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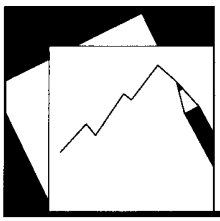

IMF Working Paper

The Real Effects of Financial Sector Risk

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Monetary and Capital Markets Department

The Real Effects of Financial Sector Risk[1]

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Abstract

This paper estimates the magnitude of key effects on the real economy from financial sector stress. We focus on the short-run feedback effect from market-based indicators of financial sector risk to the real economy through the credit channel, and estimate this effect on an economy-wide (macro) level, as well as on the level of individual large banks. Both estimates yield significant feedback effects of substantial magnitude. The estimates are consistent with other work in this area. Our results suggest *that* prudential supervision could be enhanced by taking into account the feedback effects of financial instability in the real economy. *We* also propose a way to integrate feedback effects into stress tests in order to improve realism and accuracy or macroeconomic stress scenarios, as well as a metric to interpret stress testing results.

JEL Classification Numbers: C33, E44, G01

Keywords: financial sector risk, feedback effects, second-round effects, credit growth

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I. INTRODUCTION

This paper estimates the effects on the real economy from financial sector stress. Motivating the topic of inquiry of this research has progressively become easier over the last year. The crisis is clearly showing that real effects of financial sector turmoil can be large and, quite possibly, prolonged. In addition, international contagion from financial distress in one country to that in another, and its adverse feedback effect to that country's real economy is evident.

The real effects of financial sector stress have been recognized at least since Bagehot (1873). They have been studied extensively on the back of the 1930s depression (comprehensively discussed in, e.g., Bernanke, 1983), and the more recent Asian crisis of the late 1990s (e.g., the books by Noland and others, 1998; and Hunter and others, 1999, and the references therein). These studies have led to a better understanding of the nature of financial sector risk. One of the recurring conclusions of the Asian crisis episode has been that financial systems, and banks in particular, did not adequately manage the risks in their portfolios. At the same time, supervisors and other policymakers failed to identify the buildup of risks in these institutions. Finally, bank-based financial crises, in contrast to, say, balance of payment or currency crises, tend to have a much more severe and prolonged effect on the real economy.

To date, a large part of financial stability work focuses on identifying the factors that contribute to financial sector risk and assessing and monitoring changes in financial institutions' risk profiles. The subsequent feedback loop, in which financial sector risk influences the real macro environment through the credit channel, usually remains unmodeled. To the extent research has focused on the influence of financial variables on the real economy, this has mostly been confined to variables related to stock market performance and the yield curve (see below for some references). Explicit financial sector risk variables, or risk variables pertaining to individual institutions, are normally not taken into account. This paper tries to help fill this gap by examining how financial stress affects credit growth to the private sector and GDP.

The objective of this paper is to model the feedback loop from financial system stress to the real economy and empirically estimate its magnitude. Based on a sample of mature European economies, we provide in-sample and out-of-sample predictions of declines in credit growth based on observed market-based indicators of increases in financial sector fragility. We focus on the short-run feedback effect from market-based indicators of financial sector risk to the real economy through the credit channel. This short-run feedback effect is estimated on an economy-wide (macro) level, as well as on the level of credit supplied by key individual large banks. Both estimates yield significant feedback effects of substantial magnitude.

A better understanding of the adverse feedback loops between financial stress and the broader economy is the first step toward a "macroprudential" approach to financial

supervision. One of the key lessons of the current global financial crisis is the need to better internalize the cost of systemic risk resulting from financial strains. This requires a novel approach that helps mitigate the pro-cyclical tendencies of asset prices and risk and takes better account of various types of spillovers, while continuing to monitor the health of individual institutions. The current model contributes to this effort, by shedding light on how financial risk is linked to economic activity. The model can be employed in several ways. For instance, it allows for examining how financial sector strain may spillover to other countries, thus providing a richer cost-benefit analysis of cross-border systemic risk. In addition, it would allow stress test in which the usual assumption of unchanged behavior by financial institutions is replaced by a feedback effect from financial sector strain to credit and output. This way, the model would add realism to macroeconomic stress tests.

To our knowledge this is among one of the first papers focusing on the feedback effects from financial sector fragility variables in this way, and on Europe in particular. The academic and empirical literature on the credit channel thus far has mainly focused on transmission from monetary policy to bank lending. In addition, most of the literature on the credit channel looks at the United States (see, e.g., Bernanke and Blinder, 1988; and Bernanke and Gertler, 1995, for an overview). Studies that do specifically focus on Europe, such as, e.g., Altunbas, Fazylov, and Molyneux (2002) or Angeloni and Ehrmann (2003) have not generated unambiguous conclusions. A recent study by Cihak and Koeva Brooks (2008) models real effects from losses in the banking system and stock price developments in the Euro area. It does find real effects from financial sector turmoil in the second half of 2007 to the Euro area's real economy, in the order of magnitude of 0.2–0.3 percentage point of GDP. Other studies have modeled the cross-border co-movement between output and financial variables (see, e.g., Esponiza, Fornari, and Lombardi, 2008; or Bayoumi and Swinston, 2007). However, they are generally confined to financial variables related to stock market performance (and volatility), and the yield curve.

The structure of this paper is as follows. Section II describes the data. Section III describes the methodology we use and the two different models we estimate using panel regressions. Section IV describes the regression outcomes and discusses these. Section IV places the results in a broader context and concludes.

II. DATA

We focus on major Western European economies for which both macroeconomic, as well as financial sector data are readily available. Our sample includes seven countries: France, Germany, Italy, Spain, Sweden, Switzerland, and the United Kingdom, and focuses on the largest banks in each of these countries (a total of 26 banks). The period covered is 1991–2007, over which we perform regression analysis on quarterly data.

For each country, we first construct several economy-wide and bank-specific financial sector risk variables. These variables are all based either on a simple Merton-type distance-to-

default (DD) (Box 1) model, or on Moody's KMV expected default frequency (EDF) (Figures 1 and 2).[2] In both cases we construct economy-wide risk measures by averaging the DDs and EDFs of individual large banks in the specific country. Although there is considerable variation across indicators, we find that, in both cases, the period 2004 to mid-2007 is characterized by low risk, as reflected by (almost) uniformly high DD indicators or, conversely, low EDFs. We also construct a system-wide DD, based on a hypothetical superbank comprising of all banks in the system, as well as a DD index, based on the DataStream banking sector index for a particular country. For the EDFs we use both the one-year EDF as well as the five-year EDF. In the regressions for individual banks, their respective individual DDs and EDFs, rather than economy-wide aggregates, are used.

Box 1. The Distance-to-Default Measure

The basic structural valuation model by Black and Scholes (1973) and Merton (1974)—hereafter BSM—underpins the DD measure used in this paper. In the BSM model, equity is viewed as a call option on a company's assets, with strike price equal to the current book value of total liabilities. When the value of assets is less than the strike price, its equity value is zero. The market value of assets is not observable, but can be estimated using equity prices and accounting measures of liabilities. The DD measures used here are estimated with the methodology described in Vassalou and Xing (2004) using daily equity data and annual accounting data. The formula for DD is:

$$DD_t = \frac{\ln(V_t / L_t) + \mu}{\sigma},$$

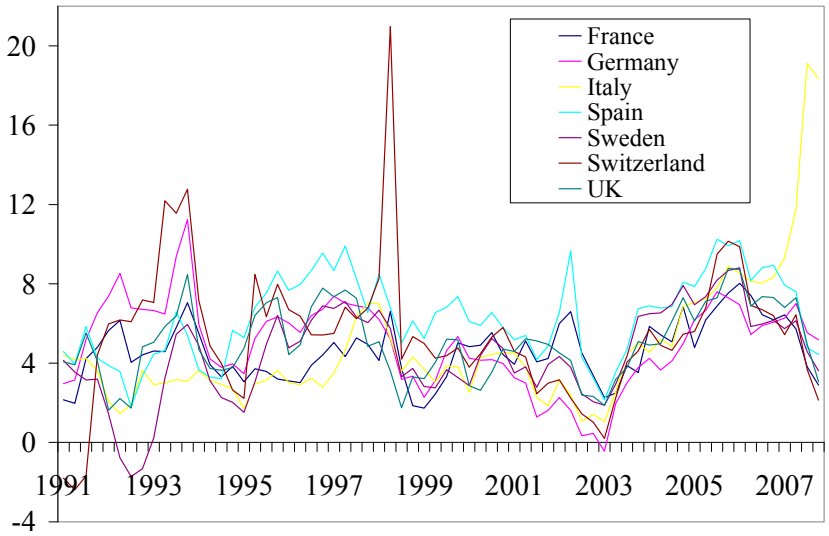
where V_t and L_t are respectively the (market-based) value of assets and (accounting) value of liabilities, and μ and σ are the mean and variance of the company's stock price respectively. As a proxy for implied volatility σ, we employ the rolling 12-month historical volatility.

We use different variations of our risk estimates. First, in addition to bank-specific DDs, we also construct several system-wide indicators. In particular, we compute an asset-weighted DD (DD-aw), a simple averages DD (DD-av), a system-wide DD based on the DataStream banking sector index (DD-index), and a system or portfolio DD (DD-system). The DD-system is constructed by creating a hypothetical "superbank" comprising all the banks in the system of a particular country. For these firms, accounting and equity values are simply added up, as if they are all part of a single super-firm. Subsequently, the DD for this imaginary super-firm is calculated as above. The DD-system can be viewed as a risk profile measure tracking the evolution of the joint risks of failure of the firms composing a portfolio (see also De Nicoló and others, 2005).

[2] Moody's KMV EDFs are also based on Merton-like calculations, after which a database of historic defaults is used to translate the model-implied risk-neutral probabilities to real world (i.e., risk averse) expected default frequencies (i.e., probabilities of default).

Figure 1. Average Distance-to-Default in the Sample

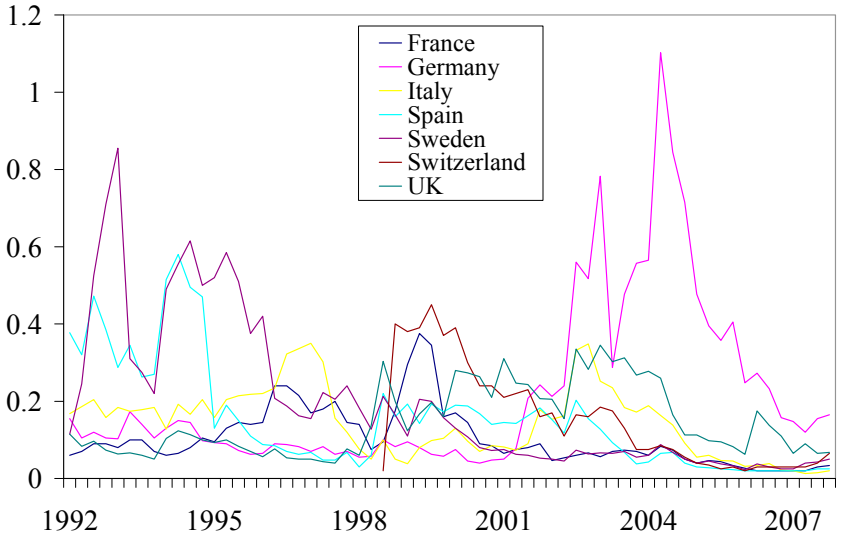
(Number of standard deviations)



Sources: DataStream; and IMF Staff calculations.

Figure 2. Average One-Year Expected Default Frequency

(In percent)

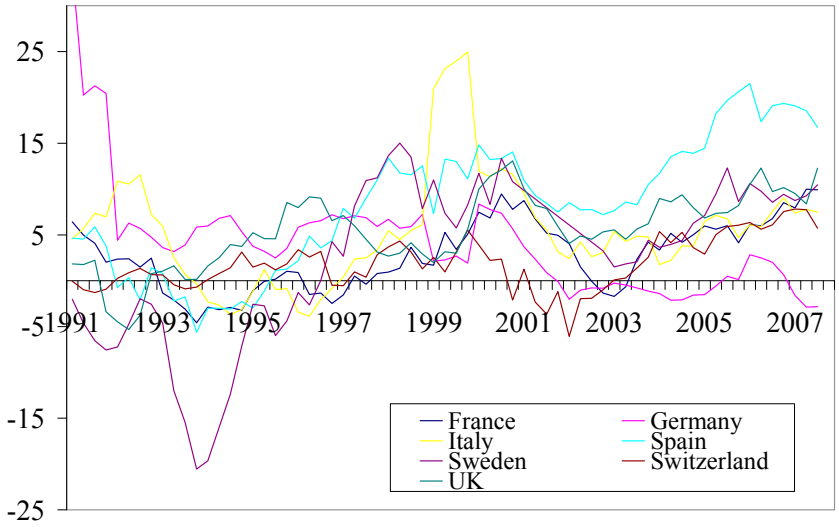


Source: Moody's KMV.

The macroeconomic data we collect consists of real GDP and real private sector credit, calculated as nominal variables deflated by the GDP deflator, and economy-wide interest rates (interbank rates and marginal rates of new lending). For the regressions on individual banks we use total loans from banks' balance sheet as the equivalent to private sector credit, and total net interest income divided by total loans as a proxy for the average interest rate

each bank charges. Note that this implies that off-balance sheet credit extension is not taken into account. Off-balance sheet items do, however, influence our risk variables to the extent that they influence the market value of assets. Real private sector credit growth is depicted in Figure 3. Credit growth is clearly higher on average in the post-2000 years of the sample (at 6.3 percent per year) compared to the 1990s (2.8 percent), even when abstracting from the crisis-related decline in Sweden in the early 1990s (3.5 percent vs. 6.0 percent).

Figure 3. Real Private Sector Credit Growth



Source: International Financial Statistics.

In addition to the pure macroeconomic data, we employ several control variables. To control for changes in house prices, we use the house price indices from Global Insight. As a control for stock market valuations and volatility, we use the Dow Jones Stoxx 600 stock index of the largest European companies, the V-DAX new index of 30-day implied volatility in the DAX (the European equivalent of the Chicago Board of Exchange's VIX), and the iTtraxx Crossover CDS index of European sub-investment grade names. We also construct a control variable that indicates the relative size of the financial sector, by dividing total financial sector assets by GDP.

All macroeconomic data is available on a quarterly frequency. Financial markets data is available daily, while accounting variable are available annually. Our data sources are the IMF's International Financial Statistics (IFS), DataStream, and Bloomberg. In order to get to quarterly frequencies for all data, the daily data was collapsed by taking the last observation of the quarter, while the annual accounting data was assumed to remain constant over the year. A complete overview of the data, including summary statistics and sources, can be found in Appendix Table 1.

III. METHODOLOGY

In our analysis of the feedback effect from financial sector risk to the real economy, we focus solely on the credit channel. As argued in a substantial body of research on this transmission channel[3], we believe credit to be the main variable through which financial risk affects the broader economy. This focus is justified by the fact that in many real life cases in the past banks under stress have curtailed their supply of credit, with often destabilizing real economy effects.

We first estimate a vector error-correction model to establish whether a cointegrating relationship exists between credit and GDP (Appendix B and Table B.2). This allows us to confirm that financial risk plays a significant role in the short-term dynamics around the cointegrating relationship between credit and GDP. Given these results, our main regression models employ two equations: credit as a function of financial sector risk variables (and controls, including lagged GDP growth), and GDP growth as a function of (lagged) credit. This central regression model is employed on macroeconomic data in a panel regression across countries, as well as on bank-specific data in a panel of large banks from the same countries.

A. Country-Specific Regression Model

Next, we address the nonstationary nature of several variables. Specifically, stationarity is rejected for credit, GDP, the DJStoxx 600, housing prices, and our measure of the relative size of the financial sector, whereas it is not rejected for the risk variables and interest rates. Except for the asset size variable, non-stationarity would be expected. Figure 3 shows how over the period 1991–2007 credit growth was on average considerably above GDP growth, whereas financial sector assets have generally grown relative to GDP, confirming the non-stationary nature of this variable. We difference the non-stationary variables and use lags of the differenced series in our subsequent analysis. We use four quarter differences to account for seasonality in the data. Moreover, we lag the differenced variables so as to prevent simultaneity problems.

We proceed to estimate a system of simultaneous equations (1), which captures the impact of financial risk on bank lending, while accounting for the endogenous relationship between GDP and credit:

$$\begin{aligned} \Delta C_t &= \alpha_1 + \beta_1 R_t + \beta_2 I_t + \gamma_1 \Delta_4 GDP_{t-1} + \gamma_2 \Delta_4 DJ_t + \gamma_3 \Delta_4 H_{t-1} + \gamma_4 \Delta_4 S_{t-1} + \varepsilon_t \\ \Delta_4 GDP_t &= \alpha_2 + \delta \Delta_4 C_{t-1} + \eta_t \end{aligned}, \qquad (1)$$

[3] See Section I for a brief discussion of some of this material.

where

$\Delta_u C_t$ = the growth rate of credit to the private sector at time t over the last u quarters,[4]

R_t = a financial risk measure at time t,

I_t = interest rates at time t,

$\Delta_u GDP_t$ = the growth rate of real gross domestic product at time t over the last u Quarters[5],

$\Delta_u DJ_t$ = the growth rate of the DJStoxx 600 index at time t over the last u quarters[5],

$\Delta_u H_t$ = the growth of the Global Insights housing price index at time t over the last u quarters[5],

$\Delta_u S_t$ = the growth of the relative size of the financial sector at time t, defined as total financial sector assets divided by GDP, over the last u quarters[5].

We employ a panel consisting of the seven countries in the sample. All variables are expressed in natural logarithms and all nominal variables have been deflated using the GDP deflator.

Various other control variables have been employed. Specifically, indices of implied volatility[5], as well as national stock exchange indices were used. The estimated coefficients for these control variables either yielded insignificant results or were dropped due to strong collinearity with our risk measures. For example, implied volatility is a major driver of DD. In addition, in period of market turbulence, the volatility of an individual stock will often display a high correlation with volatility of the index. Volatility and national stock market indices were subsequently omitted from the regressions.

Macroeconomic regression results can be found in Tables 3–11. The tables contain the results for all combinations of the dependent variable private sector credit with the different financial sector fragility variables (EDF1, EDF5, DD, DD index, DD-System, weighted average DD, weighted average EDF1, weighted average EDF5). Regressions are run with different control variable (house price, DJ Stoxx 600, size of financial sector) individually, and with several combinations of the controls. The results are discussed in Section IV.

B. Individual Bank Model

The same basic model specification is used on a bank-specific level. The panel for the individual bank regressions consists of 26 large banks from the 7 countries in the sample. On this panel, we estimate the same model (1) as above. All variables are indexed by both time and an index $j = 1,..., 26$, indicating each individual bank. The dependent variable ΔC_{jt} is the growth rate of total loans on bank j's balance sheet. This is a close equivalent to private

[4] u is omitted for $u = 1$, i.e., ΔC_t is the first difference of credit, or the quarterly credit growth rate.

[5] The German VDAX-new index of 30-day implied volatility in the DAX and the U.S. CBOE VIX index of 30-day implied volatility in the S&P500.

sector credit, which is available for individual institutions. The interest rate variable I_{jt} is the average interest rate bank *j* charges on its loans, calculated by dividing total interest income by total loans. In some of the regressions, we added a "competition" variable that captures how a bank in a given country reacts to changes in the risk profile of its peers in the same country. It consists of the average fragility of a bank's domestic peers, measured as the average-weighted EDF1, EDF5, and DD for the other banks in the same country. All other variables are the same as in the macro regressions, except that by construction we only use the bank-specific risk measures (DD and EDF) (i.e., no weighted averages or system-wide indicators). The results are given in Tables 12–18 and are discussed in Section IV below.

IV. Regresion Results and Discussion

A. Macroeconomic Regressions

The macroeconomic panel regressions show that financial sector fragility has a significant effect on credit and GDP growth. This holds for all different specifications of the risk variables, mostly at the 1 percent uncertainty level (See Appendix Tables 3–11). For Moody's KMV's EDFs, the relation is negative and significant at the 1 percent level (i.e., a higher probability of default is related to lower credit growth). This result holds for both the one-year EDF and the five-year EDF, and for both the asset-weighted EDF as well as the simple average EDF. For the DD risk measures, much the same holds: the estimated coefficients show significance at the 1 percent level, for the simple average DD, the asset-weighted DD, as well as the DD based in the banking index (DD-index), and the DD based on the portfolio consisting of all banks in a country (DD-system), suggesting that credit growth is lower when banks are closer to their default barrier (i.e., when DD is lower). These results are for the pre-crisis period up to 2007, and would likely come out even stronger if data on the ongoing crisis would be included.

The estimated magnitude of the coefficient is stable across the risk variables and specifications. For the EDFs, the coefficient estimate on the five-year EDF is slightly higher compared to the one-year EDF, which might be explained by the higher relative variance of the one-year EDF compared to the five-year EDF. Estimates show little sensitivity to using simple average rather than asset-weighted average EDFs. For the DDs, results are similar, with estimated coefficients stable across the different specifications of DD (DD-aw versus DD-avs, versus the DD-index and the DD-system).

The interest rate variable is significant at the 5 percent level in most specifications, with a negative coefficient. This holds both for the interbank rate, as well as for the IFS country-wide rate on new loans. Higher interest rates are hence associated with significantly lower credit growth, as expected from theory. More importantly, a price effect of loans can hence be distinguished clearly from a volume effect, and the volume effect found above remains after price effects have been taken into account.

A number of macroeconomic and financial sector control variables are generally found to be significant. Controlling for GDP in the credit equation mostly yields a highly significant coefficient estimate. In the equations where EDF is used as the financial sector risk variable, the significance of the GDP growth variable in the credit equation varies from 1 percent to an insignificant coefficient, depending on the number and nature of other control variables employed. Using DD as the risk variable, GDP growth is always a significant control variable, mostly at the 1 percent significance level. House prices are generally found to be significant at the 1 percent level. However, including the control for house prices in several cases results in the lower significance for the GDP growth control variable. This is unsurprising, as, over the sample period, strong GDP and house price growth tend to occur simultaneously. The relative size of the financial sector, measured as total financial sector assets over GDP, is a significant control variable (at the 1 or 5 percent level) in the estimations where the EDFs are used as risk variables. In the DD regressions, however, it is generally not significant at even the 10 percent level. The DJ Stoxx 600 index of large European corporates does not come up with a coefficient significantly different from zero. Other control variables, such as the VDAX-New volatility index or the iTraxx crossover CDS index also yield insignificant coefficient estimates (these results have been omitted in the tables).

The signs of the estimated coefficients for the controls are as expected. Credit growth is positively associated with GDP growth. Higher growth in house prices is associated with higher credit growth, which would be explained by increased mortgage lending. A bigger expansion of the financial sector relative to GDP is also associated positively with credit growth. Here, the explanation might partially be tautological, as many of the financial sector assets that define the size of the sector actually consist of loans, which would show up in credit figures.

The results are generally robust. A change in the exact specification of the regression equation does not alter the results much. We have employed different lag structures for both the dependent variable as well as the various explanatory variables, including the controls, and found that the size of the coefficient estimate does not differ much, and that it generally remains significant.[6]

[6] We have also assessed the robustness of the results against a change in the dependent variable. When using domestic credit instead of private sector credit, we find that the results are fairly robust. The same relationship between risk and credit holds, and coefficient estimates are of the correct sign and the same order of magnitude. However, many coefficient estimates lose significance. As domestic credit is a much broader category than private sector credit, and most bank credit in the countries under study is provided to the private sector, we interpret this result as indicating that private sector credit is the more relevant variable influenced by financial sector health. The domestic credit estimation results are omitted for this reason.

Our preferred regression equation for the macro regression panel is the one including controls for GDP and house prices, but excluding the DJ Stoxx 600. The control for the relative size of the financial sector could be included in the EDF regressions, where it is significant, but we prefer not to include it in the DD regressions, where it has no significance. We generally prefer the regressions using the interbank interest rate instead of the long rate. Even though both rates are generally significant and of the correct sign, the interbank rate is more responsive to changes and most loans would be based on the (short) interbank rate rather than the long-term rate. Our preferred regressions are highlighted in the regression tables. The fit of our preferred regression equations is reasonable, with R^2 between 0.14 and 0.21 depending on the exact specification. For models in first difference, this is well within range of normal values for the fraction of variance explained by the regression equation.

Our results allow us to compute the model-implied reduction in credit growth associated with financial distress. To get a better feel for the implications of the coefficient estimate, we calculated the increase in EDFs and decrease in DDs between July 1 and December 31, 2007 (i.e., in sample), and between July 1, 2007 and July 1, 2008 (i.e., out of sample), and the associated model-implied reduction in real credit growth (Table 1). Between July and end 2007, the increased financial sector risk as perceived by the market, would lead real credit growth to decrease by 0.4 percentage point in real terms on average in the countries in our sample. Set against an average real credit growth of 4.4 percent over the period 1991–2006, this implies a decrease of some 10 percent. Over the period July 2007 to July 2008, credit growth would decrease by 1.7 percentage point on average across the banks in the sample (based on the DD regression).[7] This translates into a 32 percent average model-implied reduction in credit growth across countries (see Table 1). For some countries, the estimated reductions in credit growth are much steeper, at around 60 percent for France and Sweden, and 200 percent (i.e., a credit contraction equivalent to 100 percent of average annual growth, or some 1.9 percent) in Switzerland.[8]

According to our estimates, such reductions in credit growth would impact GDP growth substantially. The average decrease in DD between July and end-2007 would reduce real GDP growth by around 0.2 percentage points, while a decrease in DD as seen between July 2007 and July 2008 would lower GDP growth by around 1.0 percentage point

[7] For these calculations, we employ the coefficient value form our preferred specification of the regression equation, which is 0.00648.

[8] A caveat that applies here is that the decreases in DD seen over the period from July 2007 are steeper than experienced in-sample. Hence these decreases take the estimates outside of the range of values for which the model is validated. In particular, non-linearities related to the estimation of relationships in natural logarithms increase when DD estimates reach values close to zero.

(See Table 1).[9] For Switzerland, our estimates predict financial stress to reduce GDP growth by some 2.2 percentage point, enough to bring it into negative territory by most estimates.

Table 1. Macroeconomic Regressions—Distance-to-Default Indicators and Implied Effect on Credit Growth for Major European Banks

	6/29/2007	12/31/2007	6/30/2008	Percentage Decrease July 2007-December 2007	Percentage Decrease July 2007-June 2008	Implied Annual Decrease in Real Credit Growth Jun.-Dec. 2007 (percentage point)	Implied Annual Decrease in Real Credit Growth Jun.. 2007-Jun. 2008 (percentage point)	Average Credit Growth 1991-2006		Implied Annual Decrease in Real GDP Growth Jul. 2007-Jul. 2008 (percentage point)
								Real	Nominal	
BNP PARIBAS	6.3	3.3	1.4	-48	-77	-0.4	-1.0			-0.5
CREDIT AGRICOLE	5.0	2.2	0.4	-55	-92	-0.5	-1.6			-0.9
SOCIETE GENERALE	5.9	1.9	0.1	-68	-98	-0.7	-2.7			-1.5
FRANCE SYSTEM	6.3	2.7	1.0	-57	-83	-0.5	-1.2			-0.7
FRANCE AVERAGE 1/	5.7	2.5	0.6	-57	-89	-0.6	-1.8	2.9	4.6	-1.0
SWEDBANK	6.2	2.6	0.1	-59	-99	-0.6	-3.1			-1.7
NORDEA BANK	5.7	4.8	1.7	-16	-70	-0.1	-0.8			-0.4
SEB A	5.2	1.9	0.0	-64	-99	-0.7	-3.4			-1.9
SVENSKA HANDBKN.	5.7	4.8	2.6	-15	-54	-0.1	-0.5			-0.3
SWEDEN SYSTEM	6.2	3.6	1.3	-42	-80	-0.4	-1.0			-0.6
SWEDEN AVERAGE	5.7	3.5	1.1	-38	-81	-0.4	-1.9	3.2	5.6	-1.1
UBS 2/	6.2	2.0	-0.8	-68	-113	-0.7	-4.5			-2.5
CREDIT SUISSE	6.6	2.5	0.1	-63	-99	-0.6	-3.1			-1.8
SWITZERLAND SYSTEM 2/	6.8	2.3	-0.4	-66	-105	-0.7	-4.5			-2.5
SWITZERLAND AVERAGE 1/ 2/	6.4	2.2	-0.4	-66	-106	-0.7	-3.8	1.9	3.2	-2.2
BANCO ESPANOL DE	7.0	2.8	0.9	-60	-88	-0.6	-1.4			-0.8
BANCO POPULAR ES	8.9	4.5	1.8	-49	-80	-0.4	-1.0			-0.6
BANCO SANTANDER	7.0	5.7	3.4	-18	-52	-0.1	-0.5			-0.3
BBV ARGENTARIA	6.6	4.7	2.2	-29	-67	-0.2	-0.7			-0.4
SPAIN SYSTEM	7.5	5.5	3.0	-27	-60	-0.2	-0.6			-0.3
SPAIN AVERAGE 1/	7.4	4.4	2.0	-39	-72	-0.3	-0.9	8.1	12.7	-0.5
BARCLAYS	5.6	1.3	0.1	-77	-99	-1.0	-3.0			-1.7
HBOS 2/	7.2	2.4	-0.8	-67	-111	-0.7	-4.5			-2.5
HSBC HDG	7.6	5.4	3.3	-30	-56	-0.2	-0.5			-0.3
LLOYDS TSB GP.	7.6	3.2	0.5	-58	-93	-0.6	-1.7			-1.0
RYL.BK.OF SCTL. 2/	5.1	1.5	-0.1	-71	-101	-0.8	-4.5			-2.5
STD.CHARTERED	6.9	4.8	2.4	-30	-65	-0.2	-0.7			-0.4
UK SYSTEM	7.8	3.2	1.3	-59	-83	-0.6	-1.1			-0.7
UK AVERAGE 1/	6.7	3.1	0.9	-55	-88	-0.6	-2.5	5.4	8.6	-1.4
BANKGESELLSCHAFT	4.9	4.7	4.7	-4	-4	0.0	0.0			0.0
BAYER.HYPO-UND-V	8.5	9.3	7.9	9	-7	0.1	0.0			0.0
COMMERZBANK	6.8	2.8	0.6	-59	-92	-0.6	-1.6			-0.9
DEUTSCHE BANK	7.2	3.5	0.3	-51	-97	-0.5	-2.2			-1.2
GERMANY SYSTEM	10.0	5.9	2.3	-41	-77	-0.3	-1.0			-0.5
GERMANY AVERAGE 1/	6.9	5.1	3.4	-26	-50	-0.3	-1.0	4.3	5.0	-0.6
UNICREDITO ITALIANO	6.3	3.4	1.2	-45	-82	-0.4	-1.1			-0.6
SAN PAOLO IMI	10.2	...	...	...	...	...	...			...
CAPITALIA	6.1	5.7	11.2	-6	82	0.0	0.4			0.2
BANCA INTESA	7.6	6.3	3.6	-17	-53	-0.1	-0.5			-0.3
BANCA MONTE DEI PASCHI	7.2	4.1	2.2	-44	-69	-0.4	-0.8			-0.4
BCA.NAZ.LAVORO	29.2	...	...	...	...	...	...			...
ITALY SYSTEM	10.1	6.4	3.4	-36	-66	-0.3	-0.7			-0.4
ITALY AVERAGE 1/	11.1	4.9	4.5	-28	-30	-0.2	-0.5	5.3	8.9	-0.3
Unweighted Average	6.6	3.8	1.9	-43.0	-71.7	-0.4	-1.7	4.4	6.9	-1.0

1/ Simple average across banks
2/ DD below zero set at 0.1 for calculation purposes.
Source: Datastream, author's calculations.

These estimated reductions in credit and GDP growth, on average, are still smaller than what has been experienced in the "great recession" year-to-date. The discrepancy can be explained by the unusual severity of the current crisis compared to the relatively benign economic environment in Western Europe during the last two decades. In addition, several caveats surround our estimates (see below). Still, our estimates indicate significant and pronounced effects, and illustrate the importance of financial sector stability on credit extension and growth.

Our estimates must be interpreted with caution, as they only capture the short-term direct effects of increased financial sector risk on credit and GDP growth. Several multiplier

[9] These results are based on regressions of financial risk variables directly on GDP. Equivalent to our credit regressions, our preferred regression equation employs long-term interest rates and house prices as controls. Table 11 presents the regression outcomes. The coefficient value used for these calculations is 0.00368.

effects, through, e.g., lower investment, may increase these effects in the medium- to longer-run. In addition, although the period over which the relationships are estimated contains economic downturns, it does not contain a major crisis, which could further exacerbate the real effect of a global financial stress, especially if unleashing a general loss of confidence or herd behavior. Hence, using the estimation results to gauge what would happen in a crisis is surrounded by caveats that could possibly be reduced by including data from crisis periods. Nonetheless, the effects illustrated by the models are likely to underestimate the true effects in a crisis, as additional factors such a loss of confidence or animal spirits often play a role there. Redoing the estimations by including data from the current crisis will therefore likely yield stronger effects, which would come closer to actual losses in output and credit growth.

Our results present a concrete way to interpret stress testing outcomes. Often, the outcome of stress tests are presented in terms of (additional) losses for the banks, insurance companies, or pension funds, while implications for financial stability and hence the financial system as a whole are discussed qualitatively. The broader implications for credit and GDP growth, and hence economic welfare, normally are not analyzed. Such an approach could be characterized as somewhere half way between the traditional microprudential approach of supervision and a macroprudential perspective. Modeling the feedback loop from financial sector stress to the real economy, and hence to economic welfare, enables a more complete macroprudential analysis. In addition, it enables estimates of costs in terms of foregone output. Such costs could potentially be weighted against the costs of fiscal and financial rescue packages to come up with a rough cost-benefit analysis for policy actions. Quantifying these fiscal costs presents a problem in itself, and could be attempted by estimating a link between banks' capital and our risk variables, thus enabling estimates of the cost of reducing financial sector risk. Such analysis is left for future work.

B. Individual Bank Regressions

The bank-specific panel regressions paint a similar picture to the macro regressions. Effects of the financial fragility variables are found to be significant and substantial, with coefficient estimates in the same range (Tables 12–18). The significance of the different control variables differs somewhat, leading to the inclusion of different control variables in our preferred regression equation. Estimated effects on real bank credit from the increase in financial sector fragility are substantially larger than the effects found in the macroeconomic regressions. However, effects on GDP growth are of the same order of magnitude.

All three risk variables yield broadly similar significant coefficient estimates. The significance of both the one- and the five-year expected default frequencies is robust across specifications and the coefficient estimates always have the expected (negative) sign. The significance of the DD measure is also at the 1 percent level in our preferred specification, but in several other specification employing additional or different control variables, has a lower significance of 5 percent or lower.

We use the same control variables as in our macro regressions, with the addition of a competition variable. Lagged GDP growth is universally found to have a significant coefficient estimate, and is included as a control in all regressions. In addition, in the EDF1 and EDF5, as well as in the DD regressions, both the DJ Stoxx index and the size of the financial sector are significant. The house price index is not significant in the EDF1 and EDF 5 regression, but is significant in the DD regressions. We hence include the DJ Stoxx and the size variables in the EDF regressions. For the specification of the DD regression, we prefer to stick closely to the specification in the macroeconomic regressions, and therefore include only the house price index as a control variable. The control variable indicating the financial health of a banks' direct competition (in the form of the EDF or DD of its domestic competitors) turns out to have some significance in the EDF1 regressions, but none in the DD and EDF5 regressions (See Appendix Tables 15–17). We hence elect to drop it.

Our preferred specification of the EDF1 and EDF5 regression equations therefore includes controls for the DJ Stoxx index, the financial sector size and GDP, but not the house price or competition variables. For the DD regressions, we prefer the specification including controls for the house prices and GDP, but no other controls. The R^2 for these regressions is generally very good, in the range of 0.40-0.45 for the EDF regression. However, for the DD regressions, the fit is less well with R^2 in the order of 0.02–0.10.

The bank-specific estimation results imply significant and pronounced effects on bank credit and real growth. Analogous to above, using the decline in DD between July 2007 and July 2008, our model predict a decline in real bank credit growth by a little below 10 percentage points (Table 2) on average over the countries in our sample. In Switzerland, the country experiencing the largest decline in DD, the decline in real bank credit would be more than double that, at 21 percentage points. The implied decline in GDP growth, though, is very similar to that found in the macroeconomic regressions. The July 2007–2008 decline in DD would results in a decline in GDP growth by 1.1 percentage point, and up to 2.5 percentage point (for Switzerland).

The effect on bank credit found here is larger than the effect on private sector credit found in the macroeconomic regressions, which hints at some replacement of bank credit by other credit during a downturn. This is natural in an environment where the banks specifically are experiencing problems, but the broader market is not or at least less so. In a more universal market crisis such as the currently great recession, such replacement is likely to be very modest, as market access is very limited for most borrowers. The ultimate effect on real GDP growth found in the bank-specific regressions is similar to the effect found through the macroeconomic model.

Table 2. Bank-Specific Regressions—Distance-to-Default Indicators and Implied Effect on Credit Growth for Major European Banks

	6/29/2007	12/31/2007	6/30/2008	Percentage Decrease Jul. 2007-Dec. 2007	Percentage Decrease Jul. 2007 - Jul. 2008	Implied Annual Decrease in Real Credit Growth Jul. 2007 - Jul. 2008 (percentage point)	Implied Annual Decrease in Real GDP Growth Jul. 2007 - Jul. 2008 (percentage point)
BNP PARIBAS	6.3	3.3	1.4	-48	-77	-5.3	-0.6
CREDIT AGRICOLE	5.0	2.2	0.4	-55	-92	-9.0	-1.1
SOCIETE GENERALE	5.9	1.9	0.1	-68	-98	-14.8	-1.7
FRANCE SYSTEM	6.3	2.7	1.0	-57	-83	-6.4	-0.8
FRANCE AVERAGE 1/	5.7	2.5	0.6	-57	-89	-9.7	-1.1
SWEDBANK	6.2	2.6	0.1	-59	-99	-16.9	-2.0
NORDEA BANK	5.7	4.8	1.7	-16	-70	-4.3	-0.5
SEB A	5.2	1.9	0.0	-64	-99	-18.6	-2.2
SVENSKA HANDBKN.	5.7	4.8	2.6	-15	-54	-2.8	-0.3
SWEDEN SYSTEM	6.2	3.6	1.3	-42	-80	-5.7	-0.7
SWEDEN AVERAGE	5.7	3.5	1.1	-38	-81	-10.6	-1.3
UBS 2/	6.2	2.0	-0.8	-68	-113	-24.7	-2.9
CREDIT SUISSE	6.6	2.5	0.1	-63	-99	-17.2	-2.0
SWITZERLAND SYSTEM 2/	6.8	2.3	-0.4	-66	-105	-24.7	-2.9
SWITZERLAND AVERAGE 1/ 2/	6.4	2.2	-0.4	-66	-106	-21.0	-2.5
BANCO ESPANOL DE	7.0	2.8	0.9	-60	-88	-7.5	-0.9
BANCO POPULAR ES	8.9	4.5	1.8	-49	-80	-5.8	-0.7
BANCO SANTANDER	7.0	5.7	3.4	-18	-52	-2.6	-0.3
BBV ARGENTARIA	6.6	4.7	2.2	-29	-67	-4.0	-0.5
SPAIN SYSTEM	7.5	5.5	3.0	-27	-60	-3.3	-0.4
SPAIN AVERAGE 1/	7.4	4.4	2.0	-39	-72	-5.0	-0.6
BARCLAYS	5.6	1.3	0.1	-77	-99	-16.5	-1.9
HBOS 2/	7.2	2.4	-0.8	-67	-111	-24.7	-2.9
HSBC HDG	7.6	5.4	3.3	-30	-56	-2.9	-0.3
LLOYDS TSB GP.	7.6	3.2	0.5	-58	-93	-9.6	-1.1
RYL.BK.OF SCTL. 2/	5.1	1.5	-0.1	-71	-101	-24.7	-2.9
STD.CHARTERED	6.9	4.8	2.4	-30	-65	-3.8	-0.4
UK SYSTEM	7.8	3.2	1.3	-59	-83	-6.3	-0.7
UK AVERAGE 1/	6.7	3.1	0.9	-55	-88	-13.7	-1.6
BANKGESELLSCHAFT	4.9	4.7	4.7	-4	-4	-0.2	0.0
BAYER.HYPO-UND-V	8.5	9.3	7.9	9	-7	-0.3	0.0
COMMERZBANK	6.8	2.8	0.6	-59	-92	-9.0	-1.1
DEUTSCHE BANK	7.2	3.5	0.3	-51	-97	-12.0	-1.4
GERMANY SYSTEM	10.0	5.9	2.3	-41	-77	-5.3	-0.6
GERMANY AVERAGE 1/	6.9	5.1	3.4	-26	-50	-5.4	-0.6
UNICREDITO ITALIANO	6.3	3.4	1.2	-45	-82	-6.1	-0.7
SAN PAOLO IMI	10.2	...	...	...	...	...	...
CAPITALIA	6.1	5.7	11.2	-6	82	2.2	0.3
BANCA INTESA	7.6	6.3	3.6	-17	-53	-2.7	-0.3
BANCA MONTE DEI PASCHI	7.2	4.1	2.2	-44	-69	-4.2	-0.5
BCA.NAZ.LAVORO	29.2	...	...	...	...	...	...
ITALY SYSTEM	10.1	6.4	3.4	-36	-66	-3.8	-0.5
ITALY AVERAGE 1/	11.1	4.9	4.5	-28	-30	-2.7	-0.3
Unweighted Average	6.6	3.8	1.9	-43	-72	-9.6	-1.1

1/ Simple average across banks
2/ DD below zero set at 0.1 for calculation purposes.
Source: Datastream, author's calculations.

V. Conclusion and Policy Implications

Our analysis finds that reductions in credit growth as a result of financial sector fragility are substantial. Between July and end 2007, the increased financial sector risk as perceived by the market, would lead real credit growth to decrease by 0.4 percentage point in real terms in the countries in our sample. Set against an average real credit growth of 4.4 percent over the period 1991–2006, this implies a decrease of some 10 percent. When taking account of further turmoil in the first half of 2008, i.e., looking out of sample at the impact over the period July 2007–July 2008, using estimated coefficients, the total impact on real credit growth amounts to a decrease of 32 percent. Individual countries and banks in our sample experience even more severe impacts, in some cases leading to a significant credit contraction. Similar effects are found for GDP. We estimate that the increase in financial fragility over the period July 2007 to July 2008 could have a negative impact on GDP growth

of over 1 percentage point on average, ranging up to 2.5 percentage points for specific countries.

Various other (unmodeled) channels and multiplier effects can result in effects even larger than found here. For example, our estimated effects are based on estimates calibrated to data from noncrises periods. In other words, these effects are the noncrisis component of the total effects, which could be substantially larger during crises due to added factors such as loss of confidence or other multiplier effects. Our results hence suggest that during a crisis, credit could decrease substantially.

Quantifying the real economic impact of financial sector fragility is important for several reasons. First, our results clearly illustrate that certain real economic variables depend on financial sector risk variables, and that these risk variables play an important role in the credit channel. Most models of the credit channel to date do not take such risk variables into account and hence may be missing an important link. Second, estimates of the real economic impact of financial sector fragility can serve to inform policy makers about costs and benefit estimates of certain financial sector policies. Third, quantifying the real economic impact of financial sector stress can serve to improve macroprudential stress tests.

The policy implications of employing a model like ours are twofold. First, our results suggest prudential supervision could be enhanced and broadened by taking the effects of financial instability on the real economy into account. A narrow "macroprudential" approach, which focuses on financial stability and contagious defaults, misses the essential element that when fragility in the system increases, there are substantial economic costs long before any banks come close to default. Such costs should be taken into account in macroprudential analysis, by focusing more on co-movements in fragility in different financial institutions, even in the range where most institutions are nowhere near their respective default barriers. Such analysis might show, for instance, that counter cyclical capital ratios (i.e., shoring up financial institutions' capital base in good times, while relaxing capital adequacy ratios in bad times) might be preferable from a social welfare point of view compared to waiting until firms come close to their minimum regulatory capital ratio. Second, our results could be of interest to fiscal policy makers, as they could serve as a better benchmark to estimate the real costs of financial sector stress. By assuming or estimating a link between banks' capital and our risk variables, the benefit of fiscal measures that increase financial sector stability could be quantified. Of course, any such benefits should be weighted against possible costs, such a moral hazard that could emerge when stability is enhanced by distorting incentives.

Our results can also be used to inform stress tests for the banking system directly. Stress tests aim at quantifying the resilience of the financial system to extreme but plausible shocks. They are regularly performed by many banks' risk management departments, as well as by supervisory and financial stability authorities. They also are a main ingredient of financial system stability assessments under the International Monetary Fund-World Bank Financial

Sector Assessment Program (FSAP).[10] In recent years, FSAP stress tests have focused on the impact of medium-term macroeconomic shock scenarios (often over a three-year horizon) on the health of individual financial institutions and the system as a whole. The macro scenarios are translated into financial risk variables, such as changes in banks' capital adequacy ratios and probabilities of default for specific credit portfolios.

Such stress tests, however, normally assume that institutions do not react to the shocks. In reality, financial institutions of course do react to a radically different environment after an extreme shock. Most importantly, banks often choose to shrink their credit portfolios or at least grow them less rapidly. Our work has shown the magnitude of such a feedback effect in Europe. The feedback effect can thus be quantified and included in the macro stress scenarios, improving their realism and accuracy. Assuming adequate data availability, this approach can be applied to other countries and institutions.[11]

In addition, our results provide a useful metric for interpreting stress testing results. They serve to translate financial sector losses, the often used metric for stress testing results, to actual output losses. As output is the ultimately relevant variable in many policy decisions, such a translation bring the results a step closer to the actual policy debate. Even when stress test results are not directly related to any policy debate, knowledge about potential output losses can serve to put macroprudential issues on the policy agenda.

[10] For more detailed information on the FSAP, see http://www.imf.org/external/np/fsap/fsap.asp .

[11] The construction of reliable risk indicators from market data rests on data availability. An evironment with illiquid or clearly inefficient markets might hence prohibit dependeable and consistent estimation of the feedback effect. In addition, the quality of the macroeconomic statistics used should be adequate.

APPENDIX I. DATA AND TABLES

A. Data

Table 1. Data Summary

		France	Germany	Italy	Spain	Sweden	Switzerland	U.K.
DD	Average	4.6	5.0	4.7	6.3	4.4	5.5	5.1
	Standard Deviation	1.5	2.2	3.3	2.1	2.3	3.5	1.8
	Availability	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007
	Source	DataStream and IMF Staff calculations						
EDF1	Average	0.10	0.22	0.14	0.15	0.19	0.15	0.15
	Standard Deviation	0.08	0.22	0.09	0.14	0.20	0.13	0.09
	Availability	1992-2007	1992-2007	1992-2007	1992-2007	1992-2007	1998-2007	1992-2007
	Source	Moody's KMV						
EDF5	Average	0.19	0.33	0.23	0.21	0.27	0.25	0.22
	Standard Deviation	0.10	0.23	0.12	0.16	0.21	0.14	0.10
	Availability	1992-2007	1992-2007	1992-2007	1992-2007	1992-2007	1998-2007	1992-2007
	Source	Moody's KMV						
PS Cred	Average	1214210	2075328	786	629854	1465	652	1206
	Standard Deviation	269980	457760	339	431340	1035	86	534
	Availability	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007
	Source	International Financial Statistics						
Dom Cred	Average	1432659	2526224	1064	742080	1629	703	1233
	Standard Deviation	327493	586533	316	435755	1028	93	524
	Availability	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007	1991-2007
	Source	International Financial Statistics						
GDP	Average	344951	497567	277365	150434	527971	100954	226252
	Standard Deviation	63187	60924	63589	54920	121866	11653	61972
	Availability	1990-2007	1990-2007	1990-2007	1990-2007	1990-2007	1990-2007	1990-2007
	Source	International Financial Statistics						
Total Loans	Average	Bank-specific						
	Standard Deviation	Bank-specific						
	Availability	1990-2007	1990-2007	1990-2007	1990-2007	1990-2007	1990-2007	1990-2007
	Source	DataStream						
House Prices	Average	119.5	99.4	100.8	1018.3	264.5	360.2	322.6
	Standard Deviation	40.5	5.3	12.6	461.9	87.1	54.4	145.9
	Availability	1995-2007	1990-2007	1991-2007	1990-2007	1990-2007	1990-2007	1990-2007
	Source	Global Insight						
DJ Stoxx 600	Average	222						
	Standard Deviation	98.2						
	Availability	1990-2007						
	Source	Bloomberg						
V-Dax New	Average	22.4						
	Standard Deviation	10.3						
	Availability	1992-2007						
	Source	Bloomberg						
ITraXX Crossover	Average	272.3						
	Standard Deviation	37.6						
	Availability	1992-2007						
	Source	Bloomberg						

Source: DataStream, Moody'sKMV, IFS, Global Insight, and IMF staff calculations.

B. Cointegrating Relationship

To study the dynamics of the relationship between credit and the financial risk variables, we start by estimating a vector error-correction model explaining the change in credit growth, i.e.,

$$\Delta Cred_t = \alpha\left(Cred_{t-1} + \beta_1 GDP_{t-1} + \beta_2\right) + \gamma_1 Risk_t + \gamma_2 Interest_t + \gamma_3 Controls_t + \gamma_4 + \varepsilon_t$$

(0.1)

The relation between brackets is the long-term equilibrium relation between (the non-stationary variables) credit "*Cred*" (both private sector and domestic credit) and "*GDP"*, with the speed of adjustment toward equilibrium determined by the coefficient α. The short-term variables determine the behavior of credit around the long-run equilibrium. Here, we use our risk measure (DD or EDF), as well as a price variable (an interest rate) to distinguish volume and price effects. We use GDP growth as a macroeconomic control.

The estimation results strongly support the existence of a cointegrating relationship between credit and GDP (Table B.2). The significance is evidenced by t-values in the 4-6 range for the long-term equilibrium relationship between credit and GDP, and in the 9–11 range for the adjustment coefficient. This hold both for the regressions explaining private sector credit, as well as the regressions with total domestic credit as the dependent variable.

Results also indicate that the various financial sector risk indicators we employ show significant short to medium-term effects. For both dependent variables, t-values for the different risk variables range from 4 to 7.5, while all estimated coefficients exhibit the expected sign (positive for DD-based measures, and negative for EDF-based measures).

The significance of our price variable and controls is less strong. The coefficient estimates for interbank interest rates are often not statistically different from 0, but generally do exhibit the expected (negative) sign. Lagged GDP growth exhibits the expected (positive) sign, but the coefficient estimate is only significantly different from 0 at the 5 percent level for the domestic credit regressions. Adding other control variables did not change this picture. Adding dummies did illustrate difference between countries, as both level dummies and dummies that interacted with the risk variables showed significance in some cases. Though adding 6 dummies to cover all 7 countries in the sample individually most often led to overidentified estimation, and hence did not yield reliable results. Adding a dummy indicating whether countries are in or outside of the Euro area seemed to indicate that the risk variables play a stronger role in the Euro area. However, this result may well have been unduly influenced by the data for Sweden in particular, as these series include the direct aftermath of the Swedish banking crisis.

Table 2. Vector Error Correction Model Regression Results
(Coefficient estimates with t-values in brackets)

Cointegrating Relationship																
PSCred(-1)	1	1	1	1	1	1	1	1								
Dcred(-1)									1	1	1	1	1	1	1	1
GDP(-1)	-1.917	-1.661	-2.480	-2.377	-2.477	-2.282	-2.279	-2.124	-1.972	-1.593	-2.630	-2.485	-2.697	-2.371	-2.496	-2.224
	(-4.8)	(-4.1)	(-5.8)	(-5.3)	(-5.7)	(-5.1)	(-5.5)	(-5.0)	(-4.2)	(-3.5)	(-5.20	(-4.8)	(-5.4)	(-4.8)	(-5.2)	(-4.7)
Adjustment Coefficient	0.0122	0.0119	0.0117	0.0112	0.0119	0.0116	0.0124	0.0120	0.0108	0.0109	0.0104	0.0101	0.0108	0.0109	0.0113	0.0113
	(10.2)	(10.1)	(9.5)	(9.1)	(9.5)	(9.2)	(10.1)	(9.7)	(10.9)	(11.2)	(10.0)	(9.7)	(10.4)	(10.5)	(10.9)	(11.0)
Short-term dynamics																
DD	2006								1873							
	(5.4)								(4.9)							
AWDD		1978								1895						
		(5.4)								(5.1)						
SYSDD			1689								1475					
			(4.8)								(4.1)					
DDINDEX				1401								1328				
				(4.3)								(4.0)				
EDF1					-37202								-39434			
					(-6.0)								(-6.2)			
AWEDF1						-35878								-38627		
						(-5.9)								(-6.2)		
EDF5							-41908								-43159	
							(-7.4)								(-7.5)	
AWEDF5								-39463								-40943
								(-7.1)								(-7.2)
IBR	-179.6	-154.1	-545.9	-584.0	-323.4	-326.7	-132.5	-164.0	-12.69	35.35	-385.1	-396.4	23.70	47.28	207.2	198.0
	(-0.6)	(-0.5)	(-1.7)	(-1.9)	(-0.9)	(-0.9)	(-0.4)	(-0.5)	(0.0)	(0.1)	(-1.2)	(-1.2)	(0.1)	(0.1)	(0.6)	(0.6)
DGDP(t-1)	0.0358	0.0194	0.0388	0.0392	0.0353	0.0200	0.0281	0.0150	0.1197	0.1045	0.1229	0.1232	0.1223	0.1088	0.1157	0.1042
	(0.7)	(0.4)	(0.7)	(0.8)	(0.7)	(0.4)	(0.1)	(0.3)	(2.4)	(2.1)	(2.3)	(2.4)	(2.3)	(2.1)	(2.2)	(2.0)

Source: IMF Staff estimates.

C. Regression Outcomes

Table 3. Macroeconomic Panel Regression Results for Private Sector Credit Using EDF1

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1edf1	-0.00593***		-0.00572***		-0.00582***		-0.00571***		-0.00558***		-0.00414**		-0.00366**		-0.00500***		-0.00389**		-0.00469***	
	(0.0014)		(0.0014)		(0.0014)		(0.0014)		(0.0015)		(0.0017)		(0.0018)		(0.0017)		(0.0018)		(0.0018)	
ibr	-0.00369**		-0.00390**		-0.0000146		-0.00370**		-0.00026											
	(0.0016)		(0.0017)		(0.0018)		(0.0016)		(0.0018)											
lr											-0.00705**		-0.00776***		-0.000824		-0.00704**		-0.00124	
											(0.0028)		(0.0029)		(0.0033)		(0.0028)		(0.0033)	
L1D4gdp	0.294***		0.289***		0.136*		0.280***		0.135*		0.228***		0.214***		0.112		0.216***		0.11	
	(0.0690)		(0.0710)		(0.0790)		(0.0690)		(0.0790)		(0.0760)		(0.0790)		(0.0820)		(0.0750)		(0.0810)	
L1D4pscred		0.0598***		0.0603***		0.0580***		0.0596***		0.0577***		0.0503***		0.0511***		0.0478***		0.0504***		0.0480***
		(0.0110)		(0.0110)		(0.0120)		(0.0120)		(0.0120)		(0.0130)		(0.0130)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			0.00448										0.00741							
			(0.0060)										(0.0065)							
L1D4housepi					0.0957***				0.0905***						0.0952***				0.0899***	
					(0.0250)				(0.0250)						(0.0300)				(0.0300)	
L1D4tagdp							0.0277***		0.0243***								0.0322***		0.0292***	
							(0.0093)		(0.0093)								(0.0100)		(0.0100)	
Constant	-0.00265	0.0192***	-0.00219	0.0192***	-0.00564	0.0195***	-0.004	0.0191***	-0.00655	0.0195***	0.0104	0.0194***	0.0125	0.0194***	-0.00183	0.0199***	0.00855	0.0194***	-0.00271	0.0198***
	(0.0044)	(0.0010)	(0.0045)	(0.0010)	(0.0044)	(0.0010)	(0.0044)	(0.0010)	(0.0045)	(0.0010)	(0.0079)	(0.0010)	(0.0081)	(0.0010)	(0.0086)	(0.0011)	(0.0079)	(0.0010)	(0.0086)	(0.0011)
Observations	400	400	400	400	384	384	391	391	375	375	349	349	349	349	333	333	344	344	328	328
R-squared	0.13	0.07	0.13	0.07	0.16	0.06	0.15	0.06	0.17	0.06	0.1	0.04	0.1	0.04	0.12	0.04	0.12	0.04	0.14	0.04

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates

Table 4. Macroeconomic Panel Regression Results for Private Sector Credit Using EDF5

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1edf5	-0.00900***		-0.00878***		-0.00847***		-0.00896***		-0.00837***		-0.00696***		-0.00637**		-0.00774***		-0.00669***		-0.00744***	
	(0.0018)		(0.0018)		(0.0018)		(0.0019)		(0.0019)		(0.0024)		(0.0025)		(0.0024)		(0.0025)		(0.0025)	
ibr	-0.00369**		-0.00386**		-0.000344		-0.00365**		-0.00057											
	(0.0016)		(0.0016)		(0.0018)		(0.0016)		(0.0018)											
lr											-0.00660**		-0.00725**		-0.000674		-0.00657**		-0.00103	
											(0.0028)		(0.0029)		(0.0033)		(0.0028)		(0.0033)	
L1D4gdp	0.263***		0.260***		0.12		0.251***		0.12		0.214***		0.202***		0.0997		0.203***		0.0987	
	(0.0690)		(0.0710)		(0.0780)		(0.0690)		(0.0780)		(0.0760)		(0.0780)		(0.0820)		(0.0750)		(0.0820)	
L1D4pscred		0.0599***		0.0603***		0.0580***		0.0597***		0.0578***		0.0504***		0.0511***		0.0479***		0.0504***		0.0480***
		(0.0110)		(0.0110)		(0.0120)		(0.0120)		(0.0120)		(0.0130)		(0.0130)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			0.00406										0.00671							
			(0.0060)										(0.0065)							
L1D4housepi					0.0895***				0.0835***						0.0927***				0.0877***	
					(0.0250)				(0.0250)						(0.0300)				(0.0300)	
L1D4tagdp							0.0282***		0.0252***								0.0316***		0.0287***	
							(0.0092)		(0.0092)								(0.0100)		(0.0100)	
Constant	-0.0036	0.0192***	-0.00327	0.0192***	-0.00573	0.0195***	-0.00545	0.0191***	-0.00710*	0.0195***	0.00783	0.0194***	0.00972	0.0194***	-0.00327	0.0199***	0.00587	0.0194***	-0.00442	0.0198***
	(0.0041)	(0.0010)	(0.0042)	(0.0010)	(0.0041)	(0.0010)	(0.0042)	(0.0010)	(0.0042)	(0.0010)	(0.0079)	(0.0010)	(0.0081)	(0.0010)	(0.0085)	(0.0011)	(0.0079)	(0.0010)	(0.0085)	(0.0011)
Observations	400	400	400	400	384	384	391	391	375	375	349	349	349	349	333	333	344	344	328	328
R-squared	0.15	0.07	0.15	0.07	0.17	0.06	0.17	0.06	0.19	0.06	0.1	0.04	0.1	0.04	0.12	0.04	0.13	0.04	0.15	0.04

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates

Table 5. Macroeconomic Panel Regression Results for Private Sector Credit Using DD

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1dd	0.00602***		0.00610**		0.00648***		0.00541**		0.00597***		0.00414*		0.00313		0.00521**		0.00352		0.00464**	
	(0.0021)		(0.0025)		(0.0021)		(0.0021)		(0.0022)		(0.0022)		(0.0027)		(0.0023)		(0.0023)		(0.0023)	
ibr	-0.00448***		-0.00447***		-0.00294*		-0.00457***		-0.00314*											
	(0.0014)		(0.0015)		(0.0016)		(0.0014)		(0.0016)											
lr											-0.00670***		-0.00711***		-0.00481*		-0.00667***		-0.00503*	
											(0.0025)		(0.0025)		(0.0028)		(0.0025)		(0.0028)	
L1D4gdp	0.333***		0.333***		0.206***		0.338***		0.216***		0.257***		0.252***		0.158**		0.266***		0.172**	
	(0.0650)		(0.0650)		(0.0750)		(0.0650)		(0.0760)		(0.0700)		(0.0710)		(0.0780)		(0.0700)		(0.0790)	
L1D4pscred		0.0672***		0.0672***		0.0645***		0.0664***		0.0638***		0.0573***		0.0577***		0.0547***		0.0567***		0.0542***
		(0.0110)		(0.0110)		(0.0110)		(0.0110)		(0.0120)		(0.0120)		(0.0120)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			-0.000402										0.00497							
			(0.0068)										(0.0072)							
L1D4housepi					0.0809***				0.0779***						0.0693***				0.0656***	
					(0.0220)				(0.0220)						(0.0250)				(0.0250)	
L1D4tagdp							0.00818		0.00641								0.00813		0.00654	
							(0.0052)		(0.0053)								(0.0055)		(0.0055)	
Constant	0.000987	0.0181***	0.000894	0.0181***	-0.00057	0.0187***	0.00117	0.0180***	-0.000318	0.0186***	0.0114*	0.0183***	0.0134*	0.0183***	0.00745	0.0189***	0.0112*	0.0183***	0.00777	0.0189***
	(0.0040)	(0.0009)	(0.0045)	(0.0009)	(0.0040)	(0.0009)	(0.0040)	(0.0009)	(0.0041)	(0.0009)	(0.0067)	(0.0010)	(0.0073)	(0.0010)	(0.0072)	(0.0010)	(0.0067)	(0.0010)	(0.0072)	(0.0010)
Observations	443	443	443	443	416	416	434	434	407	407	392	392	392	392	365	365	387	387	360	360
R-squared	0.11	0.07	0.11	0.07	0.14	0.07	0.11	0.07	0.14	0.07	0.09	0.05	0.09	0.05	0.11	0.05	0.09	0.05	0.11	0.05

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates

Table 6. Macroeconomic Panel Regression Results for Private Sector Credit Using System DD

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1sysdd	0.00751***		0.00809***		0.00831***		0.00690***		0.00785***		0.00665***		0.00634**		0.00784***		0.00598**		0.00728***	
	(0.0024)		(0.0029)		(0.0024)		(0.0024)		(0.0024)		(0.0026)		(0.0031)		(0.0026)		(0.0026)		(0.0027)	
ibr	-0.00538***		-0.00530***		-0.00382**		-0.00548***		-0.00405**											
	(0.0017)		(0.0017)		(0.0019)		(0.0017)		(0.0019)											
lr											-0.00702***		-0.00714**		-0.00526*		-0.00680**		-0.00525*	
											(0.0027)		(0.0028)		(0.0030)		(0.0027)		(0.0031)	
L1D4gdp	0.329***		0.329***		0.206***		0.332***		0.214***		0.252***		0.251***		0.154*		0.261***		0.166**	
	(0.0660)		(0.0660)		(0.0760)		(0.0660)		(0.0760)		(0.0720)		(0.0730)		(0.0800)		(0.0720)		(0.0810)	
L1D4pscred		0.0653***		0.0651***		0.0626***		0.0646***		0.0620***		0.0553***		0.0554***		0.0526***		0.0549***		0.0523***
		(0.0110)		(0.0110)		(0.0110)		(0.0110)		(0.0120)		(0.0130)		(0.0130)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			-0.00255										0.00133							
			(0.0072)										(0.0075)							
L1D4housepi					0.0796***				0.0766***						0.0694***				0.0667***	
					(0.0220)				(0.0220)						(0.0250)				(0.0250)	
L1D4tagdp							0.00824		0.00658								0.00767		0.00622	
							(0.0053)		(0.0053)								(0.0055)		(0.0056)	
Constant	-0.000974	0.0181***	-0.00187	0.0182***	-0.00349	0.0187***	-0.00068	0.0181***	-0.00318	0.0187***	0.00724	0.0183***	0.00791	0.0183***	0.00306	0.0190***	0.00691	0.0183***	0.00307	0.0189***
	(0.0050)	(0.0009)	(0.0057)	(0.0009)	(0.0051)	(0.0009)	(0.0050)	(0.0009)	(0.0051)	(0.0010)	(0.0077)	(0.0010)	(0.0086)	(0.0010)	(0.0082)	(0.0010)	(0.0077)	(0.0010)	(0.0082)	(0.0010)
Observations	426	426	426	426	399	399	418	418	391	391	375	375	375	375	348	348	371	371	344	344
R-squared	0.12	0.07	0.12	0.07	0.15	0.07	0.12	0.07	0.15	0.07	0.1	0.05	0.1	0.05	0.12	0.04	0.1	0.05	0.12	0.04

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 7. Macroeconomic Panel Regression Results for Private Sector Credit Using DD Index

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1ddindex	0.00684***		0.00729***		0.00915***		0.00702***		0.00898***		0.00645***		0.00621**		0.00887***		0.00669***		0.00879***	
	(0.0022)		(0.0027)		(0.0023)		(0.0022)		(0.0023)		(0.0024)		(0.0029)		(0.0025)		(0.0024)		(0.0025)	
ibr	-0.00547***		-0.00542***		-0.00381**		-0.00569***		-0.00414**											
	(0.0017)		(0.0017)		(0.0019)		(0.0017)		(0.0019)											
lr											-0.00782***		-0.00789***		-0.00587**		-0.00747***		-0.00586*	
											(0.0027)		(0.0027)		(0.0030)		(0.0027)		(0.0030)	
L1D4gdp	0.337***		0.338***		0.203***		0.348***		0.218***		0.254***		0.252***		0.148*		0.269***		0.164**	
	(0.0640)		(0.0650)		(0.0730)		(0.0650)		(0.0750)		(0.0700)		(0.0720)		(0.0780)		(0.0710)		(0.0800)	
L1D4pscred		0.0671***		0.0669***		0.0635***		0.0663***		0.0629***		0.0572***		0.0573***		0.0537***		0.0567***		0.0534***
		(0.0110)		(0.0110)		(0.0110)		(0.0120)		(0.0120)		(0.0130)		(0.0130)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			-0.0021										0.00113							
			(0.0072)										(0.0074)							
L1D4housepi					0.0891***				0.0841***						0.0776***				0.0738***	
					(0.0220)				(0.0220)						(0.0250)				(0.0250)	
L1D4tagdp							0.00678*		0.00447								0.00535		0.00361	
							(0.0035)		(0.0039)								(0.0036)		(0.0041)	
Constant	-0.000717	0.0179***	-0.00147	0.0179***	-0.0063	0.0186***	-0.00176	0.0178***	-0.00628	0.0185***	0.00828	0.0180***	0.00878	0.0180***	0.00124	0.0188***	0.00612	0.0180***	0.000602	0.0188***
	(0.0050)	(0.0009)	(0.0057)	(0.0009)	(0.0052)	(0.0009)	(0.0051)	(0.0009)	(0.0053)	(0.0010)	(0.0073)	(0.0010)	(0.0081)	(0.0010)	(0.0080)	(0.0010)	(0.0075)	(0.0010)	(0.0081)	(0.0010)
Observations	429	429	429	429	401	401	421	421	393	393	378	378	378	378	350	350	374	374	346	346
R-squared	0.12	0.07	0.12	0.07	0.16	0.07	0.13	0.07	0.16	0.07	0.1	0.05	0.1	0.05	0.13	0.05	0.1	0.05	0.13	0.05

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 8. Macroeconomic Panel Regression Results for Private Sector Credit Using Average Weighted DD

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1awdd	0.00593***		0.00600**		0.00641***		0.00541**		0.00597***		0.00404*		0.00301		0.00511**		0.00352		0.00464**	
	(0.0021)		(0.0025)		(0.0021)		(0.0021)		(0.0022)		(0.0023)		(0.0027)		(0.0023)		(0.0023)		(0.0023)	
ibr	-0.00451***		-0.00450***		-0.00298*		-0.00457***		-0.00314*											
	(0.0015)		(0.0015)		(0.0016)		(0.0014)		(0.0016)											
lr											-0.00676***		-0.00717***		-0.00495*		-0.00667***		-0.00503*	
											(0.0025)		(0.0026)		(0.0028)		(0.0025)		(0.0028)	
L1D4gdp	0.332***		0.332***		0.206***		0.338***		0.216***		0.258***		0.253***		0.162**		0.266***		0.172**	
	(0.0650)		(0.0660)		(0.0750)		(0.0650)		(0.0760)		(0.0700)		(0.0710)		(0.0790)		(0.0700)		(0.0790)	
L1D4pscred		0.0666***		0.0665***		0.0639***		0.0664***		0.0638***		0.0569***		0.0572***		0.0543***		0.0567***		0.0542***
		(0.0110)		(0.0110)		(0.0120)		(0.0110)		(0.0120)		(0.0130)		(0.0130)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			-0.000336										0.00501							
			(0.0069)										(0.0073)							
L1D4housepi					0.0802***				0.0779***						0.0679***				0.0656***	
					(0.0220)				(0.0220)						(0.0250)				(0.0250)	
L1D4tagdp							0.00818		0.00641								0.00813		0.00654	
							(0.0052)		(0.0053)								(0.0055)		(0.0055)	
Constant	0.00119	0.0180***	0.00111	0.0180***	-0.000388	0.0186***	0.00117	0.0180***	-0.000318	0.0186***	0.0116*	0.0183***	0.0136*	0.0182***	0.0078	0.0189***	0.0112*	0.0183***	0.00777	0.0189***
	(0.0041)	(0.0009)	(0.0045)	(0.0009)	(0.0041)	(0.0009)	(0.0040)	(0.0009)	(0.0041)	(0.0009)	(0.0067)	(0.0010)	(0.0074)	(0.0010)	(0.0072)	(0.0010)	(0.0067)	(0.0010)	(0.0072)	(0.0010)
Observations	434	434	434	434	407	407	434	434	407	407	387	387	387	387	360	360	387	387	360	360
R-squared	0.11	0.07	0.11	0.07	0.14	0.07	0.11	0.07	0.14	0.07	0.09	0.05	0.09	0.05	0.11	0.05	0.09	0.05	0.11	0.05

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 9. Macroeconomic Panel Regression Results for Private Sector Credit Using Average Weighted EDF1

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1awedf1	-0.00599***		-0.00578***		-0.00586***		-0.00571***		-0.00558***		-0.00436**		-0.00389**		-0.00523***		-0.00389**		-0.00469***	
	(0.0015)		(0.0015)		(0.0015)		(0.0014)		(0.0015)		(0.0018)		(0.0018)		(0.0018)		(0.0018)		(0.0018)	
ibr	-0.00374**		-0.00394**		-0.0000863		-0.00370**		-0.00026											
	(0.0017)		(0.0017)		(0.0019)		(0.0016)		(0.0018)											
lr											-0.00711**		-0.00781***		-0.000998		-0.00704**		-0.00124	
											(0.0029)		(0.0029)		(0.0034)		(0.0028)		(0.0033)	
L1D4gdp	0.294***		0.290***		0.139*		0.280***		0.135*		0.228***		0.215***		0.115		0.216***		0.11	
	(0.0700)		(0.0710)		(0.0790)		(0.0690)		(0.0790)		(0.0760)		(0.0790)		(0.0820)		(0.0750)		(0.0810)	
L1D4pscred		0.0593***		0.0597***		0.0575***		0.0596***		0.0577***		0.0500***		0.0507***		0.0476***		0.0504***		0.0480***
		(0.0120)		(0.0120)		(0.0120)		(0.0120)		(0.0120)		(0.0130)		(0.0130)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			0.00447										0.00718							
			(0.0061)										(0.0065)							
L1D4housepi					0.0942***				0.0905***						0.0929***				0.0899***	
					(0.0260)				(0.0250)						(0.0300)				(0.0300)	
L1D4tagdp							0.0277***		0.0243***								0.0322***		0.0292***	
							(0.0093)		(0.0093)								(0.0100)		(0.0100)	
Constant	-0.00266	0.0191***	-0.00219	0.0191***	-0.00557	0.0195***	-0.004	0.0191***	-0.00655	0.0195***	0.0101	0.0194***	0.0122	0.0194***	-0.00195	0.0198***	0.00855	0.0194***	-0.00271	0.0198***
	(0.0045)	(0.0010)	(0.0045)	(0.0010)	(0.0045)	(0.0010)	(0.0044)	(0.0010)	(0.0045)	(0.0010)	(0.0080)	(0.0010)	(0.0082)	(0.0010)	(0.0087)	(0.0011)	(0.0079)	(0.0010)	(0.0086)	(0.0011)
Observations	391	391	391	391	375	375	391	391	375	375	344	344	344	344	328	328	344	344	328	328
R-squared	0.13	0.06	0.13	0.06	0.16	0.06	0.15	0.06	0.17	0.06	0.1	0.04	0.1	0.04	0.12	0.04	0.12	0.04	0.14	0.04

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 10. Macroeconomic Panel Regression Results for Private Sector Credit Using Average Weighted EDF5

COEFFICIENT	(2) D1pscred	(3) D4gdp	(4) D1pscred	(5) D4gdp	(6) D1pscred	(7) D4gdp	(8) D1pscred	(9) D4gdp	(10) D1pscred	(11) D4gdp	(12) D1pscred	(13) D4gdp	(14) D1pscred	(15) D4gdp	(16) D1pscred	(17) D4gdp	(18) D1pscred	(19) D4gdp	(20) D1pscred	(21) D4gdp
L1awedf5	-0.00921***		-0.00897***		-0.00860***		-0.00896***		-0.00837***		-0.00742***		-0.00683***		-0.00820***		-0.00669***		-0.00744***	
	(0.0019)		(0.0019)		(0.0019)		(0.0019)		(0.0019)		(0.0025)		(0.0026)		(0.0025)		(0.0025)		(0.0025)	
ibr	-0.00372**		-0.00389**		-0.000439		-0.00365**		-0.00057											
	(0.0016)		(0.0016)		(0.0018)		(0.0016)		(0.0018)											
lr											-0.00661**		-0.00725**		-0.000795		-0.00657**		-0.00103	
											(0.0029)		(0.0029)		(0.0033)		(0.0028)		(0.0033)	
L1D4gdp	0.265***		0.262***		0.125		0.251***		0.12		0.213***		0.202**		0.102		0.203***		0.0987	
	(0.0700)		(0.0710)		(0.0790)		(0.0690)		(0.0780)		(0.0760)		(0.0790)		(0.0820)		(0.0750)		(0.0820)	
L1D4pscred		0.0594***		0.0597***		0.0575***		0.0597***		0.0578***		0.0500***		0.0507***		0.0477***		0.0504***		0.0480***
		(0.0120)		(0.0120)		(0.0120)		(0.0120)		(0.0120)		(0.0130)		(0.0130)		(0.0130)		(0.0130)		(0.0130)
D4djstoxx			0.00396										0.00643							
			(0.0060)										(0.0065)							
L1D4housepi					0.0874***				0.0835***						0.0903***				0.0877***	
					(0.0260)				(0.0250)						(0.0300)				(0.0300)	
L1D4tagdp							0.0282***		0.0252***								0.0316***		0.0287***	
							(0.0092)		(0.0092)								(0.0100)		(0.0100)	
Constant	-0.00381	0.0191***	-0.00346	0.0191***	-0.00576	0.0195***	-0.00545	0.0191***	-0.00710*	0.0195***	0.00721	0.0194***	0.00907	0.0194***	-0.0037	0.0198***	0.00587	0.0194***	-0.00442	0.0198***
	(0.0042)	(0.0010)	(0.0043)	(0.0010)	(0.0042)	(0.0010)	(0.0042)	(0.0010)	(0.0042)	(0.0010)	(0.0080)	(0.0010)	(0.0082)	(0.0010)	(0.0086)	(0.0011)	(0.0079)	(0.0010)	(0.0085)	(0.0011)
Observations	391	391	391	391	375	375	391	391	375	375	344	344	344	344	328	328	344	344	328	328
R-squared	0.15	0.06	0.15	0.06	0.17	0.06	0.17	0.06	0.19	0.06	0.1	0.04	0.11	0.04	0.12	0.04	0.13	0.04	0.15	0.04

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 11. Macroeconomic Panel Regression Results for GDP Using DD

COEFFICIENT	(2) D4gdp	(3) D4pscred	(4) D4gdp	(5) D4pscred	(6) D4gdp	(7) D4pscred	(8) D4gdp	(9) D4pscred	(10) D4gdp	(11) D4pscred	(12) D4gdp	(13) D4pscred	(14) D4gdp	(15) D4pscred	(16) D4gdp	(17) D4pscred	(18) D4gdp	(19) D4pscred	(20) D4gdp	(21) D4pscred
L4dd	0.00297**		0.00162		0.00372**		0.00298*		0.00369**		0.00193		0.000104		0.00368**		0.00204		0.00371**	
	(0.0015)		(0.0014)		(0.0015)		(0.0015)		(0.0015)		(0.0017)		(0.0016)		(0.0017)		(0.0017)		(0.0017)	
ibr	-0.000183		-0.000815		0.00217**		-0.000158		0.00221**											
	(0.0011)		(0.0010)		(0.0011)		(0.0011)		(0.0011)											
lr											-0.00791***		-0.00913***		-0.00381**		-0.00792***		-0.00383**	
											(0.0018)		(0.0017)		(0.0019)		(0.0019)		(0.0019)	
L1D4pscred	0.135***		0.123***		0.0799***		0.137***		0.0797***		0.107***		0.0906***		0.0622***		0.109***		0.0626***	
	(0.0150)		(0.0140)		(0.0160)		(0.0150)		(0.0160)		(0.0170)		(0.0160)		(0.0180)		(0.0170)		(0.0180)	
L1D4gdp		1.685***		1.676***		1.569***		1.651***		1.541***		1.414***		1.404***		1.317***		1.400***		1.310***
		(0.1400)		(0.1400)		(0.1500)		(0.1400)		(0.1500)		(0.1400)		(0.1400)		(0.1500)		(0.1400)		(0.1500)
D4djstoxx			0.0245***										0.0283***							
			(0.0037)										(0.0038)							
L1D4housepi					0.101***				0.101***						0.0973***				0.0976***	
					(0.0140)				(0.0150)						(0.0170)				(0.0170)	
L1D4tagdp							-0.00315		-0.00041								-0.00399		-0.000593	
							(0.0054)		(0.0051)								(0.0058)		(0.0057)	
Constant	0.0114***	0.00708*	0.0127***	0.00727*	0.00777***	0.0110***	0.0116***	0.00738*	0.00780***	0.0111***	0.0291***	0.00906**	0.0325***	0.00927**	0.0194***	0.0126***	0.0293***	0.00883**	0.0194***	0.0122***
	(0.0026)	(0.0038)	(0.0025)	(0.0038)	(0.0026)	(0.0040)	(0.0027)	(0.0038)	(0.0026)	(0.0040)	(0.0046)	(0.0038)	(0.0044)	(0.0038)	(0.0048)	(0.0039)	(0.0047)	(0.0038)	(0.0049)	(0.0039)
Observations	424	424	424	424	406	406	415	415	397	397	374	374	374	374	356	356	369	369	351	351
R-squared	0.11	0.17	0.2	0.17	0.22	0.16	0.11	0.17	0.22	0.16	0.13	0.14	0.24	0.14	0.21	0.14	0.13	0.14	0.21	0.14

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 12. Bank-Specific Panel Regression Results Using EDF1

COEFFICIENT	(2) D4tlo	(3) D4gdp	(4) D4tlo	(5) D4gdp	(6) D4tlo	(7) D4gdp	(8) D4tlo	(9) D4gdp	(10) D4tlo	(11) D4gdp	(12) D4tlo	(13) D4gdp
edf1	-0.0459***		-0.0423***		-0.0456***		-0.0170***		-0.0164***		-0.0164***	
	(0.0054)		(0.0054)		(0.0054)		(0.0043)		(0.0043)		(0.0044)	
bankint	-0.0517***		-0.0555***		-0.0587***		-0.0499***		-0.0509***		-0.0545***	
	(0.0120)		(0.0120)		(0.0130)		(0.0095)		(0.0095)		(0.0110)	
L1D4gdp	1.508***		1.388***		1.565***		1.309***		1.286***		1.305***	
	(0.2300)		(0.2300)		(0.2500)		(0.1800)		(0.1800)		(0.2000)	
L1D4tlo		0.00876***		0.0102***		0.00854***		0.00620**		0.00640**		0.00642**
		(0.0031)		(0.0030)		(0.0031)		(0.0030)		(0.0030)		(0.0031)
D4djstoxx			0.146***						0.0362*		0.0366*	
			(0.0260)						(0.0210)		(0.0220)	
L1D4housepi					-0.103						-0.0375	
					(0.1200)						(0.0960)	
L1D4tagdp							0.648***		0.641***		0.635***	
							(0.0220)		(0.0220)		(0.0230)	
Constant	0.0378	0.0196***	0.0497	0.0195***	0.0545	0.0197***	0.0575**	0.0198***	0.0601**	0.0198***	0.0682***	0.0198***
	(0.0310)	(0.0007)	(0.0310)	(0.0007)	(0.0330)	(0.0007)	(0.0240)	(0.0007)	(0.0240)	(0.0007)	(0.0260)	(0.0007)
Observations	1362	1362	1362	1362	1334	1334	1362	1362	1362	1362	1334	1334
R-squared	0.1100	0.0000	0.1300	0.0000	0.1100	0.0000	0.4500	0.0000	0.4500	0.0000	0.4500	0.0000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 13. Bank-Specific Panel Regression Results Using EDF5

COEFFICIENT	(2) D4tlo	(3) D4gdp	(4) D4tlo	(5) D4gdp	(6) D4tlo	(7) D4gdp	(8) D4tlo	(9) D4gdp	(10) D4tlo	(11) D4gdp	(12) D4tlo	(13) D4gdp
edf5	-0.0635***		-0.0590***		-0.0628***		-0.0248***		-0.0241***		-0.0241***	
	(0.0065)		(0.0065)		(0.0066)		(0.0053)		(0.0053)		(0.0054)	
bankint	-0.0481***		-0.0519***		-0.0563***		-0.0483***		-0.0492***		-0.0534***	
	(0.0120)		(0.0120)		(0.0130)		(0.0095)		(0.0095)		(0.0110)	
lr												
L1D4gdp	1.437***		1.324***		1.508***		1.280***		1.258***		1.285***	
	(0.2300)		(0.2300)		(0.2400)		(0.1800)		(0.1800)		(0.2000)	
L1D4tlo		0.00901***		0.0104***		0.00877***		0.00627**		0.00647**		0.00648**
		(0.0031)		(0.0030)		(0.0031)		(0.0030)		(0.0030)		(0.0031)
D4djstoxx			0.141***						0.0348*		0.0348	
			(0.0260)						(0.0210)		(0.0210)	
L1D4housepi					-0.121						-0.0481	
					(0.1200)						(0.0960)	
L1D4tagdp							0.641***		0.635***		0.629***	
							(0.0220)		(0.0230)		(0.0230)	
Constant	0.029	0.0196***	0.0403	0.0195***	0.0485	0.0197***	0.0518**	0.0198***	0.0542**	0.0198***	0.0637**	0.0198***
	(0.0300)	(0.0007)	(0.0300)	(0.0007)	(0.0330)	(0.0007)	(0.0240)	(0.0007)	(0.0240)	(0.0007)	(0.0260)	(0.0007)
Observations	1362	1362	1362	1362	1334	1334	1362	1362	1362	1362	1334	1334
R-squared	0.1200	0.0000	0.1400	0.0000	0.1200	0.0000	0.4500	0.0000	0.4500	0.0000	0.4500	0.0000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 14. Bank-Specific Panel Regression Using DD

COEFFICIENT	(2) D4tlo	(3) D4gdp	(4) D4tlo	(5) D4gdp	(6) D4tlo	(7) D4gdp	(8) D4tlo	(9) D4gdp	(10) D4tlo	(11) D4gdp	(12) D4tlo	(13) D4gdp	(14) D4tlo	(15) D4gdp
dd	0.0343***		0.0148		0.0358***		0.000627		0.00125		0.0112		-0.0000117	
	(0.0130)		(0.0140)		(0.0130)		(0.0097)		(0.0110)		(0.0140)		(0.0110)	
bankint	-0.0348**		-0.0375**		-0.0349*		-0.0261**		-0.0260**		-0.0323*		-0.0248*	
	(0.0170)		(0.0170)		(0.0180)		(0.0130)		(0.0130)		(0.0180)		(0.0140)	
L1D4gdp	1.035***		0.948***		0.809**		1.026***		1.032***		0.566		0.862***	
	(0.3200)		(0.3300)		(0.3500)		(0.2500)		(0.2500)		(0.3600)		(0.2800)	
L1D4tlo		0.000941		0.00143		0.00105		0.000439		0.000442		0.00175		0.000483
		(0.0018)		(0.0018)		(0.0018)		(0.0018)		(0.0018)		(0.0018)		(0.0018)
D4djstoxx			0.147***						-0.00478		0.183***		0.016	
			(0.0420)						(0.0320)		(0.0430)		(0.0340)	
L1D4housepi					0.303*						0.474***		0.224*	
					(0.1600)						(0.1600)		(0.1300)	
L1D4tagdp							0.852***		0.852***				0.832***	
							(0.0270)		(0.0270)				(0.0280)	
Constant	0.0763*	0.0201***	0.105**	0.0201***	0.0707	0.0203***	0.0395	0.0201***	0.0384	0.0201***	0.0942**	0.0202***	0.0357	0.0203***
	(0.0430)	(0.0006)	(0.0430)	(0.0006)	(0.0450)	(0.0007)	(0.0330)	(0.0006)	(0.0330)	(0.0006)	(0.0450)	(0.0007)	(0.0360)	(0.0007)
Observations	1418	1418	1418	1418	1371	1371	1418	1418	1418	1418	1371	1371	1371	1371
R-squared	0.0200	0.0000	0.0300	0.0000	0.0200	0.0000	0.4200	0.0000	0.4200	0.0000	0.0400	0.0000	0.4100	0.0000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates

Table 15. Bank-Specific Panel Regression Results Using EDF1 and Competition Controls

COEFFICIENT	(2) D4tlo	(3) D4gdp	(4) D4tlo	(5) D4gdp	(6) D4tlo	(7) D4gdp	(8) D4tlo	(9) D4gdp	(10) D4tlo	(11) D4gdp	(12) D4tlo	(13) D4gdp	(14) D4tlo	(15) D4gdp
edf1	-0.0399***		-0.0394***		-0.0392***		-0.0212***		-0.0399***		-0.0218***		-0.0208***	
	(0.0092)		(0.0089)		(0.0093)		(0.0077)		(0.0092)		(0.0076)		(0.0077)	
bankint	-0.0653***		-0.0679***		-0.0622***		-0.0690***		-0.0653***		-0.0700***		-0.0657***	
	(0.0170)		(0.0170)		(0.0180)		(0.0140)		(0.0170)		(0.0140)		(0.0150)	
L1D4gdp	1.683***		1.499***		1.637***		1.310***		1.683***		1.252***		1.187***	
	(0.2800)		(0.2800)		(0.3000)		(0.2300)		(0.2800)		(0.2300)		(0.2500)	
L1D4tlo		0.0200***		0.0219***		0.0201***		0.0150***		0.0200***		0.0157***		0.0159***
		(0.0047)		(0.0047)		(0.0047)		(0.0047)		(0.0047)		(0.0047)		(0.0047)
D4djstoxx			0.231***								0.101***		0.107***	
			(0.0340)								(0.0300)		(0.0310)	
L1D4housepi					0.0938								0.132	
					(0.1800)								(0.1500)	
L1D4tagdp							0.603***				0.575***		0.573***	
							(0.0330)				(0.0330)		(0.0330)	
Rawedf1	0.0112		0.0190*		0.0122		0.0209**		0.0112		0.0238**		0.0254**	
	(0.0120)		(0.0120)		(0.0120)		(0.0098)		(0.0120)		(0.0097)		(0.0099)	
Constant	0.0997**	0.0201***	0.117**	0.0199***	0.0957*	0.0201***	0.137***	0.0204***	0.0997**	0.0201***	0.143***	0.0204***	0.138***	0.0203***
	(0.0500)	(0.0010)	(0.0490)	(0.0010)	(0.0510)	(0.0010)	(0.0410)	(0.0010)	(0.0500)	(0.0010)	(0.0410)	(0.0010)	(0.0420)	(0.0010)
Observations	724	724	724	724	724	724	724	724	724	724	724	724	724	724
R-squared	0.1100	0.0200	0.1600	0.0200	0.1200	0.0200	0.3900	0.0200	0.1100	0.0200	0.4000	0.0200	0.4000	0.0200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 16. Bank-Specific Panel Regression Results Using EDF5 and Competition Controls

COEFFICIENT	(2) D4tlo	(3) D4gdp	(4) D4tlo	(5) D4gdp	(6) D4tlo	(7) D4gdp	(8) D4tlo	(9) D4gdp	(10) D4tlo	(11) D4gdp	(12) D4tlo	(13) D4gdp
edf5	-0.0415***		-0.0391***		-0.0416***		-0.0212**		-0.0211**		-0.0208**	
	(0.0100)		(0.0099)		(0.0100)		(0.0085)		(0.0085)		(0.0087)	
bankint	-0.0488***		-0.0510***		-0.0491***		-0.0560***		-0.0566***		-0.0556***	
	(0.0170)		(0.0160)		(0.0180)		(0.0140)		(0.0140)		(0.0150)	
Rawedf5	-0.0699		-0.035		-0.0703		0.0122		0.0233		0.0248	
	(0.0550)		(0.0540)		(0.0560)		(0.0460)		(0.0460)		(0.0460)	
L1D4gdp	1.556***		1.395***		1.559***		1.238***		1.186***		1.173***	
	(0.2800)		(0.2800)		(0.3000)		(0.2400)		(0.2400)		(0.2500)	
L1D4tlo		0.0209***		0.0226***		0.0209***		0.0155***		0.0161***		0.0161***
		(0.0047)		(0.0047)		(0.0047)		(0.0047)		(0.0047)		(0.0047)
D4djstoxx			0.220***						0.0939***		0.0952***	
			(0.0340)						(0.0300)		(0.0310)	
L1D4housepi					-0.00837						0.0299	
					(0.1800)						(0.1500)	
L1D4tagdp							0.596***		0.570***		0.569***	
							(0.0330)		(0.0330)		(0.0340)	
Rawedf5	-0.0699		-0.035		-0.0703		0.0122		0.0233		0.0248	
	(0.0550)		(0.0540)		(0.0560)		(0.0460)		(0.0460)		(0.0460)	
Constant	0.0792*	0.0200***	0.0728*	0.0199***	0.0799*	0.0200***	0.0733**	0.0204***	0.0708**	0.0203***	0.0683*	0.0203***
	(0.0410)	(0.0010)	(0.0400)	(0.0010)	(0.0440)	(0.0010)	(0.0340)	(0.0010)	(0.0340)	(0.0010)	(0.0360)	(0.0010)
Observations	724	724	724	724	724	724	724	724	724	724	724	724
R-squared	0.1200	0.0200	0.1700	0.0200	0.1200	0.0200	0.3900	0.0200	0.4000	0.0200	0.4000	0.0200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates

Table 17. Bank-Specific Panel Regression Results Using DD and Competition Controls

COEFFICIENT	(2) D4tlo	(3) D4gdp	(4) D4tlo	(5) D4gdp	(6) D4tlo	(7) D4gdp	(8) D4tlo	(9) D4gdp	(10) D4tlo	(11) D4gdp	(12) D4tlo	(13) D4gdp	(14) D4tlo	(15) D4gdp
dd	0.0410***		0.0296**		0.0401***		0.0231**		0.0198*		0.0256*		0.0175	
	(0.0140)		(0.0140)		(0.0140)		(0.0120)		(0.0120)		(0.0140)		(0.0120)	
bankint	-0.0588***		-0.0581***		-0.0521***		-0.0501***		-0.0500***		-0.0472***		-0.0451***	
	(0.0140)		(0.0140)		(0.0150)		(0.0120)		(0.0120)		(0.0140)		(0.0130)	
L1D4gdp	1.238***		1.121***		1.032***		1.049***		1.017***		0.791***		0.837***	
	(0.2800)		(0.2800)		(0.3000)		(0.2400)		(0.2400)		(0.3100)		(0.2600)	
L1D4tlo		0.00237		0.00269		0.00262		0.00303		0.00304		0.00311		0.00312
		(0.0026)		(0.0026)		(0.0026)		(0.0025)		(0.0025)		(0.0026)		(0.0026)
D4djstoxx			0.139***						0.0433		0.166***		0.0596*	
			(0.0380)						(0.0340)		(0.0390)		(0.0340)	
L1D4housepi					0.273**						0.408***		0.225*	
					(0.1400)						(0.1400)		(0.1200)	
L1D4tagdp							0.479***		0.472***				0.467***	
							(0.0280)		(0.0290)				(0.0290)	
Rawdd	0.00406		0.000454		0.00481		0.00134		0.000255		0.000915		0.000591	
	(0.0033)		(0.0035)		(0.0034)		(0.0029)		(0.0030)		(0.0034)		(0.0030)	
Constant	0.0777**	0.0212***	0.110***	0.0212***	0.0585	0.0212***	0.0676**	0.0211***	0.0776**	0.0211***	0.0863**	0.0211***	0.0667**	0.0211***
	(0.0360)	(0.0009)	(0.0370)	(0.0009)	(0.0380)	(0.0009)	(0.0310)	(0.0009)	(0.0320)	(0.0009)	(0.0380)	(0.0009)	(0.0330)	(0.0009)
Observations	798	798	798	798	794	794	798	798	798	798	794	794	794	794
R-squared	0.0900	0.0000	0.1100	0.0000	0.1000	0.0000	0.3300	0.0000	0.3300	0.0000	0.1200	0.0000	0.3300	0.0000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

Table 18. Bank-Specific Panel Regression Results for GDP Using DD

COEFFICIENT	(2) D4gdp	(3) D4tlo	(4) D4gdp	(5) D4tlo	(6) D4gdp	(7) D4tlo	(8) D4gdp	(9) D4tlo	(10) D4gdp	(11) D4tlo	(12) D4gdp	(13) D4tlo	(14) D4gdp	(15) D4tlo
dd	0.00449***		0.00115		0.00422***		0.00485***		0.00135		-0.000206		-0.0000112	
	(0.0010)		(0.0011)		(0.0010)		(0.0010)		(0.0011)		(0.0011)		(0.0011)	
bankint	-0.000417		-0.000882		0.00480***		-0.00037		-0.000861		0.00477***		0.00466***	
	(0.0014)		(0.0013)		(0.0014)		(0.0014)		(0.0013)		(0.0014)		(0.0014)	
L1D4tlo	0.000395		-0.000308		-0.00089		0.00944***		0.0112***		-0.002		0.00797***	
	(0.0018)		(0.0017)		(0.0017)		(0.0031)		(0.0031)		(0.0017)		(0.0029)	
L1D4gdp		1.124***		1.169***		1.132***		1.088***		1.126***		1.188***		1.160***
		(0.3200)		(0.3200)		(0.3300)		(0.3200)		(0.3200)		(0.3300)		(0.3300)
D4djstoxx			0.0243***						0.0263***		0.0316***		0.0333***	
			(0.0033)						(0.0033)		(0.0032)		(0.0032)	
L1D4housepi					0.131***						0.150***		0.148***	
					(0.0120)						(0.0120)		(0.0110)	
L1D4tagdp							-0.0183***		-0.0234***				-0.0204***	
							(0.0051)		(0.0050)				(0.0048)	
Constant	0.0143***	0.0521***	0.0191***	0.0512***	0.00129	0.0508***	0.0144***	0.0528***	0.0196***	0.0520***	0.00607*	0.0497***	0.00679*	0.0503***
	(0.0035)	(0.0100)	(0.0035)	(0.0100)	(0.0036)	(0.0100)	(0.0034)	(0.0100)	(0.0034)	(0.0100)	(0.0035)	(0.0100)	(0.0035)	(0.0100)
Observations	1418	1418	1418	1418	1371	1371	1418	1418	1418	1418	1371	1371	1371	1371
R-squared	0.0100	0.0100	0.0500	0.0100	0.1000	0.0100	0.0200	0.0100	0.0600	0.0100	0.1600	0.0100	0.1700	0.0100

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: IMF Staff estimates.

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