236	9071.603	14075.93	57	566	11761.34	11626.35
Domestic Pretax Income ($PIDOM$)	79	590	1216.105	3705.506				
Foreign Pretax Income ($PIFO$)	79	590	1047.571	2051.795				
Panel B.- Ratios								
LIQ ($[CHE + RECT]/AT$)	125	1236	0.1724	0.1300	57	566	0.2478	0.1303
CAP (SEQ/AT)	125	1236	0.3327	0.1457	57	566	0.2760	0.1243
Foreign-to-total Sales ($TFSALEP$)	80	356	0.3280	0.2218	34	234	0.6034	0.1942
FORINC ($\|PIFO\|/[\|PIDOM\| + \|PIFO\|]$)	79	590	0.3386	0.2733				
FORASS	17	94	0.4557	0.1748	34	232	0.5811	0.1921
FOREMP	17	93	0.4973	0.1680	34	232	0.5374	0.1938
EURSALEP	41	319	0.1903	0.1133	32	218	0.5717	0.2459
USSALEP	119	1063	0.7769	0.2341	24	164	0.2384	0.1752

Table 3: Pairwise correlations

This table reports pairwise correlations in the period 2000-2009. The data are obtained from Compustat Global Vantage and Compustat North America. For each firm, the variables LIQ, CAP and SIZE are linearly interpolated from year to monthly frequency using the Compustat Global Vantage dataset from 1999 to 2010. EURSALEP and USSALEP are manually constructed from Compustat Historical Segments. For the variables TFSALEP, FORINC, FORASS, FOREMP, EURSALEP and USSALEP we only use the sample average between 2000 and 2009 because the large number of missing values does not allow for interpolation.

	United States								
	LIQ	CAP	SIZE	TFSALEP	FORINC	FORASS	FOREMP	EURSALEP	USSALEP
LIQ	1.0000								
CAP	0.1194	1.0000							
SIZE	-0.1383	-0.1253	1.0000						
TFSALEP	0.3183	-0.0471	0.1402	1.0000					
FORINC	0.3501	-0.0405	0.1328	0.6978	1.0000				
FORASS	0.2110	0.3911	-0.5511	0.6531	0.7168	1.0000			
FOREMP	0.3363	0.2561	-0.4832	0.7023	0.7243	0.7780	1.0000		
EURSALEP	0.2462	0.0708	0.3166	0.7160	0.3842	0.2477	0.2336	1.0000	
USSALEP	-0.3665	0.0775	-0.1585	-0.9052	-0.7700	-0.6893	-0.8052	-0.6575	1.0000

	Economic and Monetary Union								
	LIQ	CAP	SIZE	TFSALEP	FORINC	FORASS	FOREMP	EURSALEP	USSALEP
LIQ	1.0000								
CAP	0.1492	1.0000							
SIZE	-0.2898	-0.5783	1.0000						
TFSALEP	0.1732	0.2639	-0.5263	1.0000					
FORINC	.	.	.	.	.				
FORASS	-0.1550	0.3444	-0.6466	0.7078	.	1.0000			
FOREMP	-0.0707	0.3220	-0.6524	0.7164	.	0.7585	1.0000		
EURSALEP	-0.3098	-0.0417	0.2005	-0.5664	.	-0.2457	-0.4556	1.0000	
USSALEP	-0.0044	-0.2335	-0.1905	0.4168	.	0.2461	0.3239	-0.7225	1.0000

Table 4: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary region	US		EMU	
Model	(I)	(II)	(I)	(II)
Cons.	-2.51**	-2.23*	-10.36***	-9.57***
Foreign STrate_{t-1}	62.63***	33.87**	35.55**	47.90***
$\text{LIQ}_{i,t-1}\times$Foreign STrate_{t-1}	7.21	8.31	-3.12	-3.71
$\text{CAP}_{i,t-1}\times$Foreign STrate_{t-1}	15.08	24.39**	1.19	-8.69
$\text{SIZE}_{i,t-1}\times$Foreign STrate_{t-1}	-4.06***	-0.81	-2.76**	-4.41***
Domestic STrate	No	Yes	No	Yes
Macro controls	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Firm dummy	Yes	Yes	Yes	Yes
Obs. (Firm-month)	11321	11321	4259	4259
R^2-Adj	0.8292	0.8321	0.7922	0.8046

Table 5: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$						
Monetary region	US				EMU		
Model	(III)	(IIIb)	(IIIc)	(IV)	(III)	(IIIc)	(IV)
Cons.	-2.52	-1.67	-5.03**	-0.00	-7.21***	-16.49***	-7.10***
Foreign STrate_{t-1}	25.19	19.46	40.08*	-15.55	77.95***	165.50***	38.23
$\text{LIQ}_{i,t-1}\times$Foreign STrate_{t-1}	32.29**	36.32**	39.13**	78.66***	12.14	-54.46***	8.23
$\text{CAP}_{i,t-1}\times$Foreign STrate_{t-1}	28.68**	39.11**	35.91	24.98	10.03	-4.20	0.57
$\text{SIZE}_{i,t-1}\times$Foreign STrate_{t-1}	0.20	0.03	-2.29	4.03	-6.62***	-13.25***	-3.44*
$\text{TFSALEP}_i\times$Foreign STrate_{t-1}	-26.24***			-38.93***	-20.48***		-24.80***
$\text{FORINC}_i\times$Foreign STrate_{t-1}		-18.34***					
$\text{EURSALEP}_i\times$Foreign STrate_{t-1}			-35.21**				
$\text{USSALEP}_i\times$Foreign STrate_{t-1}						-29.39***	
$\text{FORASS}_i\times$Foreign STrate_{t-1}				-64.59			-21.03
$\text{FOREMP}_i\times$Foreign STrate_{t-1}				59.97*			42.43***
Domestic STrate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. (Firm-month)	7433	7468	3477	1389	2557	1185	2557
R^2-Adj	0.8171	0.8155	0.8590	0.7851	0.8366	0.8821	0.8431

Table 6: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$	
Monetary region	US	EMU
Cons.	-1.96	-8.86***
Foreign Monetary Policy		
Foreign STrate$_{t-1}$	5.92	40.15
LIQ$_{i,t-1}$×Foreign STrate$_{t-1}$	37.39**	18.18
CAP$_{i,t-1}$×Foreign STrate$_{t-1}$	43.35***	21.48
SIZE$_{i,t-1}$×Foreign STrate$_{t-1}$	1.76	-3.62
TFSALEP$_i$×Foreign STrate$_{t-1}$	-30.61***	-19.72**
Foreign GDP growth		
Foreign growth$_{t-1}$	6.52	40.48**
LIQ$_{i,t-1}$×Foreign growth$_{t-1}$	-4.99	-1.30
CAP$_{i,t-1}$×Foreign growth$_{t-1}$	-14.56**	-11.73
SIZE$_{i,t-1}$×Foreign growth$_{t-1}$	-0.97	-3.67**
TFSALEP$_i$×Foreign growth$_{t-1}$	7.33**	-9.75
Domestic STrate	Yes	Yes
Domestic GDP growth	Yes	Yes
Macro controls	Yes	Yes
Firm controls	Yes	Yes
Firm dummy	Yes	Yes
Obs. (Firm-month)	7433	2557
R^2-Adj	0.8206	0.8422

Table 7: Panel regression for 5-year implied default probabilities on Taylor residuals

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$	
Monetary region	US	EMU
Cons.	-1.60	-8.99***
Foreign Monetary Policy		
Foreign Taylor$_{t-1}$	14.12	36.94
LIQ$_{i,t-1}$×Foreign Taylor$_{t-1}$	41.99**	14.68
CAP$_{i,t-1}$×Foreign Taylor$_{t-1}$	44.54***	17.58
SIZE$_{i,t-1}$×Foreign Taylor$_{t-1}$	0.74	-3.32
TFSALEP$_i$×Foreign Taylor$_{t-1}$	-29.02***	-16.61**
Foreign GDP growth		
Foreign growth$_{t-1}$	10.37	61.46***
LIQ$_{i,t-1}$×Foreign growth$_{t-1}$	8.12	5.67
CAP$_{i,t-1}$×Foreign growth$_{t-1}$	2.78	-1.51
SIZE$_{i,t-1}$×Foreign growth$_{t-1}$	-0.42	-5.44***
TFSALEP$_i$×Foreign growth$_{t-1}$	-7.73***	-20.42*
Domestic Taylor residuals	Yes	Yes
Domestic GDP growth	Yes	Yes
Macro controls	Yes	Yes
Firm controls	Yes	Yes
Firm dummy	Yes	Yes
Obs. (Firm-month)	7433	2557
R^2-Adj	0.8201	0.8424

Table 8: Panel regression for 5-year implied default probabilities on Taylor residuals at quarterly frequency

Panel regressions for the 5-year cumulative risk neutral default probability. Here, i stands for firm, and t stands for time. The Feasible Generalized Least Squares (FGLS) estimation allows residuals to be heteroscedastic across firms and assumes a firm-specific AR(1) error structure. The sample consists of quarterly observations for US and EMU constituents of the CDX and iTraxx indexes. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary Region	US		EMU	
Model	(I)	(II)	(I)	(II)
Estimation	FGLS	FGLS	FGLS	FGLS
Cons.	-4.65	-4.57***	-5.73***	-10.49***
$\text{LIQ}_{i,t-1}\times$Foreign Taylor_{t-1}	46.53***	90.17***	6.52	-24.98*
$\text{CAP}_{i,t-1}\times$Foreign Taylor_{t-1}	32.34***	30.57	11.50	2.00
$\text{SIZE}_{i,t-1}\times$Foreign Taylor_{t-1}	0.18	-1.11	-2.93**	-8.52***
$\text{TFSALEP}_{i}\times$Foreign Taylor_{t-1}	-21.54***		-20.29***	
$\text{EURSALEP}_{i}\times$Foreign Taylor_{t-1}		-48.25**		
$\text{USSALEP}_{i}\times$Foreign Taylor_{t-1}				-56.20***
Domestic Taylor residuals	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Quarter dummy	Yes	Yes	Yes	Yes
Obs. (Firm-quarter)	2494	1166	858	398
Wald χ^2	7844.86	4240.45	4003.74	2581.77
P-value	(0.00)	(0.00)	(0.00)	(0.00)

Table 9: Panel regression for 5-year implied default probabilities on Taylor residuals at quarterly frequency

Panel regressions for the 5-year cumulative risk neutral default probability. Here, i stands for firm, and t stands for time. The Arellano and Bond (1991) dynamic model (A&B) is estimated by treating the firm characteristics and their interactions with the domestic monetary policy as endogenous. We use up to four lags to instrument for the endogenous variables. The sample consists of quarterly observations for US and EMU constituents of the CDX and iTraxx indexes. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary Region	US		EMU	
Model	(I)	(II)	(I)	(II)
Estimation	A&B	A&B	A&B	A&B
Cons.	-1.66***	0.02	-2.55***	-5.74***
$logit\,(Q_{i,t-1}(5Y))$	0.66***	0.69***	0.63***	0.57***
$\text{LIQ}_{i,t} \times \text{Foreign Taylor}_t$	2.25	9.26	2.41	-21.39**
$\text{CAP}_{i,t} \times \text{Foreign Taylor}_t$	14.00	31.01**	10.93*	5.03
$\text{SIZE}_{i,t} \times \text{Foreign Taylor}_t$	1.81	2.39	-1.30	-5.05***
$\text{TFSALEP}_i \times \text{Foreign Taylor}_t$	-9.43*		-8.26**	
$\text{EURSALEP}_i \times \text{Foreign Taylor}_t$		-31.17*		
$\text{USSALEP}_i \times \text{Foreign Taylor}_t$				-21.40***
Domestic Taylor residuals	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Quarter dummy	Yes	Yes	Yes	Yes
Obs. (Firm-quarter)	2326	1088	790	364
Wald χ^2	13244.53	6204.62	8384.76	3842.09
P-value	(0.00)	(0.00)	(0.00)	(0.00)

Table 10: Panel regression for US and EMU policy surprises

Panel regressions for the change in cumulative risk neutral default probabilities. Here, i stands for firm, j stands for the monetary region, and t stands for time. Since we only consider disjointed events, there is only one j at each time t. The variable SALEP is defined as the percentage of sales to the monetary region j that suffers a policy shock. For firms experiencing a domestic policy shock, it is measured as 1-TFSALEP. For EMU firms experiencing a Fed surprise it is measured with USSALEP, and for US firms experiencing an ECB surprise it is measured with EURSALEP. For US firms, TFSALEP and EURSALEP are assumed to be 0 whenever they are unreported. For EMU ADR firms, USSALEP is assumed to be 0 whenever it is unreported. The sample consists of event observations for firm constituents of the CDX and iTraxx indexes with available information on foreign sales. During the sample period there are 40 changes of interest rates by the Federal Reserve and 27 changes of interest rates by the ECB. We can measure 40 Fed surprises and 17 ECB surprises with the futures data. The significance is tested using clustered standard errors by firm and by time, to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$\Delta logit\,(Q_{it}(5Y))$					
	US firms			EMU firms		
	2000-2009	<2007	2007-2009	2000-2009	<2007	2007-2009
Cons.	0.01	0.00	0.00	0.01	-0.01	0.00
FedEvent	-0.00	-0.00	-0.00	-0.00	0.00	-0.01
$\text{Surprise}_{j,t}$	0.07	-0.05	0.02	-0.37	0.01	-0.72*
$\text{Surprise}_{j,t} \times$ FedEvent	-0.07	0.07	-0.10	0.41	0.03	0.67*
$\text{Surprise}_{j,t} \times \text{LIQ}_{i,t}$	-0.13*	-0.29**	-0.05	0.32**	0.34	0.26
$\text{Surprise}_{j,t} \times \text{LIQ}_{i,t} \times$ FedEvent	0.11	0.36***	-0.07	-0.32***	-0.35	-0.19
$\text{Surprise}_{j,t} \times \text{CAP}_{i,t}$	-0.09	-0.20**	-0.18	-0.11	-0.12	0.01
$\text{Surprise}_{j,t} \times \text{CAP}_{i,t} \times$ FedEvent	0.14	0.24**	0.26	0.03	0.08	-0.04
$\text{Surprise}_{j,t} \times \text{SIZE}_{i,t}$	-0.02**	0.01	-0.02	0.00	-0.00	0.02
$\text{Surprise}_{j,t} \times \text{SIZE}_{i,t} \times$ FedEvent	0.02	-0.01	0.02	-0.01	0.00	-0.03
$\text{Surprise}_{j,t} \times \text{SALEP}_{i,j}$	-0.64***	-0.20	-0.90***	0.24	-0.30	0.43*
$\text{Surprise}_{j,t} \times \text{SALEP}_{i,j} \times$ FedEvent	0.65***	0.20	0.91***	-0.24	0.34	-0.46*
$\text{LIQ}_{i,t}$	-0.00	-0.00	0.00	-0.01*	0.01	-0.02***
$\text{CAP}_{i,t}$	-0.00	-0.00	-0.01	-0.01***	-0.00	-0.01
$\text{SIZE}_{i,t}$	-0.00	0.00	-0.00	-0.00	0.00	-0.00
$\text{SALEP}_{i,j}$	-0.01**	0.00	-0.02**	-0.00	-0.00	0.01
Obs. (Firm-event)	5524	3422	2102	1269	723	546
R^2-Adj	0.0323	0.0157	0.1049	0.0610	0.0104	0.1890

Appendix A. Variable list

Table A.11: Definitions and sources of the variables

Variables	Description	Data Source
Default risk		
Q(M)	Cumulative Default Probability implied from Credit Default Swap Spreads over a period of M years	Markit Ltd.
EDF(M)	Expected Default Frequency is a measure of default probability over a period of M years. It is measured with historical stock volatility, the level of firm's obligations, and using the structural Merton model	Moody's KMV EDF
Monetary policy		
FEDTRG	Federal Funds target rate	Federal Reserve System
ECBMRO	Main Refinancing Operations rate	European Central Bank
Taylor rule residuals	Residual of a regression of MP rate on GDP growth and inflation.	Own calculations
$\text{Surprise}_{j,t}$	Unexpected change in the target rate of monetary region j. j is either the US or the Eurozone. This surprise is measured with 30-Day Federal Funds Futures and One-Month EONIA Futures following Kuttner (2001)	Own calculations with futures from CME Group and Eurex Exchange
FedEvent	Dummy variable that takes value of 1 if a MP announcement is made by the Federal Reserve, and takes value of 0 if it is made by the ECB	Own calculations based on FOMC and ECB minutes
Foreign exposure		
TFSALEP	Average Foreign Sales as a percentage of Total Sales of a firm. This is available for US firms since 2005. Firms are required to disclose this information by the Statement of Financial Accounting Standards No. 131. In the case of European firms, this is obtained from the UNCTAD rankings	Compustat North America , UNCTAD
FORINC	Average Ratio of foreign income (or loss) over the total amount of domestic plus foreign income (or loss): $\lvert PIFO\rvert/[\lvert PIDOM\rvert+\lvert PIFO\rvert]$. It is mandatory for firms to report the foreign and domestic components of pre-tax income according to SEC regulation. $PIFO$ is the Foreign Pre-tax Income. $PIDOM$ is the Domestic Pre-tax Income	Own elaboration with Compustat North America
EURSALEP	Average Proportion of European sales over total sales of a firm	Own elaboration with Compustat Historical Segments from WRDS database
USSALEP	Average Proportion of US sales over total sales of a firm	Own elaboration with Compustat Historical Segments from WRDS database
FORASS	Average Foreign-to-total Assets of a firm	UNCTAD
FOREMP	Average Foreign-to-total Employment of a firm	UNCTAD
$\text{SALEP}_{i,j}$	Average Percentage of sales to the monetary region j, where j is either the US or the Eurozone. This variable is measured as one minus TFSALEP in the case of firms experiencing a shock in domestic monetary policy. The variable is measured as EURSALEP in the case of US firms experiencing an ECB surprise and is measured as USSALEP in the case of EMU firms experiencing a Fed surprise	Own elaboration with Compustat North America, UNCTAD, and Compustat Historical Segments
Firm controls		
LIQ	Cash and Receivables over Total Assets: $[CHE + RECT]/AT$	Compustat
CAP	Shareholders' Equity over Total Assets: SEQ/AT	Compustat
SIZE	Natural logarithm of Total Assets: $ln(AT)$	Compustat
Macroeconomic controls		
USD/EUR	USD-per-EUR exchange rate	Datastream
GDPG	GDP growth in the US and the Eurozone	Bureau of Economic Analysis, Eurostat
Inflation	Annual inflation rate in the US and the Eurozone	Bureau of Labor Statistics, Eurostat
10-year rate	10-year Treasury and 10-year German Bund	Datastream
TERM	10-year minus 2-year government bond yield spread. We use the US Treasury bonds and the German government Bunds.	Datastream

Appendix B. Extended tables – Target interest rates

Table B.12: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary region	US		EMU	
Model	(I)	(II)	(I)	(II)
Cons.	-2.51**	-2.23*	-10.36***	-9.57***
US Monetary policy				
FEDTRG_{t-1}		26.62**	35.55**	47.90***
$\text{LIQ}_{i,t-1} \times \text{FEDTRG}_{t-1}$		-1.26	-3.12	-3.71
$\text{CAP}_{i,t-1} \times \text{FEDTRG}_{t-1}$		-8.65	1.19	-8.69
$\text{SIZE}_{i,t-1} \times \text{FEDTRG}_{t-1}$		-3.35***	-2.76**	-4.41***
EMU Monetary policy				
ECBMRO_{t-1}	62.63***	33.87**		-21.97
$\text{LIQ}_{i,t-1} \times \text{ECBMRO}_{t-1}$	7.21	8.31		3.36
$\text{CAP}_{i,t-1} \times \text{ECBMRO}_{t-1}$	15.08	24.39**		33.99*
$\text{SIZE}_{i,t-1} \times \text{ECBMRO}_{t-1}$	-4.06***	-0.81		5.25***
Macro controls				
USD/EUR_{t-1}	-0.63***	-0.64***	-1.24***	-1.11***
GDPG-US_{t-1}	-11.09***	-10.47***	-12.95***	-7.83***
GDPG-EMU_{t-1}	-8.23**	-7.11*	-1.79	-13.22***
$\text{Inflation-US}_{t-1}$	-2.22	0.56	-3.34	-7.38
$\text{Inflation-EMU}_{t-1}$	32.56***	22.61**	44.61***	44.13***
$\text{10-year rate-US}_{t-1}$	-20.97**	-15.33	-30.08***	-17.04*
$\text{10-year rate-EMU}_{t-1}$	-4.02	-7.83	1.03	-12.44
TERM-US_{t-1}	-4.91	-11.40	17.62	-5.98
TERM-EMU_{t-1}	31.23**	26.97*	11.29	51.93***
Firm controls				
$\text{LIQ}_{i,t-1}$	-1.88***	-1.82***	-0.46	-0.49
$\text{CAP}_{i,t-1}$	-3.11***	-3.15***	-1.24**	-2.01***
$\text{SIZE}_{i,t-1}$	0.16	0.15	0.78***	0.64***
Firm dummy	Yes	Yes	Yes	Yes
Obs. (Firm-month)	11321	11321	4259	4259
R^2-Adj	0.8292	0.8321	0.7922	0.8046

Table B.13: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$						
Monetary region	US				EMU		
Model	(III)	(IIIb)	(IIIc)	(IV)	(III)	(IIIc)	(IV)
Cons.	-2.52	-1.67	-5.03**	-0.00	-7.21***	-16.49***	-7.10***
US Monetary policy							
FEDTRG_{t-1}	23.40*	33.52***	25.03	-21.58	77.95***	165.50***	38.23
$\text{LIQ}_{i,t-1}\times\text{FEDTRG}_{t-1}$	-10.97	-16.81*	-7.90	-12.92	12.14	-54.46***	8.23
$\text{CAP}_{i,t-1}\times\text{FEDTRG}_{t-1}$	-10.98	-14.72*	-7.85	-9.54	10.03	-4.20	0.57
$\text{SIZE}_{i,t-1}\times\text{FEDTRG}_{t-1}$	-3.16***	-3.79***	-3.59**	0.03	-6.62***	-13.25***	-3.44*
$\text{TFSALEP}_{i}\times\text{FEDTRG}_{t-1}$	7.90		8.94	5.84	-20.48***		-24.80***
$\text{FORINC}_{i}\times\text{FEDTRG}_{t-1}$		4.69					
$\text{USSALEP}_{i}\times\text{FEDTRG}_{t-1}$						-29.39***	
$\text{FORASS}_{i}\times\text{FEDTRG}_{t-1}$				55.10**			-21.03
$\text{FOREMP}_{i}\times\text{FEDTRG}_{t-1}$				-34.25			42.43***
EMU Monetary policy							
ECBMRO_{t-1}	25.19	19.46	40.08*	-15.55	-54.45*	-66.19**	-31.97
$\text{LIQ}_{i,t-1}\times\text{ECBMRO}_{t-1}$	32.29**	36.32**	39.13**	78.66***	2.02	111.66***	15.79
$\text{CAP}_{i,t-1}\times\text{ECBMRO}_{t-1}$	28.68**	39.11**	35.91	24.98	38.15**	87.46***	49.64**
$\text{SIZE}_{i,t-1}\times\text{ECBMRO}_{t-1}$	0.20	0.03	-2.29	4.03	8.17***	7.64***	6.26***
$\text{TFSALEP}_{i}\times\text{ECBMRO}_{t-1}$	-26.24***			-38.93***	-17.57	-59.07***	-19.60
$\text{FORINC}_{i}\times\text{ECBMRO}_{t-1}$		-18.34***					
$\text{EURSALEP}_{i}\times\text{ECBMRO}_{t-1}$			-35.21**				
$\text{FORASS}_{i}\times\text{ECBMRO}_{t-1}$				-64.59			32.98*
$\text{FOREMP}_{i}\times\text{ECBMRO}_{t-1}$				59.97*			-28.03**
Macro controls							
USD/EUR_{t-1}	-0.64***	-0.62***	-0.76***	-0.60*	-1.07***	-1.07***	-1.10***
GDPG-US_{t-1}	-11.46***	-10.06***	-9.66***	-11.85***	-9.04***	-9.11***	-8.79***
GDPG-EMU_{t-1}	-6.09*	-6.35*	-7.16*	-8.33**	-12.26***	-4.38	-12.39***
$\text{Inflation-US}_{t-1}$	0.30	0.16	0.91	1.81	-5.76	-1.02	-5.67
$\text{Inflation-EMU}_{t-1}$	24.20**	22.37**	21.81**	24.49**	40.69***	31.97**	40.54***
$\text{10-year rate-US}_{t-1}$	-12.63	-12.64	-18.62*	-22.17**	-14.10	-12.19	-14.29
$\text{10-year rate-EMU}_{t-1}$	-10.82	-8.93	-10.09	-7.94	-16.42	-24.45*	-16.16
TERM-US_{t-1}	-15.59	-14.72	-12.41	-22.64*	-1.63	8.29	-2.18
TERM-EMU_{t-1}	29.46**	26.68*	22.46	31.12*	53.87***	48.16***	54.13***
Firm controls							
$\text{LIQ}_{i,t-1}$	-2.54***	-2.48***	-3.39***	-5.42***	-0.71**	-3.04**	-1.17**
$\text{CAP}_{i,t-1}$	-3.38***	-3.76***	-3.67***	-0.11	-2.44***	-3.23**	-2.55***
$\text{SIZE}_{i,t-1}$	0.17	0.19	0.51**	-0.07	0.57***	1.34***	0.58***
TFSALEP_{i}	0.93		.	.	.	.	.
FORINC_{i}		-0.64					
EURSALEP_{i}			.				
USSALEP_{i}						.	
FORASS_{i}				.			.
FOREMP_{i}				.			.
Firm dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. (Firm-month)	7433	7468	3477	1389	2557	1185	2557
R^2-Adj	0.8171	0.8155	0.8590	0.7851	0.8366	0.8821	0.8431

Table B.14: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$	
Monetary region	US	EMU
Cons.	-1.96	-8.86***
US Monetary policy		
FEDTRG_{t-1}	33.76**	40.15
$\text{LIQ}_{i,t-1}\times\text{FEDTRG}_{t-1}$	-9.27	18.18
$\text{CAP}_{i,t-1}\times\text{FEDTRG}_{t-1}$	-9.20	21.48
$\text{SIZE}_{i,t-1}\times\text{FEDTRG}_{t-1}$	-3.88**	-3.62
$\text{TFSALEP}_{i}\times\text{FEDTRG}_{t-1}$	-5.35	-19.72**
EMU Monetary policy		
ECBMRO_{t-1}	5.92	20.35
$\text{LIQ}_{i,t-1}\times\text{ECBMRO}_{t-1}$	37.39**	35.32
$\text{CAP}_{i,t-1}\times\text{ECBMRO}_{t-1}$	43.35***	51.55*
$\text{SIZE}_{i,t-1}\times\text{ECBMRO}_{t-1}$	1.76	3.37
$\text{TFSALEP}_{i}\times\text{ECBMRO}_{t-1}$	-30.61***	-53.79***
US growth		
GDPG-US_{t-1}	-27.47**	40.48**
$\text{LIQ}_{i,t-1}\times\text{GDPG-US}_{t-1}$	0.22	-1.30
$\text{CAP}_{i,t-1}\times\text{GDPG-US}_{t-1}$	4.64	-11.73
$\text{SIZE}_{i,t-1}\times\text{GDPG-US}_{t-1}$	1.19	-3.67**
$\text{TFSALEP}_{i}\times\text{GDPG-US}_{t-1}$	9.19	-9.75
EMU growth		
GDPG-EMU_{t-1}	6.52	-46.39
$\text{LIQ}_{i,t-1}\times\text{GDPG-EMU}_{t-1}$	-4.99	-30.33
$\text{CAP}_{i,t-1}\times\text{GDPG-EMU}_{t-1}$	-14.56**	-10.02
$\text{SIZE}_{i,t-1}\times\text{GDPG-EMU}_{t-1}$	-0.97	2.12
$\text{TFSALEP}_{i}\times\text{GDPG-EMU}_{t-1}$	7.33**	33.11***
Macro controls		
USD/EUR_{t-1}	-0.64***	-1.11***
$\text{Inflation-US}_{t-1}$	0.30	-5.43
$\text{Inflation-EMU}_{t-1}$	24.18**	40.74***
$\text{10-year rate-US}_{t-1}$	-12.69	-14.08
$\text{10-year rate-EMU}_{t-1}$	-10.98	-16.95
TERM-US_{t-1}	-15.38	-1.87
TERM-EMU_{t-1}	29.13**	53.35***
Firm controls		
$\text{LIQ}_{i,t-1}$	-2.50***	-0.43
$\text{CAP}_{i,t-1}$	-3.41***	-2.06**
$\text{SIZE}_{i,t-1}$	0.12	0.73***
TFSALEP_{i}	0.78	.
Firm dummy	Yes	Yes
Obs. (Firm-month)	7433	2557
R^2-Adj	0.8206	0.8422

Appendix C. Extended tables – Taylor residuals

Table C.15: Panel regression for 5-year implied default probabilities on Taylor residuals

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary region	US		EMU	
Model	(I)	(II)	(I)	(II)
Cons.	-1.17	-0.93	-9.49***	-9.52***
US Monetary policy				
TAYLOR-US$_{t-1}$		44.38***	-2.99	10.37
LIQ$_{i,t-1}$×TAYLOR-US$_{t-1}$		-1.06	2.83	-0.98
CAP$_{i,t-1}$×TAYLOR-US$_{t-1}$		-7.91	24.77*	14.85
SIZE$_{i,t-1}$×TAYLOR-US$_{t-1}$		-5.22***	0.16	-1.46
EMU Monetary policy				
TAYLOR-EMU$_{t-1}$	59.91**	20.16		-119.81***
LIQ$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	0.64	2.55		16.46
CAP$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	31.68	38.72*		71.50**
SIZE$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	-4.20	0.26		13.33***
Macro controls				
USD/EUR$_{t-1}$	-0.62***	-0.63***	-1.24***	-1.11***
GDPG-US$_{t-1}$	-11.11***	-13.24***	-11.00***	-8.60***
GDPG-EMU$_{t-1}$	2.23	5.62	-2.14	2.20
Inflation-US$_{t-1}$	-2.26	-1.99	-1.73	-8.11
Inflation-EMU$_{t-1}$	37.63***	28.21***	45.57***	53.04***
10-year rate-US$_{t-1}$	-20.53**	-14.96	-30.01***	-17.36*
10-year rate-EMU$_{t-1}$	-4.30	-7.94	0.75	-12.45
TERM-US$_{t-1}$	-5.31	-11.62	16.92	-6.83
TERM-EMU$_{t-1}$	31.72**	27.58*	11.46	52.49***
Firm controls				
LIQ$_{i,t-1}$	-1.78***	-1.73***	-0.51	-0.28
CAP$_{i,t-1}$	-2.71***	-2.72***	-1.05**	-1.14***
SIZE$_{i,t-1}$	0.04	0.03	0.71***	0.66***
Firm dummy	Yes	Yes	Yes	Yes
Obs. (Firm-month)	11321	11321	4259	4259
R^2-Adj	0.8286	0.8332	0.7913	0.8085

Table C.16: Panel regression for 5-year implied default probabilities on Taylor residuals

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$						
Monetary region	US				EMU		
Model	(III)	(IIIb)	(IIIc)	(IV)	(III)	(IIIc)	(IV)
Cons.	-1.41	-0.63	-3.00*	-0.73	-7.75***	-13.15***	-8.41***
US Monetary policy							
TAYLOR-US$_{t-1}$	33.40**	45.22***	30.94**	-11.26	3.42	112.30***	0.37
LIQ$_{i,t-1}$×TAYLOR-US$_{t-1}$	-5.13	-15.07*	-5.36	-5.80	14.64*	-36.88**	9.16
CAP$_{i,t-1}$×TAYLOR-US$_{t-1}$	-8.44	-15.22	-7.21	-28.14*	30.73***	9.60	16.45*
SIZE$_{i,t-1}$×TAYLOR-US$_{t-1}$	-4.04***	-5.02***	-3.58**	-0.51	-0.55	-8.97***	-0.33
TFSALEP$_i$×TAYLOR-US$_{t-1}$	-2.81		-7.50	-18.38**	-17.70***		-24.23***
FORINC$_i$×TAYLOR-US$_{t-1}$		5.63					
USSALEP$_i$×TAYLOR-US$_{t-1}$						-38.52***	
FORASS$_i$×TAYLOR-US$_{t-1}$				53.76***			-19.81
FOREMP$_i$×TAYLOR-US$_{t-1}$				-4.52			40.12***
EMU Monetary policy							
TAYLOR-EMU$_{t-1}$	2.77	-10.63	6.40	35.40	45.55***	-300.84***	-96.11
LIQ$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	39.46*	39.57	23.25	79.51		174.86***	25.13
CAP$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	38.72	44.42	53.97	30.66		98.01**	63.00*
SIZE$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	2.78	2.79	1.85	-0.19		26.45***	11.96**
TFSALEP$_i$×TAYLOR-EMU$_{t-1}$	-48.55***			-77.28**		-47.80	-1.99
FORINC$_i$×TAYLOR-EMU$_{t-1}$		-16.80					
EURSALEP$_i$×TAYLOR-EMU$_{t-1}$			-82.72**				
FORASS$_i$×TAYLOR-EMU$_{t-1}$				-126.22			32.08
FOREMP$_i$×TAYLOR-EMU$_{t-1}$				134.54			-54.43*
Macro controls							
USD/EUR$_{t-1}$	-0.63***	-0.59***	-0.71***	-0.54	-1.01***	-1.17***	-1.12***
GDPG-US$_{t-1}$	-14.90***	-13.26***	-13.00***	-16.87***	-9.84***	-10.07***	-9.61***
GDPG-EMU$_{t-1}$	6.48*	6.02*	4.25	5.09	4.45	7.78	4.20
Inflation-US$_{t-1}$	-2.74	-2.81	-2.20	-2.97	-6.91	-2.17	-6.71
Inflation-EMU$_{t-1}$	30.09***	27.68***	27.52***	28.74**	50.91***	38.94***	50.23***
10-year rate-US$_{t-1}$	-12.71	-12.64	-18.19*	-22.01**	-12.53	-13.77	-14.94
10-year rate-EMU$_{t-1}$	-10.87	-8.86	-11.01	-8.84	-18.81	-22.68*	-15.95
TERM-US$_{t-1}$	-15.83	-14.39	-12.42	-19.62*	-2.81	7.87	-3.12
TERM-EMU$_{t-1}$	30.01**	26.62*	22.52	26.91	54.86***	47.64***	54.66***
Firm controls							
LIQ$_{i,t-1}$	-1.93***	-2.00***	-2.56***	-3.34***	-0.30	-1.20**	-0.36
CAP$_{i,t-1}$	-2.78***	-3.11***	-2.77***	-0.14	-1.09*	0.34	-0.80
SIZE$_{i,t-1}$	0.08	0.09	0.29*	-0.01	0.61***	0.96***	0.68***
TFSALEP$_i$	0.33		.	.	.	.	.
FORINC$_i$		-0.98***					
EURSALEP$_i$			.				
USSALEP$_i$						.	
FORASS$_i$				.			.
FOREMP$_i$				.			.
Firm dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. (Firm-month)	7433	7468	3477	1389	2557	1185	2557
R^2-Adj	0.8193	0.8142	0.8592	0.7891	0.8307	0.8823	0.8408

Table C.17: Panel regression for 5-year implied default probabilities on Taylor residuals

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$	
Monetary region	US	EMU
Cons.	-1.60	-8.99***
US Monetary policy		
TAYLOR-US$_{t-1}$	31.58**	36.94
LIQ$_{i,t-1}$×TAYLOR-US$_{t-1}$	-7.89	14.68
CAP$_{i,t-1}$×TAYLOR-US$_{t-1}$	-9.47	17.58
SIZE$_{i,t-1}$×TAYLOR-US$_{t-1}$	-3.79***	-3.32
TFSALEP$_i$×TAYLOR-US$_{t-1}$	-1.90	-16.61**
EMU Monetary policy		
TAYLOR-EMU$_{t-1}$	14.12	45.74
LIQ$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	41.99**	39.61
CAP$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	44.54***	63.43*
SIZE$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	0.74	1.53
TFSALEP$_i$×TAYLOR-EMU$_{t-1}$	-29.02***	-69.52***
US growth		
GDPG-US$_{t-1}$	-12.58	61.46***
LIQ$_{i,t-1}$×GDPG-US$_{t-1}$	-1.81	5.67
CAP$_{i,t-1}$×GDPG-US$_{t-1}$	1.15	-1.51
SIZE$_{i,t-1}$×GDPG-US$_{t-1}$	-0.51	-5.44***
TFSALEP$_i$×GDPG-US$_{t-1}$	8.51	-20.42*
EMU growth		
GDPG-EMU$_{t-1}$	10.37	-40.70***
LIQ$_{i,t-1}$×GDPG-EMU$_{t-1}$	8.12	-13.04
CAP$_{i,t-1}$×GDPG-EMU$_{t-1}$	2.78	12.27
SIZE$_{i,t-1}$×GDPG-EMU$_{t-1}$	-0.42	3.45***
TFSALEP$_i$×GDPG-EMU$_{t-1}$	-7.73***	10.90
Macro controls		
USD/EUR$_{t-1}$	-0.64***	-1.12***
Inflation-US$_{t-1}$	-2.61	-5.82
Inflation-EMU$_{t-1}$	29.95***	48.72***
10-year rate-US$_{t-1}$	-12.60	-14.31
10-year rate-EMU$_{t-1}$	-11.08	-16.76
TERM-US$_{t-1}$	-15.46	-1.88
TERM-EMU$_{t-1}$	29.41**	53.22***
Firm controls		
LIQ$_{i,t-1}$	-2.09***	0.22
CAP$_{i,t-1}$	-2.91***	-1.14
SIZE$_{i,t-1}$	0.11	0.75***
TFSALEP$_i$	0.31	.
Firm dummy	Yes	Yes
Obs. (Firm-month)	7433	2557
R^2-Adj	0.8201	0.8424

Appendix D. Extended tables – Different Maturity horizons

Table D.18: Panel regression for cumulative default probabilities on Taylor residuals, US firms

Panel regressions for the cumulative risk neutral and objective default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations constituents of the CDX index. The sample period goes from Jan-2000 to Dec-2009. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	*logit* $(Q_{it}(T))$											*logit* $(EDF_{it}(T))$				
Model	(I) 6M	(II) 1Y	(III) 2Y	(IV) 3Y	(V) 4Y	(VI) 5Y	(VII) 7Y	(VIII) 10Y	(IX) 15Y	(X) 20Y	(XI) 30Y	(XII) 1Y	(XIII) 2Y	(XIV) 3Y	(XV) 4Y	(XVI) 5Y
Cons.	-3.31	-2.85	-2.01	-1.68	2.21	-1.41	-0.41	0.20	0.05	1.15	1.66	0.09	-0.07	-0.15	-0.14	-0.20
US Monetary policy																
TAYLOR-US$_{t-1}$	17.40	15.54	24.80	32.75**	8.75	33.40**	26.82**	22.44*	15.80	12.28	1.01	13.70	17.40	19.69	20.21	20.61
LIQ$_{i,t-1}$×TAYLOR-US$_{t-1}$	1.64	-1.71	-5.89	-5.54	-3.69	-5.13	-3.10	-2.34	-1.36	2.47	7.00	-17.79	-14.78	-14.32	-15.60	-15.59
CAP$_{i,t-1}$×TAYLOR-US$_{t-1}$	-6.04	-11.28	-13.27	-10.64	-9.32	-8.44	-5.29	-3.47	3.98	2.95	2.78	-27.76*	-28.71*	-28.36*	-26.58*	-25.06*
SIZE$_{i,t-1}$×TAYLOR-US$_{t-1}$	-2.78*	-2.83*	-3.41**	-4.19***	-2.71**	-4.04***	-3.43***	-3.11**	-2.71**	-2.39*	-1.42	-1.84	-2.35	-2.60	-2.66	-2.67*
TFSALEP$_i$×TAYLOR-US$_{t-1}$	7.69	4.48	2.78	1.83	13.48***	-2.81	-4.25	-4.51	-3.64	-3.11	-1.14	4.81	5.42	6.09	7.74	8.32
EMU Monetary policy																
TAYLOR-EMU$_{t-1}$	6.86	8.51	2.28	-0.89	-32.45	2.77	19.49	44.76	69.58*	81.33*	122.74**	110.35***	105.17***	102.61***	100.60***	93.62***
LIQ$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	27.44	50.15*	48.89*	42.02*	15.60	39.46*	33.30	27.43	17.82	6.02	-13.28	30.20	18.35	15.58	19.08	21.38
CAP$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	68.23**	52.06*	54.81*	47.16	29.97	38.72	25.87	21.87	18.31	9.13	5.75	17.95	25.47	28.53	29.28	31.46
SIZE$_{i,t-1}$×TAYLOR-EMU$_{t-1}$	4.52	3.96	3.69	3.87	6.16	2.78	1.45	-0.16	-0.96	-1.35	-3.36	-5.67	-5.21	-5.05	-5.06	-4.74
TFSALEP$_i$×TAYLOR-EMU$_{t-1}$	-91.14***	-81.10***	-69.64***	-64.92***	-48.62**	-48.55***	-46.13***	-49.42***	-51.77***	-53.38**	-59.83**	-68.29***	-65.26***	-64.88***	-66.18***	-64.55***
Macro controls																
USD/EUR$_{t-1}$	-1.83***	-1.59***	-1.16***	-0.97***	-2.39***	-0.63***	-0.56***	-0.49**	-0.41*	-0.50**	-0.36	-1.76***	-1.80***	-1.78***	-1.71***	-1.62***
GDPG-US$_{t-1}$	-18.86***	-18.43***	-17.04***	-16.11***	-2.12	-14.90***	-13.06***	-11.32***	-12.09***	-12.86***	-14.79***	-12.90***	-12.38***	-11.77***	-11.22***	-10.65***
GDPG-EMU$_{t-1}$	7.33	6.76	6.93*	6.75*	8.23	6.48*	7.09**	7.61**	9.07**	10.70***	16.05***	-6.94*	-7.61*	-8.05*	-8.06**	-7.79**
Inflation-US$_{t-1}$	-5.61	-4.86	-4.13	-3.85	1.34	-2.74	-2.30	-3.10	-5.95	-5.48	-4.54	9.04	8.76	8.67	8.63	8.21
Inflation-EMU$_{t-1}$	53.40***	40.16***	38.26***	35.59***	0.61	30.09***	23.65**	21.96**	32.80***	33.36***	38.45***	-6.99	-5.89	-5.05	-5.10	-4.38
10-year rate-US$_{t-1}$	-43.36***	-37.22***	-28.08***	-23.20**	-61.44***	-12.71	-6.88	-0.97	-0.58	-1.30	0.80	-46.56***	-45.14***	-43.94***	-43.15***	-41.27***
10-year rate-EMU$_{t-1}$	19.48	11.94	2.07	-2.69	61.92***	-10.87	-15.85	-19.34*	-16.30	-20.39	-25.04*	54.02***	53.60***	52.95***	52.34***	49.89***
TERM-US$_{t-1}$	3.65	0.45	-6.45	-9.36	17.76	-15.83	-17.07*	-23.62**	-40.17***	-38.11***	-45.84***	-52.89***	-52.24***	-50.72***	-48.05***	-45.01***
TERM-EMU$_{t-1}$	64.91***	41.07**	41.21**	34.93**	37.19	30.01**	24.14*	29.64**	53.71***	54.48***	81.93***	85.25***	85.12***	84.27***	81.06***	76.80***
Firm controls																
LIQ$_{i,t-1}$	-2.40***	-2.47***	-2.37***	-2.19***	-1.79***	-1.93***	-1.78***	-1.72***	-1.78***	-1.95***	-2.25***	-3.66***	-3.47***	-3.36***	-3.25***	-3.11***
CAP$_{i,t-1}$	-3.07***	-2.97***	-3.15***	-2.90***	-3.49***	-2.78***	-2.67***	-2.72***	-2.81***	-2.91***	-3.31***	-3.97***	-4.01***	-3.92***	-3.73***	-3.53***
SIZE$_{i,t-1}$	0.03	0.08	0.06	0.06	0.01	0.08	0.03	0.02	0.04	0.07	-0.02	-0.24	-0.21	-0.19	-0.19	-0.18
TFSALEP$_i$	0.31	0.21	0.19	0.21	-2.60***	0.33	0.07	0.02	0.26	-1.48	0.19	0.84	0.84	0.76	0.62	0.50
Firm dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. (Firm-month)	6158	7331	7213	7368	4039	7433	7347	7193	6744	6670	6157	9228	9228	9228	9228	9228
R^2-Adj	0.8426	0.8439	0.8380	0.8353	0.8953	0.8193	0.8075	0.7947	0.7896	0.7885	0.7881	0.8069	0.8080	0.8086	0.8091	0.8091

Table D.19: Panel regression for cumulative default probabilities on Taylor residuals, EMU firms

Panel regressions for the cumulative risk neutral and objective default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the iTraxx index. The sample period goes from Jan-2000 to Dec-2009. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(T))$											$logit\,(EDF_{it}(T))$				
Model	(I) 6M	(II) 1Y	(III) 2Y	(IV) 3Y	(V) 4Y	(VI) 5Y	(VII) 7Y	(VIII) 10Y	(IX) 15Y	(X) 20Y	(XI) 30Y	(XII) 1Y	(XIII) 2Y	(XIV) 3Y	(XV) 4Y	(XVI) 5Y
Cons.	-12.03***	-11.37***	-10.19***	-9.59***	-4.65	-8.31***	-8.86***	-8.07***	-7.68***	-7.09***	-5.18**	1.58	1.69	1.60	1.32	1.05
US Monetary policy																
TAYLOR-US$_{t-1}$	-40.44	-34.63	-7.45	10.81	46.05*	28.88	33.90	39.43	35.46	35.92	50.99**	1.75	-5.44	-11.46	-15.78	-18.10
LIQ$_{i,t-1}\times$TAYLOR-US$_{t-1}$	5.55	11.67	8.92	9.25	-1.56	9.45	9.65	10.64	10.33	10.38	8.65	18.07	18.73	17.60	15.20	14.01
CAP$_{i,t-1}\times$TAYLOR-US$_{t-1}$	37.57***	31.05**	25.48**	23.05*	14.02	22.14**	21.44**	21.31**	20.92**	15.60	13.66	25.75	21.65	20.43	20.73	20.25
SIZE$_{i,t-1}\times$TAYLOR-US$_{t-1}$	3.62	2.55	0.24	-1.17	-3.56*	-2.68	-3.17	-3.66*	-3.20	-3.10	-4.43**	-3.34	-2.83	-2.30	-1.86	-1.54
TFSALEP$_i\times$TAYLOR-US$_{t-1}$	-17.83***	-16.83*	-14.74*	-14.54*	-11.65	-14.83*	-13.28*	-14.08*	-15.41**	-15.02**	-15.51**	13.16	15.01	15.19	14.81	13.67
EMU Monetary policy																
TAYLOR-EMU$_{t-1}$	-60.89	-62.22	-106.29	-121.39	-173.83**	-131.80*	-112.67	-102.11	-90.60	-84.82	-87.11	-5.90	-1.39	4.19	16.95	20.69
LIQ$_{i,t-1}\times$TAYLOR-EMU$_{t-1}$	8.67	3.76	19.80	24.18	27.66	27.06	30.95	32.79	27.01	23.42	12.30	-30.63	-30.35	-27.44	-24.38	-22.94
CAP$_{i,t-1}\times$TAYLOR-EMU$_{t-1}$	17.84	41.18	52.55	56.59	11.34	54.03	52.00	52.13	44.83	45.62	35.53	-43.83	-29.12	-20.93	-19.07	-16.50
SIZE$_{i,t-1}\times$TAYLOR-EMU$_{t-1}$	10.63	11.47*	14.07**	14.94**	16.41***	15.05**	13.28**	12.16**	11.94**	11.80**	12.28**	3.53	3.33	2.81	1.71	1.24
TFSALEP$_i\times$TAYLOR-EMU$_{t-1}$	8.35	-14.92	-16.03	-18.07	13.61	-13.43	-16.28	-13.51	-13.58	-15.84	-12.85	-37.04	-43.16	-45.55	-47.93	-46.49
Macro controls																
USD/EUR$_{t-1}$	-1.50**	-1.91***	-1.63***	-1.40***	-3.31***	-1.11***	-1.05***	-0.96***	-0.99***	-1.13***	-1.18***	-2.77***	-2.82***	-2.80***	-2.71***	-2.57***
GDPG-US$_{t-1}$	-17.31***	-18.45***	-16.10***	-13.32***	1.04	-9.80***	-7.58***	-5.29**	-4.58*	-4.60*	-7.37***	-3.16	-3.28	-3.25	-3.16	-3.09
GDPG-EMU$_{t-1}$	6.90	11.56*	10.03*	7.62	-4.59	4.26	2.71	1.47	2.41	2.86	8.78**	-7.12*	-8.02**	-8.33**	-8.08**	-7.81**
Inflation-US$_{t-1}$	-22.26**	-15.62**	-11.94*	-9.67	-7.53	-6.84	-5.69	-4.88	-5.43	-5.54	-1.34	16.16***	15.73***	15.15***	14.56***	13.76***
Inflation-EMU$_{t-1}$	106.90***	78.94***	66.56***	60.22***	41.93**	50.57***	45.41***	40.03***	39.80***	40.30***	29.72***	-37.45***	-35.93***	-34.91***	-34.24***	-32.74***
10-year rate-US$_{t-1}$	-39.35*	-37.10**	-26.22*	-23.14*	-77.56***	-14.59	-7.41	-1.75	0.85	0.47	-1.85	-48.59***	-47.23***	-45.66***	-44.06***	-42.28***
10-year rate-EMU$_{t-1}$	-19.76	-13.79	-18.15	-16.39	64.43***	-16.20	-19.53*	-20.28**	-20.97**	-20.76**	-23.31**	48.28***	47.05***	45.46***	43.50***	41.45***
TERM-US$_{t-1}$	-13.58	-3.77	-1.13	-1.69	32.29	-3.24	-6.37	-9.60	-10.49	-9.94	-4.73	15.49	12.52	11.20	10.67	9.63
TERM-EMU$_{t-1}$	122.46***	91.37***	74.84***	66.75***	31.51	54.82***	50.33***	47.47***	48.06***	47.70***	44.71***	-4.86	-2.01	-0.91	-1.21	-1.25
Firm controls																
LIQ$_{i,t-1}$	-0.17	-0.23	-0.21	-0.20	0.53	-0.16	-0.13	-0.11	-0.10	-0.08	0.08	-2.24*	-2.10*	-2.00*	-1.93**	-1.83**
CAP$_{i,t-1}$	-0.91	-0.82	-0.82	-0.81	-0.89	-0.80	-0.79	-0.78	-0.86	-0.89	-0.92	-3.33**	-3.12**	-2.93**	-2.78**	-2.59**
SIZE$_{i,t-1}$	0.76***	0.84***	0.79***	0.75***	0.40	0.66***	0.62***	0.58***	0.59***	0.59***	0.63**	-0.29	-0.29	-0.27	-0.24	-0.22
TFSALEP$_i$	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Firm dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. (Firm-month)	2307	2552	2552	2550	1631	2557	2551	2545	2538	2506	2388	3807	3807	3807	3807	3807
R^2-Adj	0.8748	0.8794	0.8719	0.8608	0.8882	0.8368	0.8140	0.7903	0.7660	0.7604	0.7427	0.6737	0.6870	0.6957	0.7003	0.7034

Appendix E. Extended tables – Quarterly frequency

Table E.20: Panel regression for 5-year implied default probabilities on Taylor residuals at quarterly frequency

Panel regressions for the 5-year cumulative risk neutral default probability. Here, i stands for firm, and t stands for time. The Feasible Generalized Least Squares (FGLS) estimation allows residuals to be heteroscedastic across firms and assumes a firm-specific AR(1) error structure. The sample consists of quarterly observations for constituents of the CDX and iTraxx indexes. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary Region	US		EMU	
Model	(I)	(II)	(I)	(II)
Estimation	FGLS	FGLS	FGLS	FGLS
Cons.	-4.65	-4.57***	-5.73***	-10.49***
US Monetary policy				
$\text{LIQ}_{i,t-1}\times\text{TAYLOR-US}_{t-1}$	-3.53	-9.48	6.52	-24.98*
$\text{CAP}_{i,t-1}\times\text{TAYLOR-US}_{t-1}$	-8.58*	-7.96	11.50	2.00
$\text{SIZE}_{i,t-1}\times\text{TAYLOR-US}_{t-1}$	-2.52***	-3.27**	-2.93**	-8.52***
$\text{TFSALEP}_{i}\times\text{TAYLOR-US}_{t-1}$	1.27	-4.15	-20.29***	
$\text{USSALEP}_{i}\times\text{TAYLOR-US}_{t-1}$				-56.20***
EMU Monetary policy				
$\text{LIQ}_{i,t-1}\times\text{TAYLOR-EMU}_{t-1}$	46.53***	90.17***	-0.63	110.19**
$\text{CAP}_{i,t-1}\times\text{TAYLOR-EMU}_{t-1}$	32.34***	30.57	59.50***	99.18***
$\text{SIZE}_{i,t-1}\times\text{TAYLOR-EMU}_{t-1}$	0.18	-1.11	7.72**	17.89***
$\text{TFSALEP}_{i}\times\text{TAYLOR-EMU}_{t-1}$	-21.54***		3.19	-28.05
$\text{EURSALEP}_{i}\times\text{TAYLOR-EMU}_{t-1}$		-48.25**		
Firm controls				
$\text{LIQ}_{i,t-1}$	-1.72***	-3.17***	-0.58**	-1.68***
$\text{CAP}_{i,t-1}$	-2.27***	-2.80***	-0.68*	0.48
$\text{SIZE}_{i,t-1}$	0.11**	0.33***	0.40***	0.84***
TFSALEP_{i}	4.29	-1.64	-2.51***	-2.77***
EURSALEP_{i}		7.18		
USSALEP_{i}				-4.19**
Unobservable effects				
Quarter dummy	Yes	Yes	Yes	Yes
Obs. (Firm-quarter)	2494	1166	858	398
Wald χ^2	7844.86	4240.45	4003.74	2581.77
P-value	(0.00)	(0.00)	(0.00)	(0.00)

Table E.21: Panel regression for 5-year implied default probabilities on Taylor residuals at quarterly frequency

Panel regressions for the 5-year cumulative risk neutral default probability. Here, i stands for firm, and t stands for time. The Arellano and Bond (1991) dynamic model (A&B) is estimated by treating the firm characteristics and their interactions with the domestic monetary policy as endogenous. We use up to four lags to instrument for the endogenous variables. The sample consists of quarterly observations for constituents of the CDX and iTraxx indexes. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary Region	US		EMU	
Model	(I)	(II)	(I)	(II)
Estimation	A&B	A&B	A&B	A&B
Cons.	-1.66***	0.02	-2.55***	-5.74***
$logit\,(Q_{i,t-1}(5Y))$	0.66***	0.69***	0.63***	0.57***
US Monetary policy				
$\text{LIQ}_{i,t}\times\text{TAYLOR-US}_t$	-1.48	-3.97	2.41	-21.39**
$\text{CAP}_{i,t}\times\text{TAYLOR-US}_t$	0.51	-1.32	10.93*	5.03
$\text{SIZE}_{i,t}\times\text{TAYLOR-US}_t$	-1.55***	-1.47*	-1.30	-5.05***
$\text{TFSALEP}_i\times\text{TAYLOR-US}_t$	2.11	-3.03	-8.26**	
$\text{USSALEP}_i\times\text{TAYLOR-US}_t$				-21.40***
EMU Monetary policy				
$\text{LIQ}_{i,t}\times\text{TAYLOR-EMU}_t$	2.25	9.26	13.50	83.81**
$\text{CAP}_{i,t}\times\text{TAYLOR-EMU}_t$	14.00	31.01**	16.06	44.11
$\text{SIZE}_{i,t}\times\text{TAYLOR-EMU}_t$	1.81	2.39	4.80**	9.87***
$\text{TFSALEP}_i\times\text{TAYLOR-EMU}_t$	-9.43*		-3.86	-24.42
$\text{EURSALEP}_i\times\text{TAYLOR-EMU}_t$		-31.17*		
Firm controls				
$\text{LIQ}_{i,t}$	-1.23***	-1.59***	-0.01	-0.75**
$\text{CAP}_{i,t}$	-1.24***	-0.63***	-0.47*	-0.01
$\text{SIZE}_{i,t}$	0.13**	-0.01	0.18***	0.41***
TFSALEP_i	0.00	0.00	0.00	0.00
EURSALEP_i		0.00		
USSALEP_i				0.00
Unobservable effects				
Quarter dummy	Yes	Yes	Yes	Yes
Obs. (Firm-quarter)	2326	1088	790	364
Wald χ^2	13244.53	6204.62	8384.76	3842.09
P-value	(0.00)	(0.00)	(0.00)	(0.00)

Appendix F. Extended tables – Contemporaneous Target interest rates

Table F.22: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary region	US		EMU	
Model	(I)	(II)	(I)	(II)
Cons.	-1.30	-1.13	-9.42***	-8.51***
US Monetary policy				
FEDTRG_t		33.21***	44.10***	58.25***
$\text{LIQ}_{i,t}\times\text{FEDTRG}_t$		-1.43	-3.77	-3.72
$\text{CAP}_{i,t}\times\text{FEDTRG}_t$		-11.21	-0.30	-9.02
$\text{SIZE}_{i,t}\times\text{FEDTRG}_t$		-3.09***	-3.17***	-4.57***
EMU Monetary policy				
ECBMRO_t	54.10***	21.07		-37.40*
$\text{LIQ}_{i,t}\times\text{ECBMRO}_t$	5.88	7.08		1.25
$\text{CAP}_{i,t}\times\text{ECBMRO}_t$	16.01*	26.99**		28.47
$\text{SIZE}_{i,t}\times\text{ECBMRO}_t$	-4.35***	-1.32		4.31**
Macro controls				
USD/EUR_t	-0.96***	-0.97***	-1.18***	-1.13***
GDPG-US_t	-11.04***	-11.03***	-10.91***	-9.10***
GDPG-EMU_t	-6.42**	-6.21*	-3.13	-7.21**
Inflation-US_t	-3.34	-3.14	-7.98*	-9.74**
Inflation-EMU_t	32.32***	31.45***	49.09***	49.13***
10-year rate-US_t	-30.91***	-30.43***	-43.82***	-39.16***
$\text{10-year rate-EMU}_t$	-3.30	-3.70	1.68	-2.92
TERM-US_t	-1.19	-1.48	13.72	4.64
TERM-EMU_t	15.27	14.32	22.58*	37.84***
Firm controls				
$\text{LIQ}_{i,t}$	-1.78***	-1.74***	-0.49	-0.49
$\text{CAP}_{i,t}$	-3.15***	-3.18***	-1.30**	-1.90**
$\text{SIZE}_{i,t}$	0.16	0.14	0.73***	0.63***
Firm dummy	Yes	Yes	Yes	Yes
Obs. (Firm-month)	11321	11321	4259	4259
R^2-Adj	0.8364	0.8385	0.8127	0.8160

Table F.23: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$						
Monetary region	US				EMU		
Model	(III)	(IIIb)	(IIIc)	(IV)	(III)	(IIIc)	(IV)
Cons.	-1.53	-0.88	-4.29*	0.46	-6.36***	-16.52***	-5.97***
US Monetary policy							
FEDTRG_t	30.77**	40.52***	31.97**	-9.06	77.90***	177.84***	47.91*
$\text{LIQ}_{i,t}\times\text{FEDTRG}_t$	-12.49	-17.78*	-10.81	-18.02	7.18	-54.65***	6.46
$\text{CAP}_{i,t}\times\text{FEDTRG}_t$	-12.79	-16.77*	-9.21	-12.64	5.62	-4.75	-0.82
$\text{SIZE}_{i,t}\times\text{FEDTRG}_t$	-3.01***	-3.64***	-3.40**	-0.14	-6.00**	-13.61***	-3.51*
$\text{TFSALEP}_i\times\text{FEDTRG}_t$	9.80		12.06*	8.02	-13.45		-22.45**
$\text{FORINC}_i\times\text{FEDTRG}_t$		5.86					
$\text{USSALEP}_i\times\text{FEDTRG}_t$						-29.88**	
$\text{FORASS}_i\times\text{FEDTRG}_t$				54.56**			-21.14
$\text{FOREMP}_i\times\text{FEDTRG}_t$				-33.86			41.15***
EMU Monetary policy							
ECBMRO_t	12.61	9.40	29.15	-34.11	-39.40	-71.51**	-51.17
$\text{LIQ}_{i,t}\times\text{ECBMRO}_t$	30.28**	33.81**	36.47**	77.96***	14.20	110.38**	18.47
$\text{CAP}_{i,t}\times\text{ECBMRO}_t$	29.82**	40.73***	36.72*	33.83	45.93**	86.67**	44.29**
$\text{SIZE}_{i,t}\times\text{ECBMRO}_t$	-0.30	-0.63	-3.05	3.84	5.04*	5.84**	5.54**
$\text{TFSALEP}_i\times\text{ECBMRO}_t$	-25.81***			-34.50**	-21.58	-65.01***	-27.59
$\text{FORINC}_i\times\text{ECBMRO}_t$		-18.50***					
$\text{EURSALEP}_i\times\text{ECBMRO}_t$			-33.78**				
$\text{FORASS}_i\times\text{ECBMRO}_t$				-65.81			33.25*
$\text{FOREMP}_i\times\text{ECBMRO}_t$				52.62			-19.73
Macro controls							
USD/EUR_t	-0.97***	-0.93***	-1.06***	-0.90***	-1.10***	-1.04***	-1.12***
GDPG-US_t	-11.91***	-10.59***	-10.65***	-12.92***	-10.04***	-10.16***	-9.83***
GDPG-EMU_t	-5.63*	-5.88*	-5.43	-6.89**	-6.62*	2.10	-6.53
Inflation-US_t	-3.54	-3.32	-1.66	-1.99	-9.03*	-5.12	-8.91*
Inflation-EMU_t	33.18***	31.12***	29.09***	35.38***	47.10***	39.48***	46.78***
10-year rate-US_t	-28.61***	-27.84***	-35.35***	-36.19***	-36.68***	-31.43***	-37.14***
$\text{10-year rate-EMU}_t$	-4.44	-2.68	-2.36	-2.53	-6.90	-16.85	-6.44
TERM-US_t	-6.79	-6.78	-3.78	-13.27	8.97	20.67**	9.01
TERM-EMU_t	17.66	16.06	13.30	22.03	38.72***	30.93**	38.49***
Firm controls							
$\text{LIQ}_{i,t}$	-2.38***	-2.32***	-3.14***	-5.16***	-0.94**	-3.04**	-1.23**
$\text{CAP}_{i,t}$	-3.41***	-3.80***	-3.67***	-0.35	-2.68***	-3.25**	-2.48***
$\text{SIZE}_{i,t}$	0.17	0.20	0.52**	-0.03	0.59***	1.41***	0.55***
TFSALEP_i	0.84		.	.	.	.	.
FORINC_i		-0.63					
EURSALEP_i			.				
USSALEP_i						.	
FORASS_i				.			.
FOREMP_i				.			.
Firm dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. (Firm-month)	7433	7468	3477	1389	2557	1185	2557
R^2-Adj	0.8236	0.8225	0.8652	0.7950	0.8487	0.8953	0.8548

Table F.24: Panel regression for 5-year implied default probabilities on target interest rates

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$	
Monetary region	US	EMU
Cons.	-1.06	-8.16***
US Monetary policy		
FEDTRG_t	43.61***	48.01
$\text{LIQ}_{i,t}\times\text{FEDTRG}_t$	-11.16	17.39
$\text{CAP}_{i,t}\times\text{FEDTRG}_t$	-11.47	20.64
$\text{SIZE}_{i,t}\times\text{FEDTRG}_t$	-3.93**	-3.60
$\text{TFSALEP}_i\times\text{FEDTRG}_t$	-4.50	-17.85*
EMU Monetary policy		
ECBMRO_t	0.78	19.92
$\text{LIQ}_{i,t}\times\text{ECBMRO}_t$	31.38*	31.04
$\text{CAP}_{i,t}\times\text{ECBMRO}_t$	45.74***	46.15
$\text{SIZE}_{i,t}\times\text{ECBMRO}_t$	0.51	1.36
$\text{TFSALEP}_i\times\text{ECBMRO}_t$	-29.61***	-58.74***
US growth		
GDPG-US_t	-26.97**	42.00**
$\text{LIQ}_{i,t}\times\text{GDPG-US}_t$	-1.07	-5.45
$\text{CAP}_{i,t}\times\text{GDPG-US}_t$	5.45	-13.60
$\text{SIZE}_{i,t}\times\text{GDPG-US}_t$	1.06	-3.78**
$\text{TFSALEP}_i\times\text{GDPG-US}_t$	10.38*	-9.50
EMU growth		
GDPG-EMU_t	0.38	-43.47
$\text{LIQ}_{i,t}\times\text{GDPG-EMU}_t$	-1.30	-25.20
$\text{CAP}_{i,t}\times\text{GDPG-EMU}_t$	-14.79**	-8.06
$\text{SIZE}_{i,t}\times\text{GDPG-EMU}_t$	-0.33	2.29
$\text{TFSALEP}_i\times\text{GDPG-EMU}_t$	6.29***	32.11**
Macro controls		
USD/EUR_t	-0.97***	-1.13***
Inflation-US_t	-3.47	-8.66*
Inflation-EMU_t	33.07***	47.00***
10-year rate-US_t	-28.70***	-36.98***
$\text{10-year rate-EMU}_t$	-4.59	-7.31
TERM-US_t	-6.39	9.11
TERM-EMU_t	17.03	38.22***
Firm controls		
$\text{LIQ}_{i,t}$	-2.30***	-0.32
$\text{CAP}_{i,t}$	-3.47***	-1.97**
$\text{SIZE}_{i,t}$	0.13	0.75***
TFSALEP_i	0.69	.
Firm dummy	Yes	Yes
Obs. (Firm-month)	7433	2557
R^2-Adj	0.8277	0.8546

Appendix G. Extended tables – Contemporaneous Taylor residuals

Table G.25: Panel regression for 5-year implied default probabilities on Taylor residuals

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$			
Monetary region	US		EMU	
Model	(I)	(II)	(I)	(II)
Cons.	-0.03	0.12	-8.39***	-8.32***
US Monetary policy				
TAYLOR-US$_t$		52.76***	3.28	19.09
LIQ$_{i,t}$×TAYLOR-US$_t$		-1.41	3.63	0.07
CAP$_{i,t}$×TAYLOR-US$_t$		-9.97	24.40*	15.45
SIZE$_{i,t}$×TAYLOR-US$_t$		-5.16***	-0.09	-1.52
EMU Monetary policy				
TAYLOR-EMU$_t$	57.28**	14.93		-135.45***
LIQ$_{i,t}$×TAYLOR-EMU$_t$	-1.96	-0.11		16.79
CAP$_{i,t}$×TAYLOR-EMU$_t$	34.49	41.98*		67.78**
SIZE$_{i,t}$×TAYLOR-EMU$_t$	-5.15*	-1.03		12.31***
Macro controls				
USD/EUR$_t$	-0.95***	-0.95***	-1.18***	-1.13***
GDPG-US$_t$	-11.05***	-11.08***	-7.74***	-7.05***
GDPG-EMU$_t$	-0.09	0.31	-3.47	-1.69
Inflation-US$_t$	-3.40	-3.36	-5.31	-7.99*
Inflation-EMU$_t$	35.52***	34.10***	50.04***	53.45***
10-year rate-US$_t$	-30.44***	-30.03***	-43.76***	-39.44***
10-year rate-EMU$_t$	-3.58	-3.82	1.43	-2.97
TERM-US$_t$	-1.65	-1.65	12.89	3.69
TERM-EMU$_t$	15.87	14.87	22.98*	38.63***
Firm controls				
LIQ$_{i,t}$	-1.75***	-1.70***	-0.57	-0.34
CAP$_{i,t}$	-2.73***	-2.77***	-1.14**	-1.19***
SIZE$_{i,t}$	0.03	0.02	0.64***	0.61***
Firm dummy	Yes	Yes	Yes	Yes
Obs. (Firm-month)	11321	11321	4259	4259
R^2-Adj	0.8358	0.8399	0.8109	0.8190

Table G.26: Panel regression for 5-year implied default probabilities on Taylor residuals

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$						
Monetary region	US				EMU		
Model	(III)	(IIIb)	(IIIc)	(IV)	(III)	(IIIc)	(IV)
Cons.	-0.47	0.15	-2.27	-0.35	-7.11***	-12.70***	-7.18***
US Monetary policy							
TAYLOR-US$_t$	42.06***	53.09***	40.56***	2.70	34.25	113.54***	9.02
LIQ$_{i,t}\times$TAYLOR-US$_t$	-5.91	-15.24*	-7.62	-8.88	8.37	-34.50**	7.91
CAP$_{i,t}\times$TAYLOR-US$_t$	-9.90	-16.78*	-8.05	-30.07**	21.62**	9.90	16.35*
SIZE$_{i,t}\times$TAYLOR-US$_t$	-4.00***	-4.97***	-3.66**	-0.71	-2.47	-8.53***	-0.38
TFSALEP$_i\times$TAYLOR-US$_t$	-2.49		-5.16	-17.62*	-12.32		-20.39***
FORINC$_i\times$TAYLOR-US$_t$		6.20					
USSALEP$_i\times$TAYLOR-US$_t$						-32.86**	
FORASS$_i\times$TAYLOR-US$_t$				51.82***			-18.92
FOREMP$_i\times$TAYLOR-US$_t$				-4.71			36.54***
EMU Monetary policy							
TAYLOR-EMU$_t$	-4.36	-14.31	-4.17	30.47	-137.55*	-310.57***	-108.88
LIQ$_{i,t}\times$TAYLOR-EMU$_t$	36.14	32.35	14.52	78.06	35.40	190.23***	33.33
CAP$_{i,t}\times$TAYLOR-EMU$_t$	39.98	42.94	55.32	34.96	53.21	110.94**	61.07*
SIZE$_{i,t}\times$TAYLOR-EMU$_t$	1.83	1.65	1.43	-1.44	13.26**	24.87***	10.77*
TFSALEP$_i\times$TAYLOR-EMU$_t$	-50.87***			-81.16**	-20.20	-63.33	-10.93
FORINC$_i\times$TAYLOR-EMU$_t$		-15.56					
EURSALEP$_i\times$TAYLOR-EMU$_t$			-94.83**				
FORASS$_i\times$TAYLOR-EMU$_t$				-129.11			23.61
FOREMP$_i\times$TAYLOR-EMU$_t$				137.46			-41.65
Macro controls							
USD/EUR$_t$	-0.95***	-0.90***	-1.01***	-0.82**	-1.12***	-1.15***	-1.14***
GDPG-US$_t$	-12.58***	-11.16***	-11.04***	-14.71***	-7.96***	-8.55***	-7.81***
GDPG-EMU$_t$	0.63	0.51	-0.75	-0.79	-0.12	3.43	-0.16
Inflation-US$_t$	-4.19	-4.05	-2.35	-4.03	-7.51	-3.97	-7.39
Inflation-EMU$_t$	36.16***	33.55***	32.05***	36.69***	52.02***	41.41***	51.72***
10-year rate-US$_t$	-28.77***	-27.86***	-34.99***	-36.11***	-37.38***	-32.93***	-37.71***
10-year rate-EMU$_t$	-4.40	-2.58	-3.06	-3.12	-6.59	-14.84	-6.34
TERM-US$_t$	-6.98	-6.32	-3.98	-10.45	7.67	19.65*	7.80
TERM-EMU$_t$	18.15	15.86	13.85	18.85	39.61***	30.43**	39.44***
Firm controls							
LIQ$_{i,t}$	-1.88***	-1.96***	-2.44***	-3.31***	-0.16	-1.17**	-0.33
CAP$_{i,t}$	-2.81***	-3.18***	-2.78***	-0.23	-0.92	0.31	-0.92
SIZE$_{i,t}$	0.07	0.09	0.29*	0.02	0.61***	0.96***	0.63***
TFSALEP$_i$	0.31		.	.	.	.	.
FORINC$_i$		-0.93***					
EURSALEP$_i$			.				
USSALEP$_i$						.	
FORASS$_i$				.			.
FOREMP$_i$				.			.
Firm dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. (Firm-month)	7433	7468	3477	1389	2557	1185	2557
R^2-Adj	0.8263	0.8210	0.8658	0.8003	0.8478	0.8920	0.8512

Table G.27: Panel regression for 5-year implied default probabilities on Taylor residuals

Panel regressions for the cumulative risk neutral default probabilities. Here, i stands for firm, and t stands for time. The sample consists of monthly observations for constituents of the CDX and iTraxx indexes. The significance is tested using clustered standard errors by firm and by time to account for possible correlation of the residuals across firms or across time. * for p<.10, ** for p<.05, and *** for p<.01.

Dependent variable	$logit\,(Q_{it}(5Y))$	
Monetary region	US	EMU
Cons.	-0.65	-8.23***
US Monetary policy		
TAYLOR-US$_t$	40.58***	42.79
LIQ$_{i,t}$×TAYLOR-US$_t$	-9.47	14.51
CAP$_{i,t}$×TAYLOR-US$_t$	-11.33	16.98
SIZE$_{i,t}$×TAYLOR-US$_t$	-3.77***	-3.17
TFSALEP$_i$×TAYLOR-US$_t$	-1.23	-14.30*
EMU Monetary policy		
TAYLOR-EMU$_t$	13.16	46.70
LIQ$_{i,t}$×TAYLOR-EMU$_t$	34.90*	39.05
CAP$_{i,t}$×TAYLOR-EMU$_t$	46.97***	59.53*
SIZE$_{i,t}$×TAYLOR-EMU$_t$	-0.88	-0.68
TFSALEP$_i$×TAYLOR-EMU$_t$	-29.18***	-75.22***
US growth		
GDPG-US$_t$	-7.73	65.21***
LIQ$_{i,t}$×GDPG-US$_t$	-4.14	2.51
CAP$_{i,t}$×GDPG-US$_t$	1.21	-3.22
SIZE$_{i,t}$×GDPG-US$_t$	-0.76	-5.55***
TFSALEP$_i$×GDPG-US$_t$	9.55*	-19.52*
EMU growth		
GDPG-EMU$_t$	1.95	-35.82***
LIQ$_{i,t}$×GDPG-EMU$_t$	9.57**	-11.41
CAP$_{i,t}$×GDPG-EMU$_t$	3.19	11.22
SIZE$_{i,t}$×GDPG-EMU$_t$	-0.20	2.76**
TFSALEP$_i$×GDPG-EMU$_t$	-7.59***	8.10
Macro controls		
USD/EUR$_t$	-0.96***	-1.14***
Inflation-US$_t$	-4.00	-6.57
Inflation-EMU$_t$	35.90***	50.30***
10-year rate-US$_t$	-28.57***	-37.18***
10-year rate-EMU$_t$	-4.73	-7.17
TERM-US$_t$	-6.47	9.12
TERM-EMU$_t$	17.31	38.09***
Firm controls		
LIQ$_{i,t}$	-2.00***	0.28
CAP$_{i,t}$	-2.95***	-1.13
SIZE$_{i,t}$	0.10	0.74***
TFSALEP$_i$	0.24	.
Firm dummy	Yes	Yes
Obs. (Firm-month)	7433	2557
R^2-Adj	0.8272	0.8548