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Abstract

Productive firms can access credit markets directly—by issuing corporate bonds—or in an intermediated manner—by borrowing through loans. In this paper, we study how the macroeconomic environment, including inflation, the stage of business cycle, and the stance of monetary policy, affects firms' decisions of which debt market to access. Tighter monetary policy leads to firms borrowing more using intermediated credit, while higher inflation rates lead firms to lock in financing rates by issuing corporate bonds. Moreover, we also explore the role that heterogeneity in leverage across different types of financial institutions plays in the composition of nonfinancial firms' financing. We show that increases in leverage in the traditional banking sector lead to a substitution from loans into bonds.

Key words: intermediated credit, leverage cycles, corporate bonds

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1 Introduction

Non-financial corporations across the world have a choice in how they fund their business activities. Traditional pecking order theory (Myers, 1984) postulates that, in financing new investments, corporations would first choose to use internal funds, then raise funding through debt markets, and, as a last resort, raise capital in the equity market. In this paper, we focus on the sources of debt funding, studying how financial sector demand for non-financial corporate credit over the business cycle and macroeconomic conditions shape both total credit growth and the growth of intermediated credit.

We start with a simple observation: just as non-financial firms have a pecking order in mind when selecting how to raise funding for their activities, determining the *demand* for credit through different types of credit instruments, financial institutions also have preferences for which types of credit instruments they hold, determining the *supply* of credit. In this paper, we argue that one of the determinants of the mix of funding for non-financial corporations at the economy level is the composition of the financial sector. Figure 1 provides the first indication that that may indeed be the case: the share of intermediated credit in the economy is larger when the monetary financial institutions (MFIs) are a bigger share of the aggregate financial sector, and smaller when either the insurance and pension funds or the shadow banking sectors are a bigger share of the aggregate financial sector. These relationships hold both cross-country – countries for which MFIs represent a bigger portion of the financial system tend to have a greater share of credit intermediated – and within country – as the MFI sector shrinks within a country, the share of intermediated credit declines.

We formalize this intuition by introducing a credit supply model to study sources of variation in the share of intermediated credit as well as overall credit borrowed by non-financial corporations across 33 countries. We model financial institutions' willingness to supply credit at the country-institution type level to match international financial sector holdings

of non-financial firms' loans and corporate bonds, collected from individual countries' financial national accounts. We start with market clearing identities for both types of credit: the demand for funding through each credit instrument must equal the supply of credit across all lender sectors. The supply of credit can thus be viewed as a portfolio choice problem from the perspective of the non-financial firms, where the non-financial sector chooses not only the composition of liabilities on its balance sheet, but also how to allocate each liability type across different types of institutions of the financial sector.

Starting with a portfolio choice model, Koijen and Yogo (2019) show that an investor's optimal portfolio weights could be expressed as a logit function of assets characteristics and latent demand (that is, characteristics unobserved by the econometrician). Using their intuition, we specify the credit supply by financial sectors to depend on yields (or loan rates for the case of loans) but also, crucially, on macroeconomic conditions, including output growth, inflation, the unemployment gap, and the stance of monetary policy, as well as the balance sheet health of financial sectors. The supply of corporate bonds in the economy thus depends directly on financial institutions' willingness to hold corporate bonds but also indirectly – through market clearing – on financial institutions' willingness to hold corporate loans. Recognizing that credit spreads are an endogenous outcome to the amount of credit borrowed, we instrument for default-adjusted spread in each market using the granular instrumental variables (GIV) approach of Gabaix and Koijen (2020). The GIV uses the intuition that demand shocks in credit spreads on loans and bonds of different sizes do not perfectly average out in the cross-section, so that information on the relative sizes of instruments observed can be used to isolate the effect of these shocks.

While Figure 1 provides suggestive evidence that the composition of the financial sector in a country plays a role in determining the composition of non-financial firms' debt financing, previous literature (Adrian and Shin, 2014) has also found that the share of intermediated credit in an economy is related to macroeconomic conditions. The credit supply

system approach allows us to study this question more carefully, separating out the impact of macroeconomic conditions from the impact of the stance of monetary policy. While there is a growing literature of micro-level empirical studies showing the causal effects of loose monetary policy on risk-taking by financial institutions and households, that literature has largely ignored both the question of how such micro-level evidence translates into aggregate effects and also how monetary policy influences the composition of non-financial institutions' borrowing. Our paper is thus the first to provide evidence on how the systematic conduct of monetary policy shapes firms' borrowing decisions and financial institutions' willingness to hold non-financial corporation debt.

We document three basic facts. First, we show that the traditional banking sector and the household sector (which, in national accounts, includes hedge funds) trade against each other as their corresponding leverage grows. The share of monetary financial institutions (MFIs) in both non-financial corporate bonds and loans increases as their leverage increases, while the opposite is true for the household sector.

Second, turning to the effects of macroeconomic conditions, we document that business cycle downturns correspond to a substitution by MFIs away from non-financial corporate credit provision through corporate bonds into credit provision through loans. We also observe a similar business cycle dynamic for the non-bank, non-insurance and pension fund part of the financial system, suggesting that at least some types of "shadow banks" may behave more like the traditional banking sector in adjusting their corporate credit provision dynamics over the business cycle.

Finally, we show that the stance of monetary policy has a much more homogeneous effect across countries and time periods on the supply of non-financial corporate loans than on the supply of non-financial corporate bonds. Tighter monetary policy corresponds uniformly to increases in the share of loans in the liabilities of the non-financial corporate sector. In contrast, while some countries like Japan and the UK have a positive elasticity of the share

of corporate bonds to the stance of monetary policy, others have a negative one or even, as is the case for the U. S., have elasticities that change sign over time. The stance of monetary policy thus has a much more ambiguous effect on corporate borrowing through marketable instruments than through intermediated credit.

This paper contributes to the literature on demand-based asset pricing. The seminal Koijen and Yogo (2019) paper estimates the demand system of institutional investors for long positions in U. S. equities. The demand system approach has since been applied to a variety of settings, including exchange rates and yield determination (Koijen and Yogo, 2020), impact of Euro-area quantitative easing (Koijen et al., 2017), institutional holdings of U. S. corporate bonds (Bretscher et al., 2020), corporate bond issuance (Siani, 2022), and institutional demand for U. S. fixed income assets (Boyarchenko and Shachar, 2019). We deviate from this literature by focusing on the determinants of credit *supply* rather than security *demand*.

This paper also provides new evidence on the relationship between the stance of monetary policy and aggregate credit supply in the economy. Several empirical studies show that when interest rates are low, both bank (Jiménez et al., 2017; Maddaloni and Peydró, 2011; Dell'Ariccia et al., 2017; Ioannidou et al., 2015; Paligorova and Santos, 2017; Altunbas et al., 2022) and non-bank (Choi and Kronlund, 2018; Di Maggio and Kacperczyk, 2017; Chodorow-Reich, 2014; Hau and Lai, 2016) financial institutions engage in increased risk taking by "reaching for yield" (Rajan, 2006). Relative to that literature, we focus on the impact of *systematic* conduct of monetary policy as measured by long-run deviations of the real policy rate from the natural rate of interest. This approach has the advantage of capturing the intuition that financial vulnerabilities in the economy build-up gradually over time, and are not the result of a one-time deviation of monetary policy.[1]

This paper also speaks to the literature on international corporate credit provision. In a series of papers, Cetorelli and Goldberg (2011, 2012b,a) show that global banks manage liquidity on

[1] See Boyarchenko et al. (2022) for a more detailed discussion of the extant empirical literature on the impact of monetary policy on aggregate financial stability and risk taking.

a global scale, reducing cross-border lending to both the non-financial and financial sectors in response to contractionary domestic shocks. In the same spirit, Avdjiev et al. (2018) present a case study of past episodes of financial stress in Asia, illustrating the cross-border nature of the procyclical risk-taking propensity of financial intermediaries through the composition of liabilities. Avdjiev et al. (2017) show that the composition and drivers of international bank lending and international bond issuance has changed since the financial crisis, with the responsiveness of international bank lending to global risk conditions declining considerably post-crisis and becoming similar to that of international debt securities. Blanchard et al. (2017) argue that the composition of corporate credit also determines whether capital inflows are expansionary or contractionary for a small open economy, with capital inflows through bank lending reducing the overall cost of financing for productive firms. This literature has focused on cross-border credit flows, while our paper focuses on the within-country corporate credit provision by different parts of the financial sector and is thus complementary to these earlier studies.

Finally, this paper is related to the recent literature on balance sheet management by insurance companies. Koijen and Yogo (2015) show that, during the financial crisis, life insurers managed the size of their balance sheet by selling long-term policies at deep discounts relative to actuarial values, exploiting regulation that allowed them to record less than a dollar of reserve per dollar of future insurance liability. At the same time, insurance companies changed the composition of their liabilities by increasing the fees on variable annuities, reducing the sales of such products (Koijen and Yogo, 2018). On the asset composition side, Chodorow-Reich et al. (2018) argue that insurance companies act as asset insulators, holding assets for the long-run to protect their equity from fluctuations in market asset values. Extending this intuition, Boyarchenko and Shachar (2019) document that corporate issuers cater to these preferences by fragmenting their overall bond issuances into multiple individual issues and issuing privately-traded debt. Unlike these earlier studies that utilize insurance-company-level balance sheet data, we focus on the cyclical properties of the balance sheet of

the aggregate insurance company sector, and on how it contrasts with the cyclical properties of the balance sheet of the aggregate bank and shadow bank sectors.

The rest of the paper is organized as follows. We introduce our supply system approach to credit provision in Section 2. We describe the data sources and summarize the main properties of the data in Section 3. Section 4 then presents the basic credit supply system estimates. We compute supply elasticities with respect to key variables of interest in Section 5. Section 6 concludes.

2 A supply system approach to credit provision

In this paper, we take a "supply system" approach to estimating how aggregate economic conditions and balance sheet health of financial institutions affect the supply of credit to the non-financial sector. We focus on the determinants of supply of credit within a particular economy; since our data do not include cross-border lending, we can estimate the supply system country-by-country.

2.1 Credit supply and demand

Consider an economy with $N+1$ credit supplier sectors, indexed by $j = 1, \ldots, N$, with $j = 0$ corresponding to the "rest of the world" (RoW). We consider two types of credit provision: through loans (asset class $l = 1$) and through market-based credit, such as corporate bonds, (asset class $l = 2$). We denote by $P_t(l)$ the price of credit instrument l in quarter t, and by lower case letters logs of the upper case, so that $p_t(l) = \log P_t(l)$. Since we are interested in the supply of fixed income securities, it is natural to consider security valuations in terms of

yields, which are related to the price of the security through duration $D_t(l)$:

$$y_t(l) = -D_t(l)^{-1} \log P_t(l).$$

We model the composition of credit demanded by the non-financial corporate business sector (NFCB) as

$$w_t(j,l) = w_t(j|\,l)\, w_t(l),$$

where $w_t(l)$ is the share of credit instrument l in NFCB borrowing and $w_t(j|\,l)$ is the share of credit provided by financial subsector j through instrument l. We model the share of credit provided by financial subsector j through instrument l as a logistic function

$$w_t(j|\,l) = \frac{\delta_t(j,l)}{1 + \sum_{m=1}^{N} \delta_t(m,l)},$$

where

$$\delta_t(j,l) = \exp\left\{\beta_{0,l,t} + \Theta_{lt}'\vec{x}_t(j)\right\} \epsilon_t(j,l). \tag{1}$$

Here, $\vec{x}_t(j)$ is a vector subsector-specific and economy-wide characteristics, including metrics of balance sheet health for subsector j and output growth, inflation, unemployment rate, and stance of monetary policy. We refer to $\epsilon_t(j,l)$ as the latent supply of credit instrument l by sector j, which captures willingness of sector j to provide credit with unobserved characteristics of instrument l. Because we are interested in credit supplied by potentially regulated sectors in the economy, which may have restrictions on which types of credit securities they are allowed to hold, we allow for the case of $\epsilon_t(j,l) \equiv 0$.

We normalize the mean of latent supply $\epsilon_t(j,l)$ to one for each instrument l so that the intercept $\beta_{0,l,t}$ in equation (1) is identified. The intercept $\beta_{0,l,t}$ and latent supply $\epsilon_t(j,l)$ thus

play different roles in the within security-class supply determination. While $\beta_{0,l,t}$ determines the supply of security type l by the domestic sectors relative to the willingness of the rest of the world ("RoW") to supply credit through instrument l, cross-sectional variation in $\epsilon_t(j,l)$ captures the relative supply across domestic sectors. Notice that, by construction, the sum of the shares of credit provided by different subsectors equals 1, so that we can represent the share of credit provided by RoW through instrument l as

$$w_t(0|\,l) = \left(1 + \sum_{m=1}^{N} \delta_t(m,l)\right)^{-1},$$

so that

$$\frac{w_t(j|\,l)}{w_t(0|\,l)} = \delta_t(j,l) = \exp\left\{\beta_{0,l,t} + \Theta'_{lt}\vec{x}_t(j)\right\}\epsilon_t(j,l). \tag{2}$$

Across instruments, we assume that the share of credit demanded through instrument l can be represented in a nested logit structure

$$w_t(l) = \frac{\left(1 + \sum_{m=1}^{N} \delta_t(m,l)\right)^{\lambda_{lt}} \exp\left\{\alpha_l - \beta_{lt} y_t(l) + \xi_t(l)\right\}}{1 + \sum_{k=1,2}\left(1 + \sum_{m=1}^{N} \delta_t(m,k)\right)^{\lambda_{kt}} \exp\left\{\alpha_k - \beta_{kt} y_t(k) + \xi_t(k)\right\}}, \tag{3}$$

where $\lambda_{lt} \in [0,1]$ denotes the degree of substitution in credit borrowed through different instruments, α_l is an instrument-specific fixed effect, and $\xi_t(l)$ denotes instrument-specific credit demand. The term $\beta_{lt} y_t(l)$ captures the willingness of the non-financial sector to raise credit through instrument l as the relative valuation of instruments changes. Finally, the "inclusive value" of each instrument l is measured by $\left(1 + \sum_{m=1}^{N} \delta_t(m,l)\right)$, which connects changing financial institutions' balance sheet health and the state of the economy in the inner nest of the logit to the respective changes in weights across credit instruments in the outer nest.

With this assumption, the share of liabilities in other instruments is given by

$$w_t(0) = \left(1 + \sum_{k=1,2}\left(1 + \sum_{m=1}^{N}\delta_t(m,k)\right)^{\lambda_{kt}} \exp\left\{\alpha_k - \beta_{kt}y_t(k) + \xi_t(k)\right\}\right)^{-1},$$

so that the relative share of liabilities represented by credit instrument l can be expressed as a simple exponential

$$\log\frac{w_t(l)}{w_t(0)} = -\lambda_{lt}\log w_t(0|\,l) + \alpha_l - \beta_{lt}y_t(l) + \xi_t(l). \tag{4}$$

Finally, denote by $Q_t(l)$ the total face value of credit borrowed through instrument l, which can be interpreted as the equilibrium supply of instrument l. Market clearing then implies

$$L_t\sum_{n=0}^{N} w_t(n,l) = Q_t(l)\,P_t(l).$$

2.2 Estimating the supply system

We can interpret the supply system for liabilities of non-financial corporate business specified by equations (2) and (4) as a non-linear regression model that relates the cross-section of credit supply to the state of economy and financial institutions' balance sheets. Estimating this system requires an identifying assumption as latent supply is determined jointly with debt securities' prices and the overall state of the economy. Following the literature on demand system estimation, the baseline identification assumption is

$$\mathbb{E}\left[\begin{array}{c}\epsilon_t(j,l)\\ \xi_t(l)\end{array}\middle|\,\vec{y}_t,\vec{x}_t,\vec{Q}_t\right] = \left[\begin{array}{c}1\\ 0\end{array}\right], \tag{5}$$

so that financial (sub)sector characteristics, such as leverage, and contemporaneous macroeconomic outcomes are exogenous to the non-financial sector's credit demand. Intuitively,

non-financial firms' borrowing today is transmitted into output, unemployment, and inflation with a lag.

We relax the identification assumption (5) by constructing granular instrumental variables (GIVs) as in Gabaix and Koijen (2020) for loan and corporate bond prices, recognizing endogeneity of the pricing of non-financial corporate liabilities to the non-financial sector's credit demand. More specifically, consider a bond/loan b issued by firm f with credit spread $s_{b(f),t}$ and amount outstanding relative to total assets of firm f of $q_{b(f),t}$ at time t. Under the assumption that issuers form beliefs about the expected costs of issuing credit securities based on firm and aggregate characteristics, we can represent the relationship between amount outstandings and credit spreads as

$$s_{b(f),t} = \varphi_f q_{b(f),t} + \vec{m}_f' \vec{C}_{ft} + \eta_{b(f),t},$$

where $\vec{C}_{ft}$ is a vector of bond and firm characteristics, and $\eta_{b(f),t}$ are latent credit demand shocks to firm f. Similarly, we can represent the total supply of credit to the non-financial sector as a function of aggregate credit spreads and aggregate conditions as

$$Q_t = \varphi_a s_t + \vec{m}_a' \vec{C}_{at} + u_t.$$

The GIV approach relies on the assumption that credit spreads are granular, so that the equal-weighted average latent credit demand shock is not equal to the size-weighted average latent credit demand shock

$$\sum_{b(f)} \frac{1}{\mathcal{N}_t} \eta_{b(f),t} = \sum_{b(f)} \frac{q_{b(f),t}}{\sum q_{b(f),t}} \eta_{b(f),t},$$

so that an instrument for the unpredictable part of the aggregate credit spread can be constructed as the difference between the size-weighted and equal-weighted average latent

credit demand shocks

$$z_t = \sum_{b(f)} \frac{q_{b(f),t}}{\sum q_{b(f),t}} \eta_{b(f),t} - \sum_{b(f)} \frac{1}{\mathcal{N}_t} \eta_{b(f),t}.$$

We then use GMM to estimate equations (2) and (4) subject to the instrumented moment restriction

$$\mathbb{E}\left[\begin{array}{c} \epsilon_t(j,l) \\ \xi_t(l) \end{array} \middle| \vec{z}_t, \vec{x}_t, \vec{Q}_t \right] = \begin{bmatrix} 1 \\ 0 \end{bmatrix}. \tag{6}$$

We describe the details of the GIV construction for our context in Section 3.2.

3 Data description

We need three types of data to estimate the credit supply system described by equations (2) and (4): national accounts data that measure liabilities outstanding of the non-financial sector and holdings of liabilities of non-financial firms by other sectors of the economy, prices of corporate bonds and loans, and data on macroeconomic outcomes.

3.1 National accounts data

One of the contributions of this paper is to provide stylized facts on the features of corporate credit provision across a range of developed economies. To that end, we collect consolidated balance sheet information for the *financial business* sector (and its four subsectors *monetary financial institutions*, *insurance companies*, *pension funds*, and *other financial institutions*), the *non-financial corporate business* sector, and *households and non-profit institutions serving households* for the United States, the United Kingdom, Japan, Canada,

Australia, Norway, and member countries of the European Union from their respective "flow of funds" data.[2] Flow of funds data are national accounts that present an overview of providers and users of financial instruments in the economy. Note that due to reporting requirements the household sector is thought to also include information about hedge funds as they are not contained in any other category. To maintain compatibility of the national accounts data across countries, we use the national accounts reported using the most recent version of the United Nations System of National Accounts (2008 SNA, see United Nations, 2009) or the European System of Accounts (ESA 2010, see also Eurostat, 2013), which is broadly consistent with 2008 SNA, as appropriate. For most countries, 2008 SNA reports institutional balance sheets at book values, with loans reported at the principal amount outstanding, excluding amounts written off or written down, and corporate bonds reported on an other-than-temporary-impairment (OTTI) basis. The only exceptions in our data are Canada and Norway, which report national accounts on a market value basis.

We follow the ECB convention and define monetary financial institutions (MFIs) as credit institutions, deposit-taking corporations other than credit institutions, and money market funds. Throughout, we exclude the monetary authority or central bank from the MFI sector in the corresponding country, and remove monetary authority/central bank assets, liabilities and holdings from the financial sector aggregates in each country. "Other financial institutions" (OFIs) are then defined as non-monetary financial corporations, excluding insurance companies and pension funds.

For all the countries in our sample, the flow of funds data is available at the sectoral level for both the asset and the liability side of the balance sheet, which allows us to observe at the sectoral level who is borrowing and who is lending using which instruments. Where available (Australia and member countries of the European Union), we use the "who-to-

[2] In particular, we use data from the ECB for Austria, Belgium, Bulgaria, Cyprus, Denmark, Germany, Estonia, France, Finland, Greece, Croatia, Italy, Ireland, Latvia, Malta, Netherlands, Poland, Portugal, Romania, Spain, Slovenia, and Slovakia. From the available countries, we drop Hungary, Czech Republic and Lithuania due to bad data quality.

whom" version of national accounts, which directly measures how much funding flows from one sector of the economy to another.

Throughout, we collect data on the (financial) assets and liabilities of the users and providers of credit, defining equity to be the difference between total assets and total liabilities of the sector of interest in each country and each quarter. We consider two main types of funding for the non-financial corporate sector: loans, excluding mortgage loans, and market-traded debt instruments, excluding commercial or short-term paper. We construct the external sector holdings of non-financial sector loans and market-traded debt instruments as the difference between the liabilities of the non-financial corporate sector and the sum of holdings of the financial business and the household/non-profits sectors. We define (sub)-sector-level financial leverage as the ratio between total liabilities and total assets. Table A.1 in the Appendix summaries the country-specific definitions of credit instruments, MFIs, OFIs, and data sources we use throughout the paper.

3.2 Security-level bond market data

We follow Boyarchenko and Elias (2023) in putting together a granular data of firms' primary market issuances, secondary market quotes and firm financial information. In particular, for corporate bonds, we collect primary market (offering) pricing information from a combination of SDC Platinum New Issues database (capturing information on global corporate bonds) and Mergent FISD (capturing issuance by U. S. companies). The consolidated primary bond market dataset contains information on offering amounts and yields, as well as bond and issuer characteristics, such as issuer and parent domicile, issuer industry, currency of issuance, coupon type, rate, and payment frequency, bond seniority, and call and put provisions. The consolidated primary bond market dataset has 1,171,207 unique bond observations, corresponding to 101,171 unique issuers.

We augment the primary bond market information with secondary bond market quotes from ICE Global Bond Indices. In particular, we collect the underlying constituents at a monthly frequency from the ICE Global Corporate Index and ICE Global High Yield Corporate Index, starting at the inception of ICE indices in 1998. The underlying constituents data includes effective option-adjusted spread and duration for each bond-day, as well as bond and issuer characteristics, such as issuer domicile, issuer industry, currency of issuance, coupon type and rate, bond seniority, and call and put provisions. While the primary market pricing data from the consolidated SDC Platinum - Mergent FISD dataset provides a more accurate representation of the actual credit spreads paid by companies bringing new issuances to the corporate bond market, primary market issuance is infrequent and only captures cost of capital information for firms able to issue in a given period. Secondary market pricing information instead captures the potential cost of capital for both companies issuing new debt as well as companies unable/unwilling to issue in a given period, and thus provides complimentary information to that contained in realized offering spreads.[3] Figure A.5 in the Appendix plots the country-level average non-financial secondary bond market yield from the ICE Global Bond Indices together with the corresponding country-level S&P Investment Grade Corporate Bond Indices for a subset of the countries in our sample. The universe represented by the ICE Global Bond Indices captures the time series behavior of the S&P bond indices well and, for some countries, for a longer time span than the S&P bond indices.

For both the primary and secondary bond market spreads, we follow Gilchrist and Zakrajšek (2012) and construct bond(-date) level default-adjusted spreads. Given a market price yield on security b of firm f on date t issued in currency c with duration $d^c_{b(f),t}$, we first compute

[3] One potential concern with using the secondary market pricing from the ICE Global Bond Indices is coverage of the outstanding bonds. However, Figures A.2 and A.3 show that a substantial fraction of the offering amount from the consolidated SDC Platinum - Mergent FISD dataset appears in the two ICE Global Bond Indices we use at some point over its lifetime.

the duration-adjusted credit spread as

$$s^c_{b(f),t} = y^c_{b(f),t} - z^c_{b,d},$$

where $z^c_{b,d}$ is the yield on the duration-matched sovereign bond in the corresponding country/currency. We then estimate the component of log-duration-matched spreads that can be explained by bond and firm characteristics and firm expected default frequencies

$$\log s^c_{b(f),t} = \alpha_I + \alpha_t + \gamma \log \text{EDF}_{f,t-1} + \vec{\beta}'_{\text{bond}} X_{bond,t} + \vec{\beta}'_{\text{firm}} X_{firm,t-1} + \epsilon_{b(f),t}, \tag{7}$$

where the vector of contemporaneous bond characteristics $X_{bond,t}$ includes (log) duration, (log) coupon rate, (log) age, and dummies for bond callability and bond currency.[4] The regression also controls for a number of lagged firm characteristics $X_{firm,t-1}$ – (log) firm size (in USD), profitability, leverage, asset tangibility and market-to-book – which we obtain from Worldscope as of the fiscal year prior to the bond observation, as well as the firm-level one year expected default frequency (EDF) from Moody's KMV CreditEdge as of the month prior to the bond observation, and includes industry and year fixed effects. The default-adjusted credit spread is then the difference between the realized duration-matched spread for each bond observation and the duration-matched spread predicted from the above regression.

We estimate regression (7) at the country level for the large countries in our sample (U. S., Canada, Australia, Japan, and United Kingdom) and at a country-group level for the European countries, which have fewer corporate bond issuances (specifically, we specify three groups including core Europe, Nordic and Baltic countries, and other European countries, respectively), separately for the primary and secondary market credit spreads.[5] Tables A.3–

[4] The currency dummy controls for whether the bond is denominated in USD, local currency or other foreign (non-USD) currency with respect to the currency in the issuer's domicile.

[5] "Core Europe" are France, Germany, Belgium and the Netherlands. "Nordics/Baltics" are Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union

A.4 in the Appendix report the estimated coefficients from these regressions, and Figure A.6 plots the time series of country-average duration-matched and default-adjusted primary market bond credit spreads. The results show that, while the predictive regression (7) explains a substantive portion of the level of credit spreads across the countries in our sample, there is still significant time-series variation in the default adjusted credit spreads.

Finally, we construct the primary market and secondary market bond credit spread GIVs as the difference between the equal-weighted and amount-outstanding-weighted average default-adjusted credit spread within a country (group)-month

$$GIV_{ct}^{BM} = \sum_{b(f)} \left(\frac{FV_{b(f),t}}{\sum_{b(f)} FV_{b(f),t}} - \frac{1}{\mathcal{N}_{ct}} \right) \text{EBP}_{b(f),t} \equiv \text{EBP}_{ct}^{VW} - \text{EBP}_{ct}^{EW},$$

where $\mathcal{N}_{ct}$ is the number of bonds in each country (group) at date t, $FV_{b(f),t}$ is the amount outstanding of bond b of firm f in country c at date t, and $\text{EBP}_{b(f),t}$ is the default-adjusted spread of the same bond.[6] Figures A.8 and A.9 in the Appendix plot the distribution of the amount-outstanding weights for the primary market and secondary market GIVs, respectively, across our country groupings. For both the primary and the secondary market, there is substantial heterogeneity in the size of the bonds, with a significant right tail of the size distribution in both markets, suggesting that the GIV is a valid approach in our setting.

We formally test the validity of the GIV as an instrument for country-level primary and secondary bond market default-adjusted credit spreads by estimating the first-stage regression

$$\text{EBP}_{ct}^{VW} = \alpha_c + \beta_c GIV_{ct}^{BM} + \eta_{ct}.$$

Tables 1a and 1b report the F-statistic from the above regression for each country (group),

countries.

[6] As with the estimation of regression (7), we compute the bond market GIVs at the country level for the large countries in our sample (U. S., Canada, Australia, Japan, and United Kingdom) and at a country-group level for the European countries, which have fewer corporate bond issuances (Core Europe, Nordics/Baltics, and Other Europe).

as well as for the full set of observations, for the primary and secondary bond markets, respectively. In almost all specifications, the F-statistic is above the conventional critical value of 10 for instrument relevance, and above conventional critical values for weak instruments for the remaining specifications.

3.3 Security-level loan market data

When looking for granular data on loans to non-financial firms, the standard approach in the literature is to focus on syndicated loan market data from Dealscan (Thomson Reuters LoanConnector), SDC Platinum New Issues database or a combination of the two. There are four drawbacks to using syndicated loan market data in our setting. First, despite the global growth of the market over the last 20 years, firms domiciled in the U. S. are over-represented among syndicated loan borrowers, with the relative fraction of U. S. borrowers both in terms of the number of loans as well as dollar amount borrowed increasing the further back in time we go. Second, the non-U. S. borrowers in the syndicated loan data are either financial firms and/or do not have public financial statements as captured in Worldscope. Third, pricing information is missing (since syndicated loan filings may be private) for a large number of loans in certain countries, such as Japan and Australia. Finally, even in the U. S., only a small set of firms – even relative to those that issue corporate bonds – have access to the syndicated loan market, suggesting that the capital costs of those borrowers may not be representative of the borrowing costs of the non-financial corporate sector as a whole.

Instead, we thus collect granular loan data from the Capital IQ Debt Capital Structure dataset. The Capital IQ Debt Capital Structure dataset collects information on debt securities outstanding for each company from its accounting statements. For each security captured in the database, we observe a number of security characteristics including the security type, interest rate, currency, maturity, security seniority and amount outstanding. As described in greater detail in Appendix B.2, we retain data on term loans from annual filings

only, keeping the first observation of each term loan in the dataset. This implicitly assumes that each new loan first appears in accounting statements close to its issuance date. To the extent that fiscal year end dates may be much later than loan issuance dates within the corresponding fiscal year, such date mismatches would bias us against finding any results as the loan pricing information would be misattributed to a later date.

As with the corporate bond sample, we focus on loans issued by non-financial borrowers. Figure A.7 in the Appendix compares equal and amount-outstanding-weighted average loan interest rates from our security-level data with bank lending rates reported in the IMF's International Finance Statistics and the ECB's MFI Interest Rate Statistics. The figure shows that the country-average loan interest rates we construct from the security-level data provide a good representation of the economy-wide lending rates across a number of countries.

Since the Capital IQ Debt Capital Structure dataset does not contain information on offering yields of the securities captured in the dataset, we follow a different strategy for estimating default-adjusted credit spreads for the loan market than the procedure for the corporate bond market described above. Since the only pricing information we observe is the loan interest rate, we estimate the predicted (log) spread regression (7) for loan interest rates directly, controlling for time-to-maturity and currency and secured dummies at the loan level, and log one year EDF, (log) firm size (in USD), profitability, leverage, asset tangibility and market-to-book at the firm level.[7] We estimate regression (7) at the country level for the large countries in our sample (U. S., Canada, Australia, Japan, and United Kingdom) and at a country-group level for the European countries, which have fewer loan issuances (Core Europe, Nordics/Baltics, and Other Europe), with the coefficients reported in Appendix Table A.5.

Finally, we construct the loan interest rate GIVs as the difference between the equal-weighted

[7] As with the corporate bonds, we obtain data on (log) firm size (in USD), profitability, leverage, asset tangibility and market-to-book from Worldscope, and log one year EDFs from Moody's KMV CreditEdge. We lag both types of firm-level controls by one year relative to the fiscal period in which we (first) observe the loan.

and amount-outstanding-weighted average default-adjusted interest rate within a country (group)-month

$$GIV_{ct}^{LM} = \sum_{l(f)} \left(\frac{FV_{l(f),t}}{\sum_{l(f)} FV_{l(f),t}} - \frac{1}{\mathcal{N}_{ct}} \right) \text{ELP}_{l(f),t} \equiv \text{ELP}_{ct}^{VW} - \text{ELP}_{ct}^{EW},$$

where $\mathcal{N}_{ct}$ is the number of loans in each country (group) at date t, $FV_{l(f),t}$ is the amount outstanding of loan l of firm f in country c at date t, and $\text{ELP}_{b(f),t}$ is the default-adjusted loan interest rate of the same loan.[8] Figure A.10 in the Appendix plots the distribution of the amount-outstanding weights for the loan market GIV across our country groupings. There is substantial heterogeneity in the size of the loans, with significant right tail of the size distribution across our countries, suggesting that the GIV is a valid approach in our setting.

We formally test the validity of the GIV as an instrument for country-level loan market default-adjusted interest rates by estimating the first-stage regression

$$\text{ELP}_{ct}^{VW} = \alpha_c + \beta_c GIV_{ct}^{LM} + \eta_{ct}.$$

Table 1c reports the F-statistic from the above regression for each country (group), as well as for the full set of observations. Across all countries (groups), the F-statistic is above the conventional critical value of 10 for instrument relevance.

3.4 Macroeconomic data

We use standard data sources to construct country-level annual CPI inflation as the percent growth rate in the consumer price index. In addition to inflation, non-financial firms' bor-

[8] As with the estimation of regression (7), we compute the loan market GIV at the country level for the large countries in our sample (U. S., Canada, Australia, Japan, and United Kingdom) and at a country-group level for the European countries, which have fewer loan issuances (Core Europe, Nordics/Baltics, and Other Europe).

rowing decisions may be affected by the state of the business cycle, which we proxy using labor market conditions. We collect data on the non-accelerating inflation rate of unemployment (NAIRU) from the European Commission (for EU-member countries and the U.S.) and from the OECD (for UK, Canada, Australia, Norway and Japan). Economies whose realized rate of unemployment falls below the NAIRU are economies with tight labor markets. We compute a measure of labor market tightness, the "unemployment gap", as the difference between the rate of unemployment and NAIRU.

Finally, we follow Holston et al. (2017) and construct country-level natural rates of interest (r^*)– that is, the real short-term interest rate that would prevail absent transitory disturbances – for the countries in our sample. Briefly, the r^* estimation uses data on the real realized policy rate, real GDP (output) growth and inflation to decompose movements in the real policy rate into monetary policy stance (the distance between realized real policy rate and r^*), movements due to movements in the trend growth of natural rate of output and other trend movements in the natural rate of interest. For countries that do not belong to the Euro Area, we use policy rate data from the BIS. For Euro Area member countries, we follow Jordà et al. (2017) and use the short term money market rate from IMF's International Finance Statistics (IFS) as the corresponding country's policy rate prior to the country joining the Euro Area.[9]

The stance of monetary policy is then defined as

$$\text{Stance}_{ct} = \text{Policy rate}_{ct} - \text{CPI}_{t-4,t} - r^*_{ct}.$$

As in Grimm et al. (2022), we are interested in the impact of persistently loose monetary policy on the financing decision of non-financial corporations, rather than in single periods of undershooting. We thus construct a long-horizon stance of monetary policy as the two-year

[9] The short term money market rate is not available for Belgium, Greece, and Malta. For these countries we use the 3 month Treasury bill rate instead. Figure A.1 in the Appendix plots the time series of the range of r^* estimates across the countries in our sample.

moving average of the one period stance:

$$\text{Long-term Stance}_{ct} = \frac{1}{8}\sum_{k=0}^{8} \text{Stance}_{c,t-k}.$$

Figure 2 summarizes the historical distribution of economic conditions across the countries in our sample, focusing on the fraction of economies that are running "hot", "cold", or "neutral" according to each metric. The figure shows that there is substantial variation in economic conditions across countries for any given quarter in our data.

4 Estimation results

We now turn to the estimated supply system (2) and (4) subject to the instrumented moment restriction (6) across different sets of countries in our sample.

4.1 Credit spreads and leverage

Table 2 reports the estimated coefficients together with Newey-West standard errors for the supply system (2) and (4) for all countries (first two columns), the G7 countries (columns 3 and 4), the four biggest European Union economies ("EU4", France, Germany, Spain and Italy; columns 5 and 6), and European Union member countries outside the four biggest ones ("Other Europe"; columns 7 and 8).

Starting with the determinants of the share of bonds and loans in non-financial sector liabilities (bottom two rows), we see that the corresponding credit spread has a consistently negative and statistically significant effect across all sets of countries. That is, the non-financial sector has a smaller share of liabilities in corporate bonds when corporate credit spreads are high, and a smaller share of liabilities in loans when loan interest rates are high.

Turning to the estimated degree of substitution λ across different types of liabilities, we see that, in the full sample, bonds have a negative degree of substitution while loans have a positive degree of substitution.[10] Thus, when a greater share of bonds is held outside of the sectors covered in our data – either by other parts of the domestic economy or by non-resident institutions – bonds increase as a share of liabilities of the non-financial sector. The share of loans in the liabilities of the non-financial sector instead decreases when a greater fraction of loans outstanding is held by the external sector. These results are statistically significant and have the same sign across all country subgroups. The only exception is the estimated degree of substitution for loans in the G7 sample, which becomes negative.

The top panel of Table 2 report the estimated coefficients of the determinants of the across-sector allocations of non-financial bonds and loans. Starting with the top four rows, which report the estimated effect of leverage of each financial sector, we see that the MFIs (omitted category) hold a larger share of outstanding of both non-financial bonds and non-financial loans as their leverage increases. Comparing the estimated coefficients across different country groups, it is apparent that the discussed effect of MFI leverage on their bond share appears to be primarily driven by the behavior of MFIs in the EU4 sample, while the discussed effect of MFI leverage on their loan shares appears to be primarily driven by the behavior of MFIs in the smaller EU economies.

Turning to the household sector (which includes the hedge fund sector in national accounts) in the second row, we see that higher leverage corresponds to lower shares held of outstanding of both non-financial bonds and non-financial loans. This negative effect is consistent across country groupings and statistically significant for all except loans in the EU4 sample. To the extent that MFI leverage is procyclical and hedge fund leverage is countercyclical, the results in the first two rows of Table 2 are consistent with the traditional banking sector providing a large share of credit to non-financial firms – through both loans and bonds – as the economy expands, and some of that credit provision shifting to the hedge fund sector

[10] Recall that $-\lambda$ is the coefficient on the share of non-financial sector liabilities held by the external sector.

during downturns.

While the MFIs and the household sector seem to be trading against each other as their corresponding leverage grows, insurance companies and pension funds (third row) and other financial institutions (OFIs, fourth row) are substituting between non-financial bonds and loans as their leverage increases. Insurance companies and pension funds reduce their share of outstanding of non-financial loans and increase their share of outstanding of bonds as their leverage increases, and doing so consistently across different subsamples. The OFIs, instead, increase their share of outstanding of non-financial loans.

4.2 Macroeconomic conditions

So how do macroeconomic conditions affect sectoral allocations to non-financial credit? Starting with the business cycle, which we proxy for using the unemployment gap, we see in row five that MFIs substitute away from bonds into loans during economic downturns – when the unemployment gap is more positive. This is consistent with banks transitioning towards the more traditional business model of providing credit to the non-financial sector more predominantly through loans during economic downturns. The OFIs, which include "shadow banks", likewise substitute away from bonds into loans when the unemployment gap is larger, with the point estimates on their coefficients not statistically significantly different from the effects we observe in the MFI sector. The household sector likewise represents a higher share of loans outstanding of the non-financial corporate sector during economic downturns, while insurance companies and pension funds provide a smaller share of non-financial corporate credit overall during periods with high unemployment gap.

Turning next to the impact of inflation, in rows 9 – 11 , we see that, while the share of loans held by each financial subsector appears invariant to realized inflation, the impact on the share of bonds held varies noticeably across different samples. It is important to note,

however, that our sample ends in Q4 2019, before the post-pandemic period of high inflation, and thus does not include periods of inflation substantially above 2% for the majority of the countries.

The last four rows of the top panel of Table 2 capture the effect of the stance of policy. While effects seem muted for the MFIs, the household sector substitutes away from bonds into loans when the policy stance is more restrictive.

4.3 Robustness

One potential concern with the estimates in Table 2 are the definitions of the subsectors of the financial sector that we consider: to keep the largest possible cross-section of countries, we used the coarsest definitions available, which include the central bank/monetary authority in the MFI subsector and combine insurance companies and pension funds into a single sector. Table 3 investigates whether the estimates of supply elasticities are materially different when we use the finer gradations available for a subset of our countries.[11] Separating insurance companies and pension funds allows us to see that the effects on the shares held by the combined insurance and pension fund sector described above are primarily driven by the behavior of insurance companies over the business cycle and their own financial cycle.

Another potential concern with the estimates in Table 2 is that we measure bond market credit spreads (and instrument for bond market credit spreads) using information on yields of bonds that were actually issued. Tables A.6 and A.7 in the Appendix repeat the results of Tables 2 and 3 using secondary bond market credit spreads instead. The impact of leverage and macroeconomic conditions on sector shares is broadly consistent with the effects

[11] The UK does not separate the central bank from the rest of the monetary financial institutions sector nor insurance companies from pension funds at any point in our sample. The European Union member countries begin reporting national bank balance sheets separately from the MFI sector in the later half of our sample.

reported here, though the elasticity of the overall supply of non-financial corporate bonds has a counter-intuitive positive coefficient in some specifications.

5 Supply elasticities

While the point estimates in Table 2 provide the marginal effects of each characteristic on each sectoral share of non-financial bonds and loans, the overall effect of credit spreads, financial institutions' leverage, and macroeconomic conditions on the share of non-financial credit borrowed through different types of debt is better captured by the overall supply elasticities. Using the definition of the share of non-financial credit borrowed through debt security type l in (3), we show in Appendix A that the elasticities with respect to leverage and macroeconomic conditions can be represented as

$$\begin{aligned}\frac{1}{w_t(l)}\frac{\partial w_t(l)}{\partial x_{jt}} = (1-w_t(l))\left(\lambda_{lt}\sum_{m=1}^{N} w_t(m|\,l)\,\Theta^{(j)}_{l,m,t} - \beta_{lt}\frac{\partial y_t(l)}{\partial x_{jt}}\right)\\ - w_t(k\neq l)\left(\lambda_{kt}\sum_{m=1}^{N} w_t(m|\,k)\,\Theta^{(j)}_{k,m,t} - \beta_{kt}\frac{\partial y_t(k)}{\partial x_{jt}}\right),\end{aligned}$$

while the elasticity with respect to the credit spread of instrument j can be represented as

$$\frac{1}{w_t(l)}\frac{\partial w_t(l)}{\partial y_t(j)} = -\beta_{lt}\frac{\partial y_t(l)}{\partial y_t(j)} + \sum_{k=1,2} w_t(k)\,\beta_{kt}\frac{\partial y_t(k)}{\partial y_t(j)}.$$

Leverage and macroeconomic conditions thus affect the share of each instrument by changing the relative willingness of each financial sector to choose that instrument over other debt instruments available, with the marginal effects estimated in Table 2 first aggregated to the direct effect level

$$\left(\lambda_{lt}\sum_{m=1}^{N} w_t(m|\,l)\,\Theta^{(j)}_{l,m,t} - \beta_{lt}\frac{\partial y_t(l)}{\partial x_{jt}}\right)$$

using the shares held of instrument l by each financial sector, and then averaged across the direct and indirect effects using the relative share of instrument outstanding.

As the shares of loans and bonds in the liabilities of the non-financial sector and the shares of each type of instrument held by different financial subsectors fluctuate over time and across countries, the elasticity of supply to aggregate conditions changes even though the point estimates of the marginal effects remain constant. We investigate this supply elasticity variation using the full sample estimates in Figures 3 and 4 for non-financial corporate bonds and loans, respectively. Each panel in Figures 3 and 4 corresponds to elasticity with respect to a different variable of interest, and in each of the panels we plot the supply elasticities for the U. S., UK, and Japan, together with the median elasticity and the interquartile (p25, p75) range of elasticities across the countries in our sample.

In computing these elasticities, we make the simplifying assumption that financial subsector leverage and macroeconomic conditions have no contemporaneous effect on credit spreads. Note that the extensive literature on the role of credit markets for real outcomes focuses on the predictive relationship between current credit market spreads and future real activity outcomes, not on the reverse relationship and not on the contemporaneous relationship.

5.1 Supply elasticity of corporate bonds

Starting with the supply elasticities of the share of corporate bonds in non-financial sector liabilities, plotted in Figure 3, we see in the top row that increases in leverage in the financial sectors (MFIs, Insurance and Pension funds, and OFIs) correspond to a greater share of credit provided through bonds. On the other hand increases in leverage in the household sector correspond to lower bond shares (panel d).

Turning to the elasticities with respect to macroeconomic variables, panels e and f show that higher economic activity (more negative unemployment gap) and higher inflation correspond

to a greater share of credit provided through bonds. While the sign of the effects described thus far is consistent across time and countries, the elasticity of the supply of corporate bonds with respect to the stance of monetary policy is more nuanced. First, we see that there is significant cross-country variation in the direction of the effect. Second, even within country, the elasticity may change signs over time as evidenced by the case of the U. S..

The last two panels of Figure 3 show that the elasticities with respect to the corresponding credit spread is of the expected sign. That is, as the bond spread widens the share of bond decreases, while the opposite is true for the loan spread. Moreover, it is worth noting that the elasticity with respect to the bond spread is substantially smaller in the U. S. than in the rest of countries in the sample.

5.2 Supply elasticity of corporate loans

Turning next to the supply elasticities of the share of corporate loans in non-financial sector liabilities, plotted in Figure 4, a number of differences with respect to the results in Figure 3 are worth noting. First, while the elasticities are negative in panels a and c (implying substitution from loans to bonds as MFIs and OFIs become more levered), the same is not true for the insurance and pension fund sector. As panel b shows, the elasticity is negative for the U. S. but positive for other countries. The U. S. seems to also be a special case in terms of the elasticity with respect to leverage in the household sector as evidenced by panel d.

The elasticities with respect to the unemployment gap and inflation show similar patterns as the ones observed for bonds with the exception of the U. S. in panel e. In terms of the policy stance, there seems to be little cross-country variation (with the exception of Japan) in the elasticity of the loan supply with a more restrictive policy stance being associated with a higher share of loans.

Finally, as discussed with the bonds, the elasticities with respect to credit spreads have the expected sign. Higher bond credit spreads and lower loan credit spreads correspond to higher loan share.

6 Conclusion

We provide a first quantification of the direct link between monetary policy and vulnerabilities due to non-financial sector borrowing and the composition of non-financial sector liabilities. We use cross-country, cross-financial-sector data to overcome the empirical challenge of quantifying such interactions in an environment with slow-moving financial vulnerabilities, predictable variation in the stance of monetary policy over the business cycle, and other factors that confound identification in pure macroeconomic time series. Our paper shows that the effect of the stance of monetary policy on non-financial corporate borrowing through loans is much more stable than that on non-financial borrowing through bonds. To the extent that different economies have different shares of loans and bonds outstanding for the non-financial corporate sector, financial vulnerabilities may thus build-up differently in response to the conduct of monetary policy across different countries.

Our paper also shows that the sensitivity of the provision of credit through loans and corporate bonds to changes in the macroeconomic environment depends crucially on the composition of the financial sector. Monetary financial institutions and shadow banks primarily provide credit through loans, while insurance companies and pension funds primarily provide credit through corporate bonds. Thus, the differential sensitivities in bank and non-bank balance sheet health to prolonged periods of loose monetary policy together with cross-country heterogeneity in bank-dependence of the financial sector translate into different patterns of overall credit provision and a different share of intermediated credit over time. With continuing post-crisis expansion of corporate credit accompanied by a diminished role of banks

as both lenders in the loan market and investors in debt securities (Aldasoro and Ehlers, 2018), understanding how the systematic conduct of monetary policy affects incentives of both bank and non-bank institutions to supply credit to the non-financial sector is crucial.

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Table 1: GIV first stage F-tests. This table reports the F-statistic from the first-stage instrumental variable regressions of country-level default-adjusted credit spreads on the corresponding granular instrumental variable (GIV). "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries. "All" includes all country-groups, and the first stage specification includes group fixed effects.

(a) Offering spread, corporate bonds

	(1) US	(2) CA	(3) AU	(4) JP	(5) UK	(6) Core Europe	(7) Nordic/Baltic	(8) Other Europe	(9) All
F-statistic	56.61	80.87	36.70	1125.43	18.12	28.39	7.57	15.99	284.78
N. obs	338	315	216	319	308	296	194	239	2225

(b) Secondary market spread, corporate bonds

	(1) US	(2) CA	(3) AU	(4) JP	(5) UK	(6) Core Europe	(7) Nordic/Baltic	(8) Other Europe	(9) All
F-statistics	7.27	264.75	3.78	329.16	0.69	12.35	0.30	4.38	19.28
N. obs	455	324	315	315	324	324	312	315	2684

(c) Loan interest rate

	(1) US	(2) CA	(3) AU	(4) JP	(5) UK	(6) Core Europe	(7) Nordic/Baltic	(8) Other Europe	(9) All
F-statistic	47.19	35.10	25.53	27.10	69.71	30.67	83.12	30.21	293.77
N. obs	31	22	21	24	23	23	22	21	187

Table 2: Panel coefficient estimates. This table reports the coefficients from the estimation of supply system (2) and (4) subject to the instrumented moment restriction (6). Bond market credit spreads measured using offering spreads. Bond and loan credit spreads instrumented using corresponding granular instrumented variables. "MFIs" are monetary financial institutions including the central bank/monetary authority (omitted sector). "OFIs" are financial institutions other than MFIs, insurance companies and pension funds. "EU4" reports results using Germany, France, Italy and Spain only. "Other EU" are all other European Union countries. "Unemployment gap" measured as the difference between the country-level unemployment rate and NAIRU; "Policy stance" measured as the country-level two-year moving average of quarterly differences between the real policy rate and r^*. Inflation measured in year-over-year terms. All specifications include country and year fixed effects. Newey-West standard errors with 20 lags reported under point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

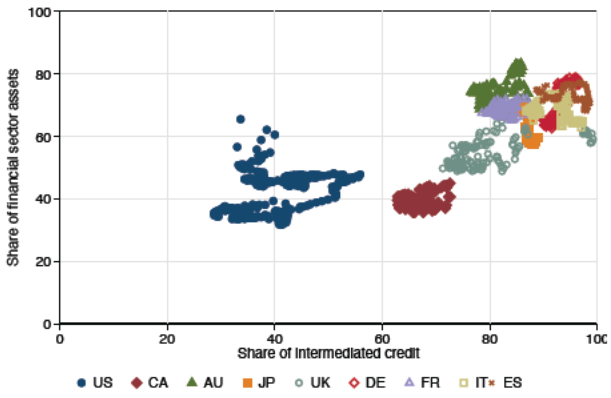
	All countries		G7		EU4		Other Europe	
	Bonds	Loans	Bonds	Loans	Bonds	Loans	Bonds	Loans
Leverage	0.54*	3.09***	0.10	-0.79	1.95***	-21.30	0.57	2.63***
	(0.30)	(0.49)	(0.50)	(0.99)	(0.49)	(34.92)	(0.55)	(0.83)
×HH/NPISH	-3.52***	-8.09***	-7.29***	-19.35***	-1.64**	-92.32	-2.91***	-7.68***
	(0.46)	(1.21)	(1.37)	(3.00)	(0.83)	(136.09)	(0.87)	(1.66)
×Insurance/PF	-0.12	-4.14***	-0.17	-3.69***	0.79**	-5.26**	-0.19	-4.65***
	(0.12)	(0.16)	(0.13)	(0.23)	(0.32)	(2.11)	(0.21)	(0.26)
×OFIs	-0.56***	-1.88***	-0.75***	-1.77***	-0.40**	-4.70	-0.51**	-1.75***
	(0.15)	(0.14)	(0.21)	(0.22)	(0.19)	(2.86)	(0.25)	(0.21)
Unemployment gap	-0.19***	0.06**	-0.19***	0.08	-0.05	-0.21	-0.18***	0.09***
	(0.03)	(0.03)	(0.07)	(0.08)	(0.03)	(0.44)	(0.05)	(0.03)
×HH/NPISH	0.20***	-0.12	0.38***	-0.00	-0.06*	0.35	0.24***	-0.21
	(0.05)	(0.10)	(0.09)	(0.14)	(0.03)	(1.39)	(0.07)	(0.13)
×Insurance/PF	0.03	-0.14**	0.18***	0.05	-0.14***	0.26	-0.01	-0.26***
	(0.05)	(0.07)	(0.07)	(0.14)	(0.05)	(0.36)	(0.05)	(0.04)
×OFIs	-0.01	-0.02	0.04	0.08	-0.08***	0.06	0.01	-0.04
	(0.05)	(0.03)	(0.08)	(0.09)	(0.02)	(0.13)	(0.08)	(0.03)
Inflation	-0.02	-0.03	-0.13***	0.06	0.22***	-0.10	0.08	-0.02
	(0.03)	(0.03)	(0.04)	(0.04)	(0.07)	(0.45)	(0.05)	(0.04)
×HH/NPISH	0.08**	0.01	0.18***	0.06	-0.25**	0.62	0.01	0.04
	(0.04)	(0.05)	(0.03)	(0.07)	(0.11)	(2.01)	(0.07)	(0.06)
×Insurance/PF	0.13***	0.01	0.21***	0.07**	-0.35***	0.12	0.00	-0.15**
	(0.03)	(0.04)	(0.02)	(0.03)	(0.13)	(0.47)	(0.06)	(0.07)
×OFIs	-0.03	0.01	0.00	0.07*	-0.19***	-0.09	-0.08	-0.03
	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)	(0.45)	(0.06)	(0.04)
Policy stance	0.04	-0.06	-0.04	0.07	0.18	0.05	0.13**	-0.10*
	(0.03)	(0.04)	(0.05)	(0.06)	(0.13)	(1.09)	(0.06)	(0.05)
×HH/NPISH	-0.15***	0.11*	-0.13**	-0.16	-0.43***	3.51	-0.22**	0.27***
	(0.04)	(0.07)	(0.07)	(0.11)	(0.13)	(6.13)	(0.09)	(0.10)
×Insurance/PF	0.03	0.30***	-0.09**	-0.09**	0.01	0.43	0.00	0.26***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.09)	(0.58)	(0.07)	(0.09)
×OFIs	-0.11***	-0.07**	-0.12**	-0.05	-0.06	-0.52	-0.16**	-0.12**
	(0.04)	(0.03)	(0.05)	(0.05)	(0.07)	(1.09)	(0.08)	(0.05)
Credit spread	-0.13***	-0.03***	-0.03***	-0.02***	-0.01*	-0.02***	-0.16***	-0.05***
	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.02)	(0.01)
Share held elsewhere	0.36***	-0.31***	0.20***	0.14***	1.73***	-0.87***	0.37***	-0.41***
	(0.02)	(0.01)	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)
N	12,744		3,764		1,550		7,594	

Table 3: Panel coefficient estimates for alternative financial sector definitions. This table reports the coefficients from the estimation of supply system (2) and (4) subject to the instrumented moment restriction (6). Bond market credit spreads measured using offering spreads. Bond and loan credit spreads instrumented using corresponding granular instrumented variables. "MFIs-ex CB" are monetary financial institutions excluding the central bank/monetary authority (omitted sector). "OFIs" are financial institutions other than MFIs, insurance companies and pension funds. "Unemployment gap" measured as the difference between the country-level unemployment rate and NAIRU; "Policy stance" measured as the country-level two-year moving average of quarterly differences between the real policy rate and r^*. Inflation measured in year-over-year terms. All specifications include country and year fixed effects. Newey-West standard errors with 20 lags reported under point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

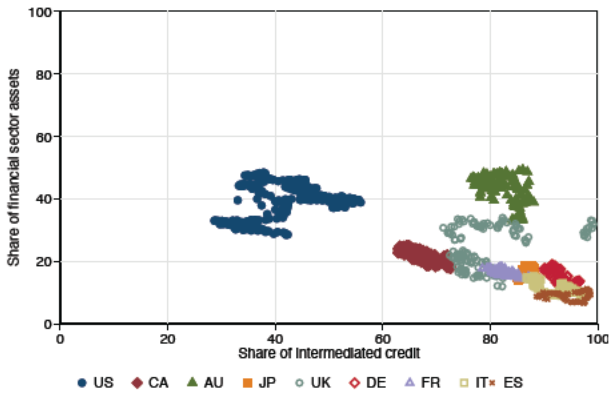
	All countries		G7	
	Bonds	Loans	Bonds	Loans
Leverage	0.16	1.60**	0.02	-3.42*
	(0.34)	(0.63)	(0.52)	(1.77)
×HH/NPISH	-3.59***	-6.43***	-5.96***	-23.44***
	(0.56)	(1.15)	(1.38)	(4.70)
×Insurance	-0.44**	-3.35***	0.01	-3.66***
	(0.18)	(0.22)	(0.19)	(0.33)
×PF	-0.32	-0.06	-0.24	-1.13***
	(0.21)	(0.34)	(0.32)	(0.37)
×OFIs	-1.02***	-4.37***	-1.28***	-4.51***
	(0.18)	(0.29)	(0.22)	(0.39)
Unemployment gap	-0.22***	-0.03	-0.18***	0.19
	(0.05)	(0.06)	(0.07)	(0.14)
×HH/NPISH	0.22***	-0.05	0.33***	-0.09
	(0.06)	(0.10)	(0.08)	(0.17)
×Insurance	0.09	-0.00	0.15**	0.10
	(0.06)	(0.07)	(0.07)	(0.18)
×PF	0.01	0.10	-0.01	-0.04
	(0.06)	(0.07)	(0.08)	(0.13)
×OFIs	-0.00	-0.16	0.09	-0.06
	(0.07)	(0.10)	(0.08)	(0.21)
Inflation	-0.11***	-0.04	-0.18***	0.14**
	(0.03)	(0.04)	(0.04)	(0.06)
×HH/NPISH	0.14***	0.02	0.18***	-0.02
	(0.04)	(0.06)	(0.03)	(0.10)
×Insurance	0.18***	0.01	0.17***	-0.01
	(0.03)	(0.03)	(0.02)	(0.03)
×PF	0.05	0.02	0.01	0.01
	(0.05)	(0.05)	(0.05)	(0.05)
×OFIs	0.20***	-0.17*	0.32***	-0.09
	(0.03)	(0.09)	(0.04)	(0.13)
Policy stance	0.02	0.10**	-0.09*	0.09
	(0.04)	(0.04)	(0.05)	(0.07)
×HH/NPISH	-0.16***	-0.02	-0.09	-0.14
	(0.05)	(0.07)	(0.06)	(0.13)
×Insurance	0.06	0.07	-0.04	-0.13**
	(0.05)	(0.05)	(0.06)	(0.06)
×PF	-0.11**	-0.32***	-0.06	-0.03
	(0.05)	(0.06)	(0.07)	(0.06)
×OFIs	0.04	0.08	-0.02	-0.12
	(0.05)	(0.07)	(0.05)	(0.17)
Credit spread	-0.15***	-0.02***	-0.03***	-0.02***
	(0.01)	(0.00)	(0.01)	(0.00)
Share held elsewhere	0.20***	-0.03***	0.16***	0.14***
	(0.02)	(0.01)	(0.02)	(0.03)
N	13,278		3,909	

Figure 1. Intermediated credit and sector prominence. This figure plots the relationship between the share of intermediated credit to the non-financial corporate sector and the relative size of financial business subsectors. Intermediated credit defined as the ratio between loans and the sum of loans and debt instruments. "MFIs" are monetary financial institutions including the monetary authority and central banks; "Shadow banks" refers to all financial institutions that are not MFIs, insurance companies or pension funds.

(a) MFIs



(b) Insurance and pension funds



(c) Shadow banks

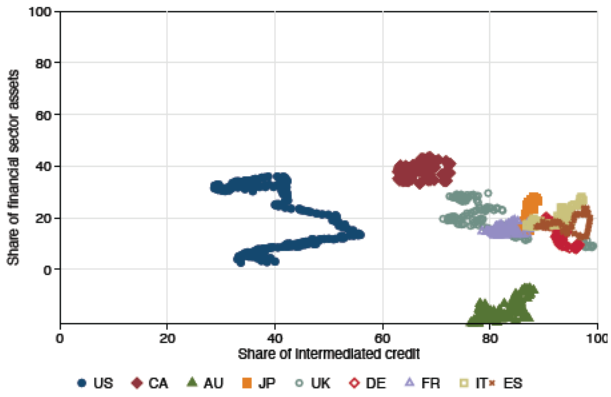


Figure 2. Cross-country economic conditions experiences. This figure plots the fraction of countries in our common, overlapping sample that experience "hot", "cold", or "normal" economic conditions, together with the number of countries in our sample.

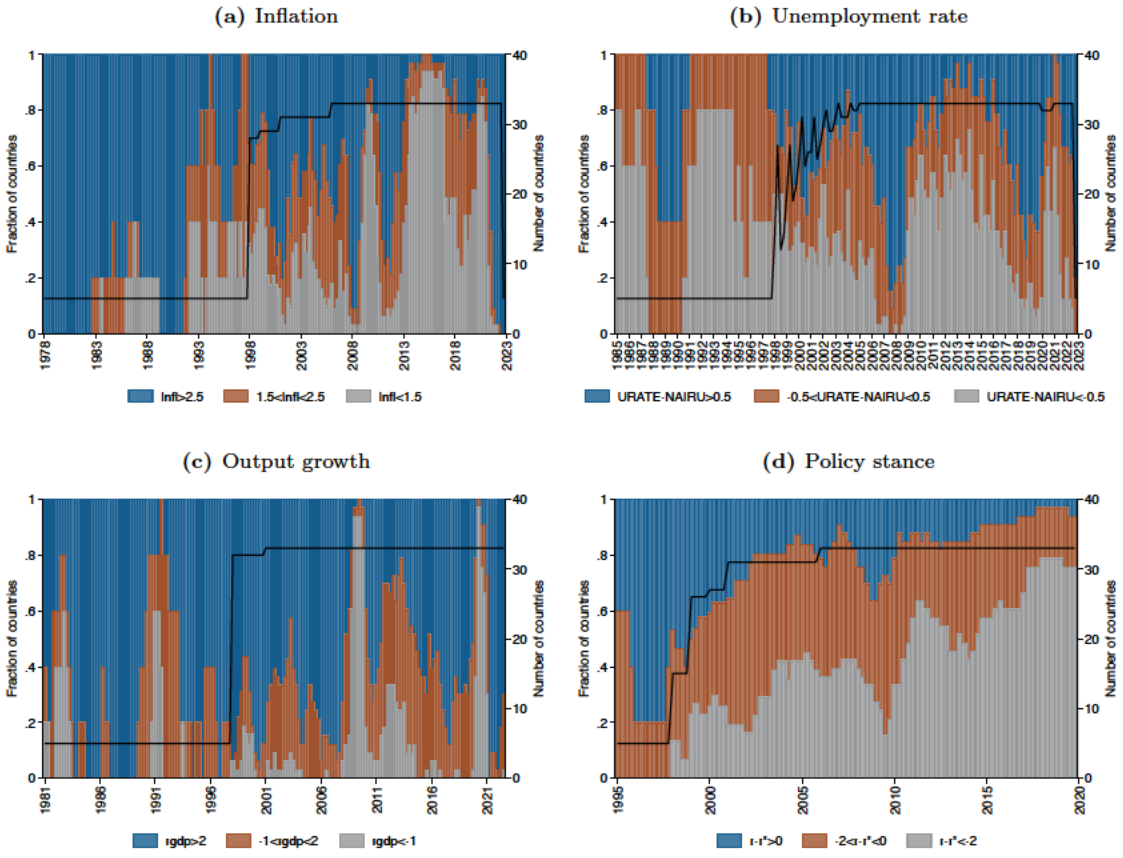


Figure 3. Bond supply elasticities. This figure plots the time series of estimated (log) elasticities of corporate bonds as a share of total liabilities of the non-financial corporate sector with respect to each aggregate characteristic."Unemployment gap" measured as the difference between the country-level unemployment rate and NAIRU; "Policy stance" measured as the country-level two-year moving average of quarterly differences between the real policy rate and r^*. Inflation measured in year-over-year terms. Grey shaded area corresponds to the (p25, p75) range of estimates across countries.

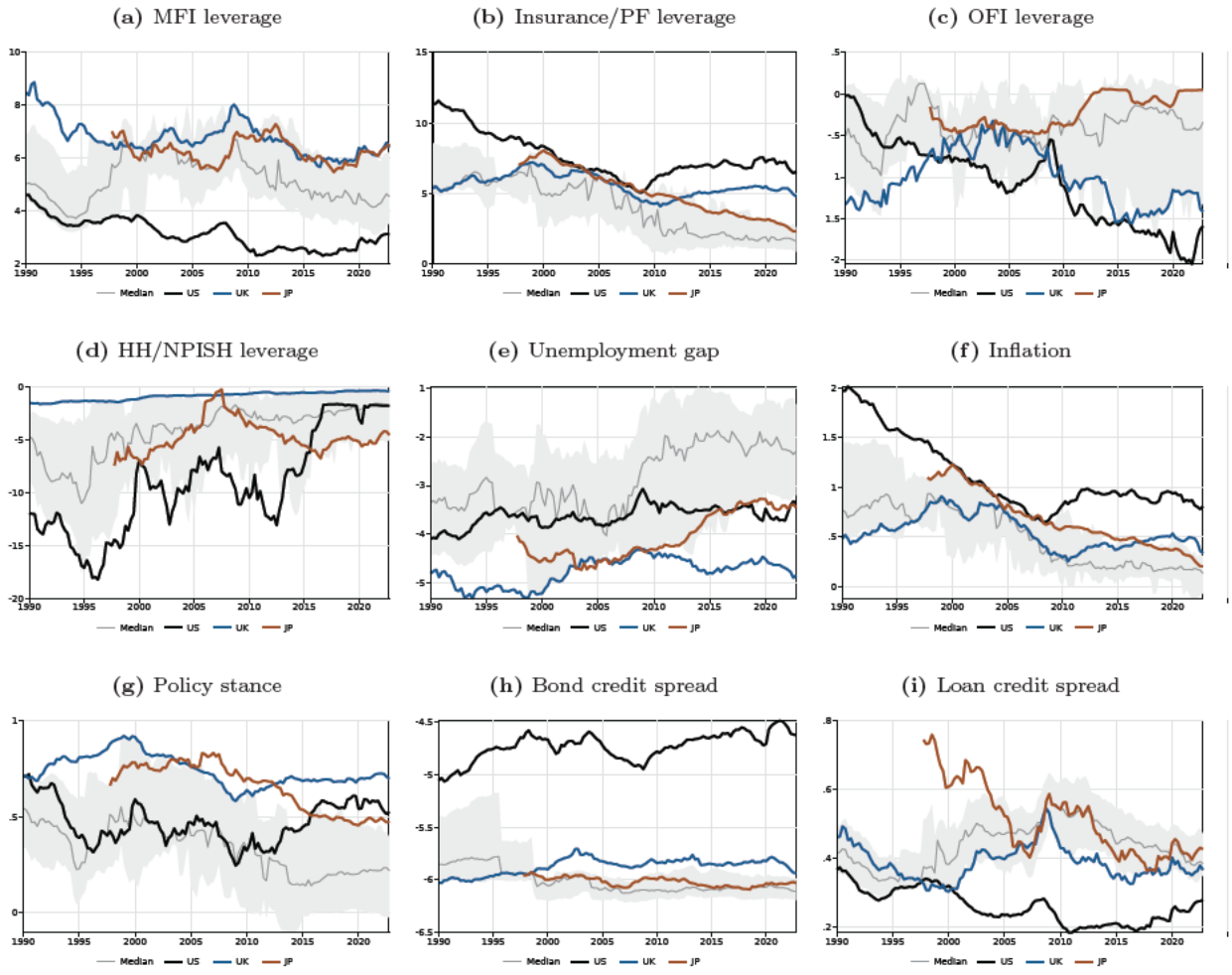
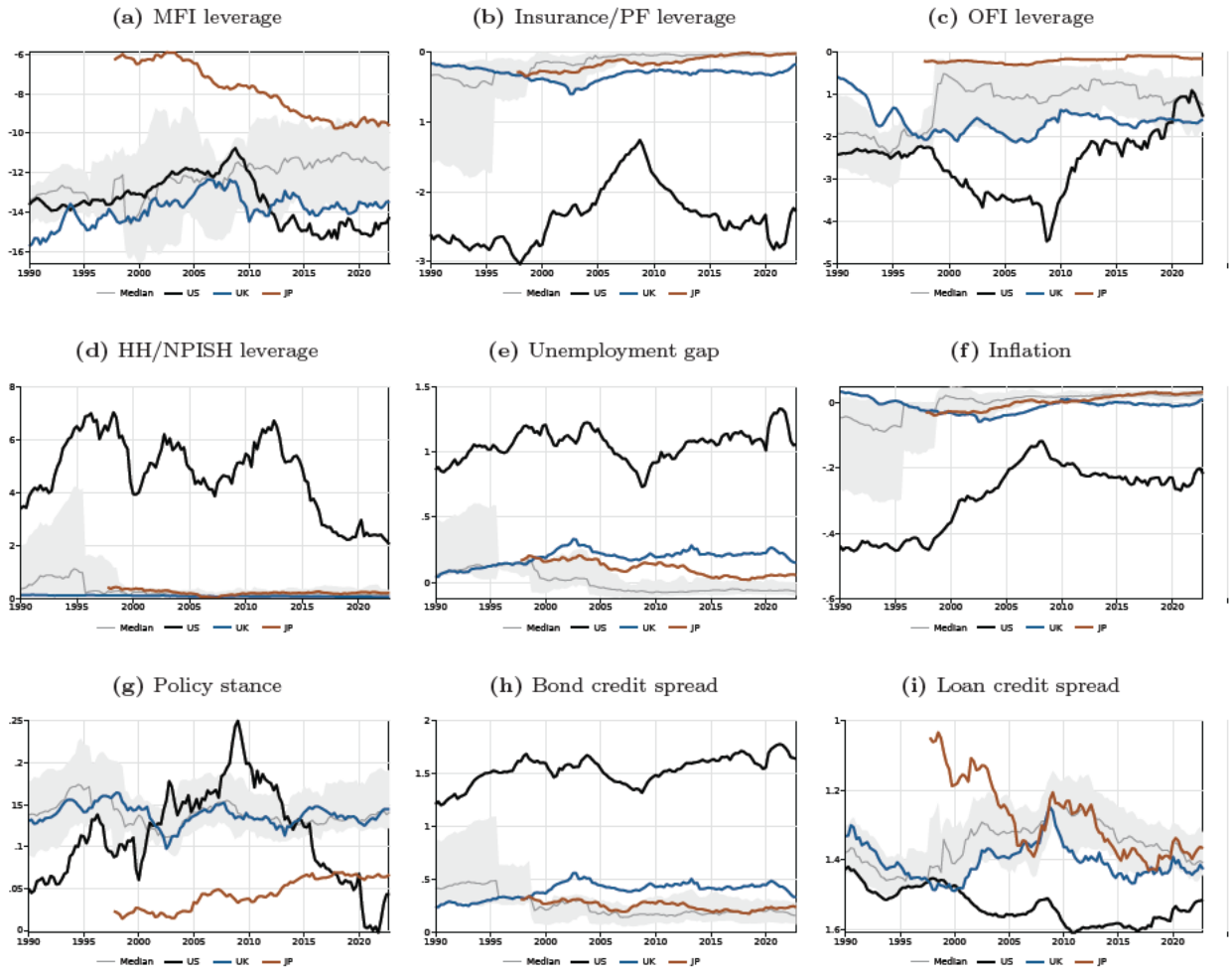


Figure 4. Loan supply elasticities. This figure plots the time series of estimated (log) elasticities of loans as a share of total liabilities of the non-financial corporate sector with respect to each aggregate characteristic."Unemployment gap" measured as the difference between the country-level unemployment rate and NAIRU; "Policy stance" measured as the country-level two-year moving average of quarterly differences between the real policy rate and r^*. Inflation measured in year-over-year terms. Grey shaded area corresponds to the (p25, p75) range of estimates across countries.



A Proofs

A.1 Computing elasticities

Recall that the share of credit demanded through instrument l can be represented as

$$w_t(l) = \frac{\left(1+\sum_{m=1}^{N}\delta_t(m,l)\right)^{\lambda_{lt}}\exp\left\{\alpha_l-\beta_{lt}y_t(l)+\xi_t(l)\right\}}{1+\sum_{k=1,2}\left(1+\sum_{m=1}^{N}\delta_t(m,k)\right)^{\lambda_{kt}}\exp\left\{\alpha_k-\beta_{kt}y_t(k)+\xi_t(k)\right\}}, \tag{A.1}$$

where

$$\delta_t(m,l) = \exp\left\{\beta_{0,l,t}+\Theta'_{l,m,t}\vec{x}_t(m)\right\}\epsilon_t(m,l).$$

We are interested in the elasticities of the shares of credit $w_t(l)$ with respect to the aggregate characteristics $\vec{x}_t$. Taking the derivative of (A.1) with respect to the j^{th} element of $\vec{x}_t$, we have

$$\begin{aligned}
\frac{1}{w_t(l)}\frac{\partial w_t(l)}{\partial x_{jt}} &= \frac{\lambda_{lt}}{\left(1+\sum_{m=1}^{N}\delta_t(m,l)\right)}\sum_{m=1}^{N}\delta_t(m,l)\,\Theta^{(j)}_{l,m,t}-\beta_{lt}\frac{\partial y_t(l)}{\partial x_{jt}} \\
&\quad-\sum_{k=1,2}\frac{\left(1+\sum_{m=1}^{N}\delta_t(m,k)\right)^{\lambda_{kt}}\exp\left\{\alpha_k-\beta_{kt}y_t(k)+\xi_t(k)\right\}}{1+\sum_{i=1,2}\left(1+\sum_{m=1}^{N}\delta_t(m,i)\right)^{\lambda_{it}}\exp\left\{\alpha_i-\beta_{it}y_t(i)+\xi_t(i)\right\}}\times \\
&\quad\times\left(\frac{\lambda_{kt}}{\left(1+\sum_{m=1}^{N}\delta_t(m,k)\right)}\sum_{m=1}^{N}\delta_t(m,k)\,\Theta^{(j)}_{k,m,t}-\beta_{kt}\frac{\partial y_t(k)}{\partial x_{jt}}\right) \\
&= \frac{\lambda_{lt}}{\left(1+\sum_{m=1}^{N}\delta_t(m,l)\right)}\sum_{m=1}^{N}\delta_t(m,l)\,\Theta^{(j)}_{l,m,t}-\beta_{lt}\frac{\partial y_t(l)}{\partial x_{jt}} \\
&\quad-\sum_{k=1,2}w_t(k)\left(\frac{\lambda_{kt}}{\left(1+\sum_{m=1}^{N}\delta_t(m,k)\right)}\sum_{m=1}^{N}\delta_t(m,k)\,\Theta^{(j)}_{k,m,t}-\beta_{kt}\frac{\partial y_t(k)}{\partial x_{jt}}\right) \\
&= \lambda_{lt}w_t(0|\,l)\sum_{m=1}^{N}\delta_t(m,l)\,\Theta^{(j)}_{l,m,t}-\beta_{lt}\frac{\partial y_t(l)}{\partial x_{jt}} \\
&\quad-\sum_{k=1,2}w_t(k)\left(\lambda_{kt}w_t(0|\,k)\sum_{m=1}^{N}\delta_t(m,k)\,\Theta^{(j)}_{k,m,t}-\beta_{kt}\frac{\partial y_t(k)}{\partial x_{jt}}\right) \\
&= \lambda_{lt}\sum_{m=1}^{N}w_t(m|\,l)\,\Theta^{(j)}_{l,m,t}-\beta_{lt}\frac{\partial y_t(l)}{\partial x_{jt}}-\sum_{k=1,2}w_t(k)\left(\lambda_{kt}\sum_{m=1}^{N}w_t(m|\,k)\,\Theta^{(j)}_{k,m,t}-\beta_{kt}\frac{\partial y_t(k)}{\partial x_{jt}}\right).
\end{aligned}$$

That is, the elasticity of the share of credit demanded through instrument l with respect to aggregate variable x_j has both a direct effect through the demand for credit instrument l by each of the financial subsectors but also an indirect effect through the demand for the other credit instrument $k \neq l$.

Similarly, we can compute the elasticities of the shares of credit $w_t(l)$ with respect to credit spread in security j as

$$\frac{1}{w_t(l)}\frac{\partial w_t(l)}{\partial y_t(j)} = -\beta_{lt}\frac{\partial y_t(l)}{\partial y_t(j)} + \sum_{k=1,2} w_t(k)\,\beta_{kt}\frac{\partial y_t(k)}{\partial y_t(j)}.$$

B Data appendix

B.1 Zero-coupon reference rate curves

We construct zero-coupon reference rate curves for a broad set of countries. For the UK, Canada, Switzerland, Germany, France, Italy, Spain, Greece and Japan we collect individual sovereign bond prices from Datastream. We supplement this data by collecting government yield curve data from ICE Indices for the Netherlands, Belgium, Poland, Slovakia, Denmark, Sweden, Norway, and Australia. ICE provides government yield curve data on a semi-annual compounding basis for maturities up to 30 years. We estimate the Svensson (1994) extension of the Nelson and Siegel (1987) (NSS) model for each country by minimizing yield curve fitting errors for the available daily secondary market prices/quotes. Finally, we use the Gürkaynak et al. (2007) NSS parameter estimates for the U. S., and the NSS curve estimates for non-AAA rated sovereign bonds from the ECB for the European Union countries for which we don't have individual sovereign yield curves.

B.2 Data on loans to non-financial corporates

We collect data on loans to non-financial firms from the Capital IQ Debt Capital Structure dataset. The Capital IQ Debt Capital Structure dataset collects information on individual debt securities outstanding for each company from accounting statements. For each security captured in the Capital IQ Debt Capital Structure dataset, we observe a number of security characteristics including the security type, interest rate, currency, maturity, security seniority, and amount outstanding, as well as the Capital IQ company ID. Each debt security appears in the dataset in each accounting statement filed over its lifetime (including those for the fiscal period immediately after its maturity, with the security reported as having 0 amount outstanding). Since we are interested in the cost of new debt of non-financial firms, rather than the coupon payments made on that debt over the lifetime of the debt security, we keep the first fiscal period observation of each debt security only. Keeping only the first fiscal period for each debt security proxies for the interest rate charged on that security at

issuance, with the implicit assumption that the security first appears in accounting statements close to its issuance date. Loans that first appear in filings much later than their issuance date would bias results against us, as their pricing would appear too late in our sample. Figure A.4 shows the implied distribution of offering time-to-maturity.

After excluding undrawn facilities and securities with negative amount outstanding, we apply a number of filters to the Capital IQ Debt Capital Structure dataset, summarized in Table A.2.

1. **Filing type.** We focus on annual filings, as most firms in our sample only file annually (106,984 firms relative to 68,602 filing quarterly). From these, we exclude press release and no-change-from-original restatements. We then keep the latest filing for each fiscal period.
2. **With balance sheet information.** We match companies in the Capital IQ Debt Capital Structure dataset to companies in Worldscope using the Capital IQ identifiers dataset (which maps security-level ISINs to Capital IQ company IDs).
3. **Issuer type.** We exclude debt securities issued by financial firms (banks, insurance companies and other financials).
4. **Security type.** We retain senior fixed-rate term loans only, excluding securitized loans.
5. **Key information.** We retain securities with non-missing interest rate and maturity date information only.

B.3 Duration-matched spreads

To construct our country-level corporate bond primary and secondary market indices and loan interest rate indices, we follow Gilchrist and Zakrajšek (2012) and compute security-level duration-adjusted spreads in the primary markets and security-date level duration adjusted spreads for the secondary corporate bond market indices. More specifically, given a market price yield on security b of firm f on date t issued in currency c with duration $d^c_{b(f),t}$, the duration-adjusted credit spread is given by

$$s^c_{b(f),t} = y^c_{b(f),t} - z^c_{b,d}, \tag{A.2}$$

where $z^c_{b,d}$ is the yield on the duration-matched sovereign bond in the corresponding country/currency. Some discussion of how to apply the duration-adjusted spread calculation in (A.2) is necessary.

First, in both the primary and secondary corporate bond markets, we have bond observations for which the currency of the bond is not the same as the currency of the issuer's country (for example, Japanese firms issuing in EUR). In such cases, we use the sovereign zero coupon

yield curve corresponding to the *currency* of the issuance, rather than the country of the issuer. Second, given the heterogeneity of sovereign risks across countries in the Eurozone, to the extent available, we use country-level EUR sovereign zero coupon yield curves for issuers in European countries. For issuers from countries outside of Europe issuing in EUR, we use the zero coupon yield curve constructed based on German sovereign bonds.

Table A.1: Summary of balance sheet data sources.

Country	Debt securities	Loans	MFIs	OFIs	Source
United States	Corporate bonds[a]	Depository institution loans + Other loans and advances[b]	Private Depository Institutions + Money market mutual funds + Security brokers and dealers + Holding Companies	Domestic financial – Monetary authority – MFIs – Insurance companies – Pension funds – RoW	Flow of Funds of the US
Canada	Other Canadian bonds and debentures	Non–mortgage loans + corporate claims: loans and advances	Total chartered banks and quasi–banks + Money market mutual funds + Security and derivative dealers	Financial corporations – Total monetary authorities – MFIs – Insurance and pensions funds	Statistics Canada
United Kingdom	Debt securities	Loans	Monetary financial institutions including Bank of England	Other financial intermediaries and financial auxiliaries	Office for National Statistics
Australia	Bonds, etc. issued in Australia + Bonds, etc. issued offshore	Short term loans and placements + long term loans and placements	Banks/Authorized deposit taking institutions + Other depository corporations/other broad money institutions + Money market financial investment funds	Financial corporations – Central bank – MFIs – Insurance corporations – Pension funds	Australian Bureau of Statistics
Japan	Industrial securities + External securities issued by residents	Loans by private financial institutions + loans by public financial institutions + loans by the non–financial sector[c]	Depository corporations + MMF and MRF bond investment trusts + Financial dealers and brokers + Financial holding companies	All financial institutions – Central bank – MFIs – Insurance and pension funds	Bank of Japan

Continued on next page

Table A.1 – *Continued from previous page*

Country	**Debt securities**	**Loans**	**MFIs**	**OFIs**	**Source**
Norway	Debt securities	Loans	Monetary financial institutions ex Central bank + Banks and mortgage companies + Money market funds	Financial corporations – MFIs – Insurance corporations and pension funds	Statistisk Sentralbyra
EU countries	Debt securities	Loans	Monetary financial institutions other than central bank	Financial corporations other than MFIs, insurance corporations and pension funds	Eurostat

[a] "Corporate and foreign bonds" on asset side. We impute the fraction of bonds held represented by bonds issued by non-financial corporations using the economy-wide non-financial corporate bond outstanding as a fraction of total corporate and foreign bonds in the U.S.

[b] We impute the fraction of loans held that were issued by U.S. non-financial corporations using the economy-wide non-financial loans outstanding as a fraction of total loans outstanding in the U.S.

[c] "Loans to companies and governments" on the asset side.

Table A.2: Data cleaning for Capital IQ Debt Capital Structure dataset. This table reports number of unique securities and issuers, together with the median size of the securities (in USD million) as each filter is sequentially applied to the Capital IQ Debt Capital Structure dataset.

Sample	N. issuers	N. securities	Median size
Full sample	115,316	5,873,399	8.34
Annual filings	106,984	4,197,812	6.58
Not press releases/no-change restatements	106,864	4,148,102	6.73
Latest filing per fiscal period	106,861	4,147,289	5.16
Matched to Worldscope	66,956	2,693,087	3.96
Non-financial issuers	57,914	2,233,693	2.87
Senior, non-securitized term loans	51,187	1,144,480	3.06
With non-missing interest rate and maturity	34,709	413,510	3.17
First observation per security	34,709	413,510	3.22

Table A.3: Offering bond market default-adjusted spreads. This table reports the estimated coefficients from the regression of log duration-matched offering bond market spreads on firm characteristics and log one year expected default frequencies from Moody's KMV CreditEdge. "Currency" is a dummy for bond offerings denominated in USD (omitted category), local currency, or other foreign (non-USD) currency. "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries. All specifications include industry (2-D SIC code) and year fixed effects. Standard errors clustered at the issuer-quarter level reported under point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	(1) US	(2) CA	(3) AU	(4) JP	(5) UK	(6) Core Europe	(7) Nordic/Baltic	(8) Other Europe
Constant	-3.12	-3.61	-1.76	-3.57	-3.74	-1.67	-1.45	-2.79
	(0.15)***	(0.63)***	(0.68)**	(0.35)***	(0.53)***	(0.36)***	(0.61)**	(0.53)***
Log 1 yr EDF	0.10	0.06	0.06	0.13	0.12	0.12	0.08	0.03
	(0.00)***	(0.01)***	(0.02)***	(0.01)***	(0.01)***	(0.01)***	(0.02)***	(0.02)*
Log duration	-0.05	-0.08	-0.19	-0.26	0.07	-0.11	-0.18	-0.25
	(0.01)***	(0.03)***	(0.06)***	(0.04)***	(0.04)*	(0.03)***	(0.05)***	(0.05)***
Log coupon rate	1.09	1.16	0.64	0.44	0.74	0.63	0.57	1.06
	(0.02)***	(0.12)***	(0.14)***	(0.03)***	(0.04)***	(0.02)***	(0.03)***	(0.06)***
Callable=1	0.24	0.12	0.14	0.42	0.21	0.14	0.24	0.28
	(0.01)***	(0.02)***	(0.04)***	(0.11)***	(0.03)***	(0.03)***	(0.04)***	(0.04)***
Log firm size	-0.12	-0.08	-0.13	-0.06	-0.07	-0.12	-0.13	-0.10
	(0.01)***	(0.02)***	(0.03)***	(0.01)***	(0.02)***	(0.01)***	(0.03)***	(0.02)***
Profitability	-0.04	-0.57	0.10	-0.57	0.09	-1.03	-1.67	-0.68
	(0.07)	(0.23)**	(0.30)	(0.37)	(0.37)	(0.41)**	(0.65)**	(0.44)
Leverage	0.19	-0.04	0.48	0.65	0.37	0.09	0.23	-0.21
	(0.03)***	(0.09)	(0.34)	(0.09)***	(0.16)**	(0.11)	(0.20)	(0.16)
Asset tangibility	-0.25	-0.03	0.00	-0.20	0.17	-0.14	0.50	0.15
	(0.03)***	(0.07)	(0.16)	(0.10)*	(0.12)	(0.10)	(0.19)***	(0.16)
M/B	-0.01	0.01	0.01	-0.01	0.06	0.11	-0.05	0.06
	(0.01)*	(0.04)	(0.06)	(0.04)	(0.04)	(0.04)***	(0.06)	(0.05)
Currency:								
Local		-0.10	-0.25	0.01	-0.01	0.08	-0.09	-0.02
		(0.02)***	(0.05)***	(0.13)	(0.04)	(0.03)**	(0.08)	(0.04)
Foreign, non-USD	0.73	0.23	0.12	0.27	0.30	0.04	0.09	0.48
	(0.03)***	(0.08)***	(0.07)	(0.18)	(0.04)***	(0.05)	(0.06)	(0.08)***
Adj. R^2	0.78	0.80	0.76	0.60	0.69	0.67	0.73	0.63
N. obs	26132	2302	759	7436	2036	3425	674	1216
N. clust	13078	1569	448	4389	1112	2096	503	861

Table A.4: Secondary bond market default-adjusted spreads. This table reports the estimated coefficients from the regression of log duration-matched secondary bond market spreads on firm characteristics and log one year expected default frequencies from Moody's KMV CreditEdge. "Currency" is a dummy for bond offerings denominated in USD (omitted category), local currency, or other foreign (non-USD) currency. "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries. All specifications include industry (2-D SIC code) and year fixed effects. Standard errors clustered at the issuer-quarter level reported under point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	(1) US	(2) CA	(3) AU	(4) JP	(5) UK	(6) Core Europe	(7) Nordic/Baltic	(8) Other Europe
Constant	-0.89	-0.55	-2.43	-3.68	-2.41	-0.69	-1.44	1.73
	(0.08)***	(0.37)	(0.33)***	(0.52)***	(0.28)***	(0.29)**	(0.68)**	(0.50)***
Log 1 yr EDF	0.23	0.17	0.13	0.26	0.22	0.22	0.19	0.15
	(0.00)***	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.00)***	(0.01)***	(0.01)***
Log duration	0.23	0.25	0.14	0.15	0.30	0.24	0.29	0.15
	(0.00)***	(0.00)***	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.01)***
Log coupon rate	0.69	0.75	0.55	0.04	0.26	0.25	0.21	0.45
	(0.01)***	(0.01)***	(0.02)***	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.02)***
Log age	-0.01	-0.04	-0.08	-0.03	-0.01	-0.02	0.04	-0.02
	(0.00)***	(0.00)***	(0.01)***	(0.00)***	(0.00)***	(0.00)***	(0.01)***	(0.01)**
Callable=1	0.10	0.06	0.34	0.24	0.04	0.15	0.12	0.50
	(0.00)***	(0.01)***	(0.02)***	(0.03)***	(0.01)***	(0.01)***	(0.02)***	(0.03)***
Log firm size	-0.19	-0.20	-0.14	-0.03	-0.10	-0.16	-0.14	-0.27
	(0.00)***	(0.02)***	(0.01)***	(0.02)	(0.01)***	(0.01)***	(0.03)***	(0.02)***
Profitability	-0.50	-1.62	-0.25	-0.02	-1.42	-1.28	-1.74	-1.16
	(0.04)***	(0.16)***	(0.16)	(0.45)	(0.20)***	(0.21)***	(0.46)***	(0.41)***
Leverage	0.32	-0.06	1.19	0.09	0.99	-0.04	0.19	-0.12
	(0.01)***	(0.08)	(0.15)***	(0.11)	(0.08)***	(0.06)	(0.15)	(0.13)
Asset tangibility	-0.19	0.52	0.22	0.20	0.10	-0.26	0.49	-0.28
	(0.01)***	(0.06)***	(0.10)**	(0.12)*	(0.06)*	(0.07)***	(0.19)***	(0.11)***
M/B	-0.03	-0.28	-0.02	-0.07	0.02	0.19	0.06	-0.11
	(0.00)***	(0.04)***	(0.02)	(0.05)	(0.03)	(0.03)***	(0.05)	(0.05)**
Other	0.50	-0.07	0.13	0.24	0.04	0.09	-0.13	0.48
	(0.01)***	(0.03)**	(0.03)***	(0.03)***	(0.01)***	(0.02)***	(0.03)***	(0.03)***
Local	0.00	-0.11	-0.04	-1.12	-0.03	-0.11	-0.33	-0.56
	(.)	(0.01)***	(0.02)*	(0.02)***	(0.01)***	(0.01)***	(0.03)***	(0.03)***
Adj. R^2	0.70	0.69	0.74	0.70	0.67	0.59	0.65	0.61
N. obs	995566	104903	13546	65802	68810	109268	18748	32784
N. clust	94374	9112	2016	6310	9855	12290	2409	5469

Table A.5: Loan default-adjusted spreads. This table reports the estimated coefficients from the regression of log duration-matched loan interest rate spreads on firm characteristics and log one year expected default frequencies from Moody's KMV CreditEdge. "Currency" is a dummy for bond offerings denominated in USD (omitted category), local currency, or other foreign (non-USD) currency. "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries. All specifications include industry (2-D SIC code) and year fixed effects. Standard errors clustered at the issuer-quarter level reported under point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	(1) US	(2) CA	(3) AU	(4) JP	(5) UK	(6) Core Europe	(7) Nordic/Baltic	(8) Other Europe
Constant	-2.62	-1.63	-1.76	-4.32	-2.11	-2.95	-2.81	-2.56
	(0.11)***	(0.25)***	(0.25)***	(0.17)***	(0.23)***	(0.22)***	(0.26)***	(0.43)***
Log 1 yr EDF	0.07	0.01	0.01	0.02	0.02	0.02	0.04	0.08
	(0.01)***	(0.01)	(0.01)	(0.01)***	(0.01)	(0.01)**	(0.01)***	(0.01)***
Log time-to-maturity	0.01	-0.04	-0.06	0.11	-0.05	-0.04	-0.04	-0.09
	(0.01)	(0.02)**	(0.02)***	(0.01)***	(0.02)***	(0.01)***	(0.02)*	(0.02)***
Secured	0.11	0.08	0.04	0.21	0.11	0.02	-0.07	0.08
	(0.02)***	(0.03)**	(0.04)	(0.02)***	(0.04)***	(0.02)	(0.04)**	(0.03)**
Unsecured	-0.16	0.10	0.03	0.32	0.06	-0.03	0.13	0.05
	(0.03)***	(0.06)*	(0.05)	(0.04)***	(0.04)*	(0.05)	(0.07)*	(0.06)
Log firm size	-0.02	-0.07	-0.06	0.01	-0.03	-0.01	-0.02	-0.04
	(0.01)***	(0.01)***	(0.01)***	(0.01)**	(0.01)***	(0.01)	(0.01)	(0.02)*
Profitability	-0.14	-0.16	-0.12	-1.09	-0.60	-0.71	-0.70	-0.03
	(0.03)***	(0.04)***	(0.06)*	(0.16)***	(0.12)***	(0.17)***	(0.14)***	(0.29)
Leverage	-0.00	-0.11	0.07	0.13	0.08	0.29	0.07	0.25
	(0.03)	(0.07)	(0.09)	(0.06)**	(0.10)	(0.11)**	(0.12)	(0.16)
Asset tangibility	-0.03	0.19	0.16	-0.47	0.05	0.05	0.08	0.15
	(0.04)	(0.07)***	(0.06)**	(0.06)***	(0.08)	(0.09)	(0.11)	(0.12)
M/B	0.01	-0.02	-0.01	0.04	-0.04	-0.00	0.06	0.12
	(0.00)***	(0.01)	(0.01)	(0.02)**	(0.02)	(0.03)	(0.02)***	(0.04)***
Net leverage	-0.00	0.00	-0.01	-0.00	-0.01	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)*	(0.00)**	(0.00)*	(0.00)	(0.00)	(0.00)
Currency:								
Local		0.03	0.21	-0.35	-0.05	-0.11	0.02	-0.15
		(0.03)	(0.06)***	(0.10)***	(0.04)	(0.05)**	(0.04)	(0.06)**
Foreign, non-USD	-0.08	-0.10	0.00	0.34	-0.21	0.08	0.07	0.05
	(0.03)**	(0.06)*	(0.12)	(0.17)**	(0.06)***	(0.09)	(0.04)	(0.07)
Adj. R^2	0.30	0.19	0.25	0.33	0.26	0.34	0.25	0.28
N. obs	20791	5418	3157	37169	3605	7704	3620	8978
N. clust	4084	1038	839	3951	851	839	481	827

Table A.6: Panel coefficient estimates with secondary market bond spreads. This table reports the coefficients from the estimation of supply system (2) and (4) subject to the moment restriction (5). Bond market credit spreads measured using secondary market spreads. "MFIs" are monetary financial institutions including the central bank/monetary authority (omitted category). "OFIs" are financial institutions other than MFIs, insurance companies and pension funds. "EU4" reports results using Germany, France, Italy and Spain only. "Other EU" are all other European Union countries. "Unemployment gap" measured as the difference between the country-level unemployment rate and NAIRU; "Policy stance" measured as the country-level two-year moving average of quarterly differences between the real policy rate and r^*. Inflation measured in year-over-year terms. All specifications include country and year fixed effects. Newey-West standard errors with 20 lags reported under point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	All countries		G7		EU4		Other Europe	
	Bonds	Loans	Bonds	Loans	Bonds	Loans	Bonds	Loans
Leverage	0.54*	3.09***	0.1	-0.79	1.95***	-21.30	0.57	2.63***
	(0.30)	(0.49)	(0.50)	(0.99)	(0.49)	(34.92)	(0.55)	(0.83)
×HH/NPISH	-3.52***	-8.09***	-7.29***	-19.35***	-1.64**	-92.32	-2.91***	-7.68***
	(0.46)	(1.21)	(1.37)	(3.00)	(0.83)	(136.11)	(0.87)	(1.66)
×Insurance/PF	-0.12	-4.14***	-0.17	-3.69***	0.79**	-5.26**	-0.19	-4.65***
	(0.12)	(0.16)	(0.13)	(0.23)	(0.32)	(2.11)	(0.21)	(0.26)
×OFIs	-0.56***	-1.88***	-0.75***	-1.77***	-0.40**	-4.70	-0.51**	-1.75***
	(0.15)	(0.14)	(0.21)	(0.22)	(0.19)	(2.86)	(0.25)	(0.21)
Unemployment gap	-0.19***	0.06**	-0.19***	0.08	-0.05	-0.21	-0.18***	0.09***
	(0.03)	(0.03)	(0.07)	(0.08)	(0.03)	(0.44)	(0.05)	(0.03)
×HH/NPISH	0.20***	-0.12	0.38***	-0.00	-0.06*	0.35	0.24***	-0.21
	(0.05)	(0.10)	(0.09)	(0.14)	(0.03)	(1.39)	(0.07)	(0.13)
×Insurance/PF	0.03	-0.14**	0.18***	0.05	-0.14***	0.26	-0.01	-0.26***
	(0.05)	(0.07)	(0.07)	(0.14)	(0.05)	(0.36)	(0.05)	(0.04)
×OFIs	-0.01	-0.02	0.04	0.08	-0.08***	0.06	0.01	-0.04
	(0.05)	(0.03)	(0.08)	(0.09)	(0.02)	(0.13)	(0.08)	(0.03)
Inflation	-0.02	-0.03	-0.13***	0.06	0.22***	-0.10	0.08	-0.02
	(0.03)	(0.03)	(0.04)	(0.04)	(0.07)	(0.45)	(0.05)	(0.04)
×HH/NPISH	0.08**	0.01	0.18***	0.06	-0.25**	0.62	0.01	0.04
	(0.04)	(0.05)	(0.03)	(0.07)	(0.11)	(2.01)	(0.07)	(0.06)
×Insurance/PF	0.13***	0.01	0.21***	0.07**	-0.35***	0.12	0.00	-0.15**
	(0.03)	(0.04)	(0.02)	(0.03)	(0.13)	(0.47)	(0.06)	(0.07)
×OFIs	-0.03	0.01	0.00	0.07*	-0.19***	-0.09	-0.08	-0.03
	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)	(0.45)	(0.06)	(0.04)
Policy stance	0.04	-0.06	-0.04	0.07	0.18	0.05	0.13**	-0.10*
	(0.03)	(0.04)	(0.05)	(0.06)	(0.13)	(1.09)	(0.06)	(0.05)
×HH/NPISH	-0.15***	0.11*	-0.13**	-0.16	-0.43***	3.51	-0.22**	0.27***
	(0.04)	(0.07)	(0.07)	(0.11)	(0.13)	(6.13)	(0.09)	(0.10)
×Insurance/PF	0.03	0.30***	-0.09**	-0.09**	0.01	0.43	0.00	0.26***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.09)	(0.58)	(0.07)	(0.09)
×OFIs	-0.11***	-0.07**	-0.12**	-0.05	-0.06	-0.52	-0.16**	-0.12**
	(0.04)	(0.03)	(0.05)	(0.05)	(0.07)	(1.09)	(0.08)	(0.05)
Credit spread	-1.29	-0.03***	0.04**	-0.02***	0.09**	-0.02***	0.02	-0.05***
	(0.95)	(0.00)	(0.02)	(0.00)	(0.04)	(0.00)	(0.05)	(0.01)
Share held elsewhere	0.41***	-0.31***	0.22***	0.14***	1.61***	-0.87***	0.34***	-0.41***
	(0.07)	(0.01)	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)
N	12,790		3,760		1,558		7,614	

Table A.7: Panel coefficient estimates with secondary market bond spreads for alternative financial sector definitions. This table reports the coefficients from the estimation of supply system (2) and (4) subject to the moment restriction (5). Bond market credit spreads measured using secondary market spreads. "MFIs-ex CB" are monetary financial institutions excluding the central bank/monetary authority (omitted category). "OFIs" are financial institutions other than MFIs, insurance companies and pension funds. "Unemployment gap" measured as the difference between the country-level unemployment rate and NAIRU; "Policy stance" measured as the country-level two-year moving average of quarterly differences between the real policy rate and r^*. Inflation measured in year-over-year terms. All specifications include country and year fixed effects. Newey-West standard errors with 20 lags reported under point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	All countries		G7	
	Bonds	Loans	Bonds	Loans
Leverage	0.16	1.60**	0.02	-3.42*
	(0.34)	(0.63)	(0.52)	(1.77)
×HH/NPISH	-3.59***	-6.43***	-5.96***	-23.44***
	(0.56)	(1.15)	(1.38)	(4.70)
×Insurance	-0.44**	-3.35***	0.01	-3.66***
	(0.18)	(0.22)	(0.19)	(0.33)
×PF	-1.02***	-4.37***	-1.28***	-4.51***
	(0.18)	(0.29)	(0.22)	(0.39)
×OFIs	-0.32	-0.06	-0.24	-1.13***
	(0.21)	(0.34)	(0.32)	(0.37)
Unemployment gap	-0.22***	-0.03	-0.18***	0.19
	(0.05)	(0.06)	(0.07)	(0.14)
×HH/NPISH	0.22***	-0.05	0.33***	-0.09
	(0.06)	(0.10)	(0.08)	(0.17)
×Insurance	0.09	-0.00	0.15**	0.10
	(0.06)	(0.07)	(0.07)	(0.18)
×PF	-0.00	-0.16	0.09	-0.06
	(0.07)	(0.10)	(0.08)	(0.21)
×OFIs	0.01	0.10	-0.01	-0.04
	(0.06)	(0.07)	(0.08)	(0.13)
Inflation	-0.11***	-0.04	-0.18***	0.14**
	(0.03)	(0.04)	(0.04)	(0.06)
×HH/NPISH	0.14***	0.02	0.18***	-0.02
	(0.04)	(0.06)	(0.03)	(0.10)
×Insurance	0.18***	0.01	0.17***	-0.01
	(0.03)	(0.03)	(0.02)	(0.03)
×PF	0.20***	-0.17*	0.32***	-0.09
	(0.03)	(0.09)	(0.04)	(0.13)
×OFIs	0.05	0.02	0.01	0.01
	(0.05)	(0.05)	(0.05)	(0.05)
Policy stance	0.02	0.10**	-0.09*	0.09
	(0.04)	(0.04)	(0.05)	(0.07)
×HH/NPISH	-0.16***	-0.02	-0.09	-0.14
	(0.05)	(0.07)	(0.06)	(0.13)
×Insurance	0.06	0.07	-0.04	-0.13**
	(0.05)	(0.05)	(0.06)	(0.06)
×PF	0.04	0.08	-0.02	-0.12
	(0.05)	(0.07)	(0.05)	(0.17)
×OFIs	-0.11**	-0.32***	-0.06	-0.03
	(0.05)	(0.06)	(0.07)	(0.06)
Credit spread	-0.34*	-0.02***	0.06***	-0.02***
	(0.18)	(0.00)	(0.02)	(0.00)
Share held elsewhere	0.20***	-0.03***	0.17***	0.14***
	(0.02)	(0.01)	(0.02)	(0.03)
N	13,314		3,905	

Figure A.1. $r*$ estimates. This figure plots the distribution of $r*$ estimates across countries in our sample. Shaded blue area corresponds to the cross-country estimate interquartile range. Where available, the full list of countries includes: U.S., Canada, UK, Norway, Japan, Australia, and members of the European Union.

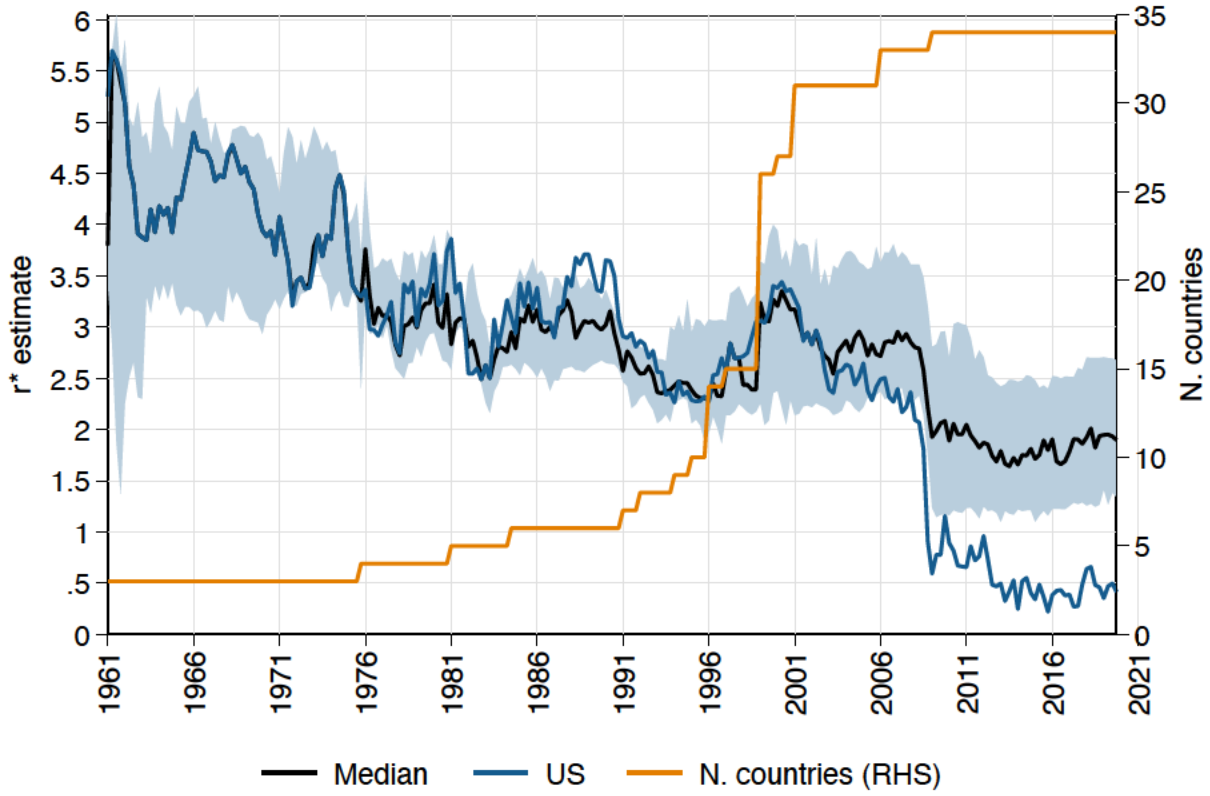


Figure A.2. Corporate bond sample by country. This figure reports the sample of senior, fixed-coupon non-financial corporate bonds that appear at any time in either the ICE-BAML Global Corporate Bond Index or the ICE-BAML Global High Yield Corporate Bond Index, relative to total issued within a quarter in the paper sample countries as captured in either SDC Platinum New Issues database or Mergent FISD. The paper sample of countries includes: U.S., Canada, UK, Norway, Japan, Australia, and members of the European Union. "EU4" are Germany, France, Spain and Italy; "Other EU" are the remaining member countries of the European Union.

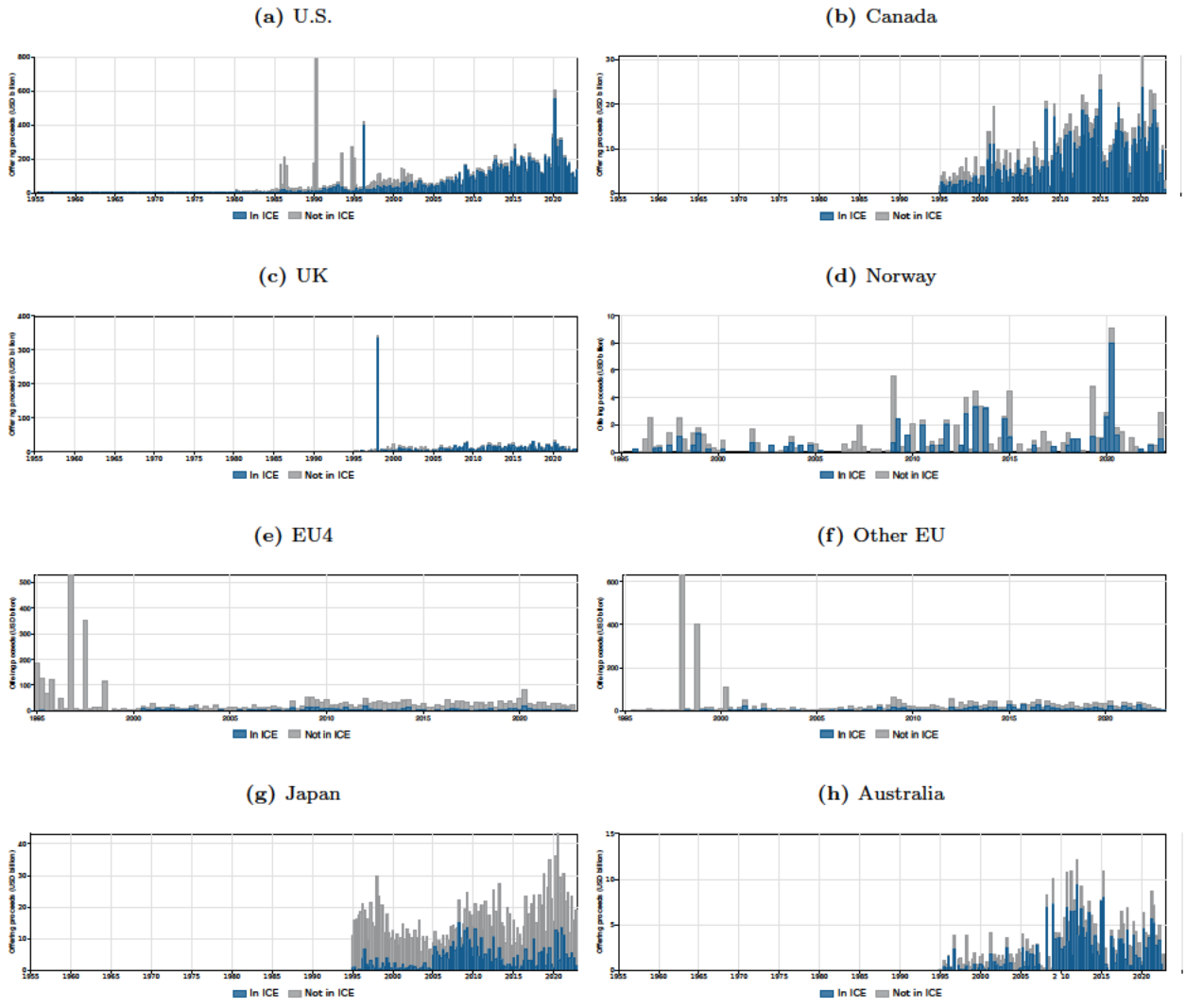
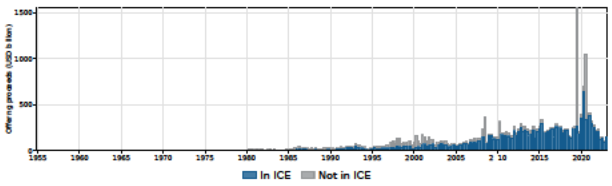
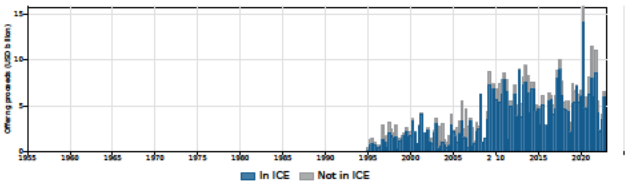


Figure A.3. Corporate bond sample by currency. This figure reports the sample of senior, fixed-coupon non-financial corporate bonds that appear at any time in either the ICE-BAML Global Corporate Bond Index or the ICE-BAML Global High Yield Corporate Bond Index, relative to total issued within a quarter in the same set of currencies as captured in either SDC Platinum New Issues database or Mergent FISD. "EUR" includes Euro precursor currencies.

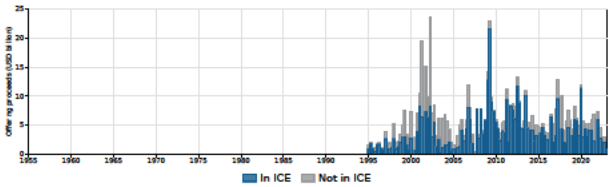
(a) USD



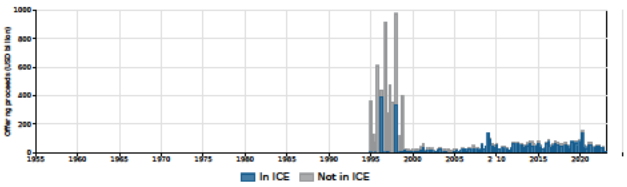
(b) CAD



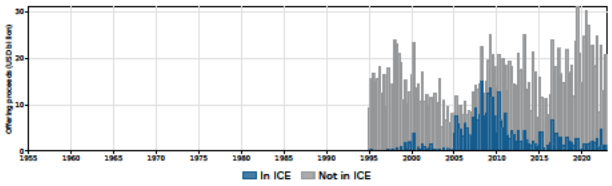
(c) GBP



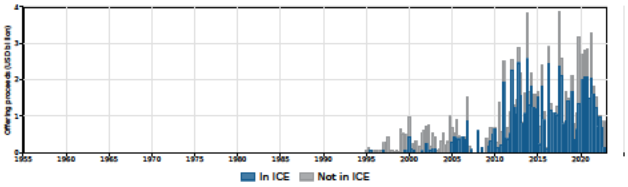
(d) EUR



(e) JPY



(f) AUD



(g) CHF

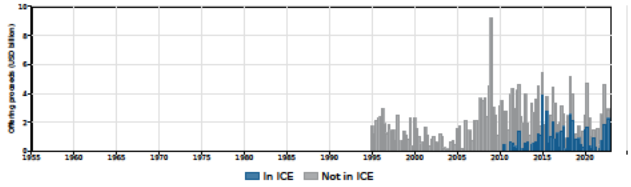


Figure A.4. Distribution of loan time-to-maturity. This figure plots the distribution of the time-to-maturity of loans in the Capital IQ Debt Capital Structure database, with first observations of each loan selected as described in Section B.2.

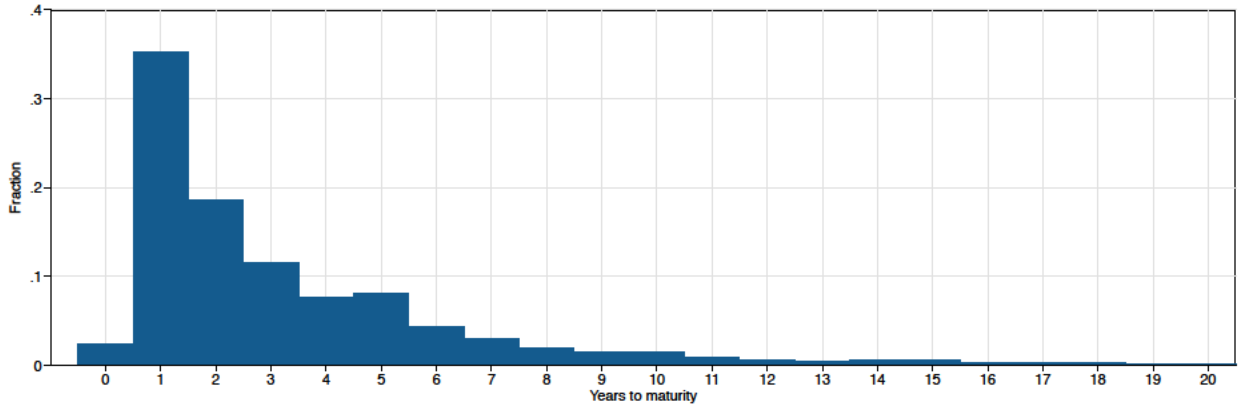


Figure A.5. Country-level secondary market bond credit spreads. This figure plots the time series of face-value-weighted average corporate bond yields from ICE global bond indices together with the corresponding country-level S&P Investment Grade Corporate Bond Index for a sub-sample of countries. For countries that do not have a corporate bond index available, we use either the S&P Aggregate Bond Index or the Bloomberg Total Return Value Unhedged indices. ICE corporate bond sample includes fixed-coupon bonds to non-financial firms only.

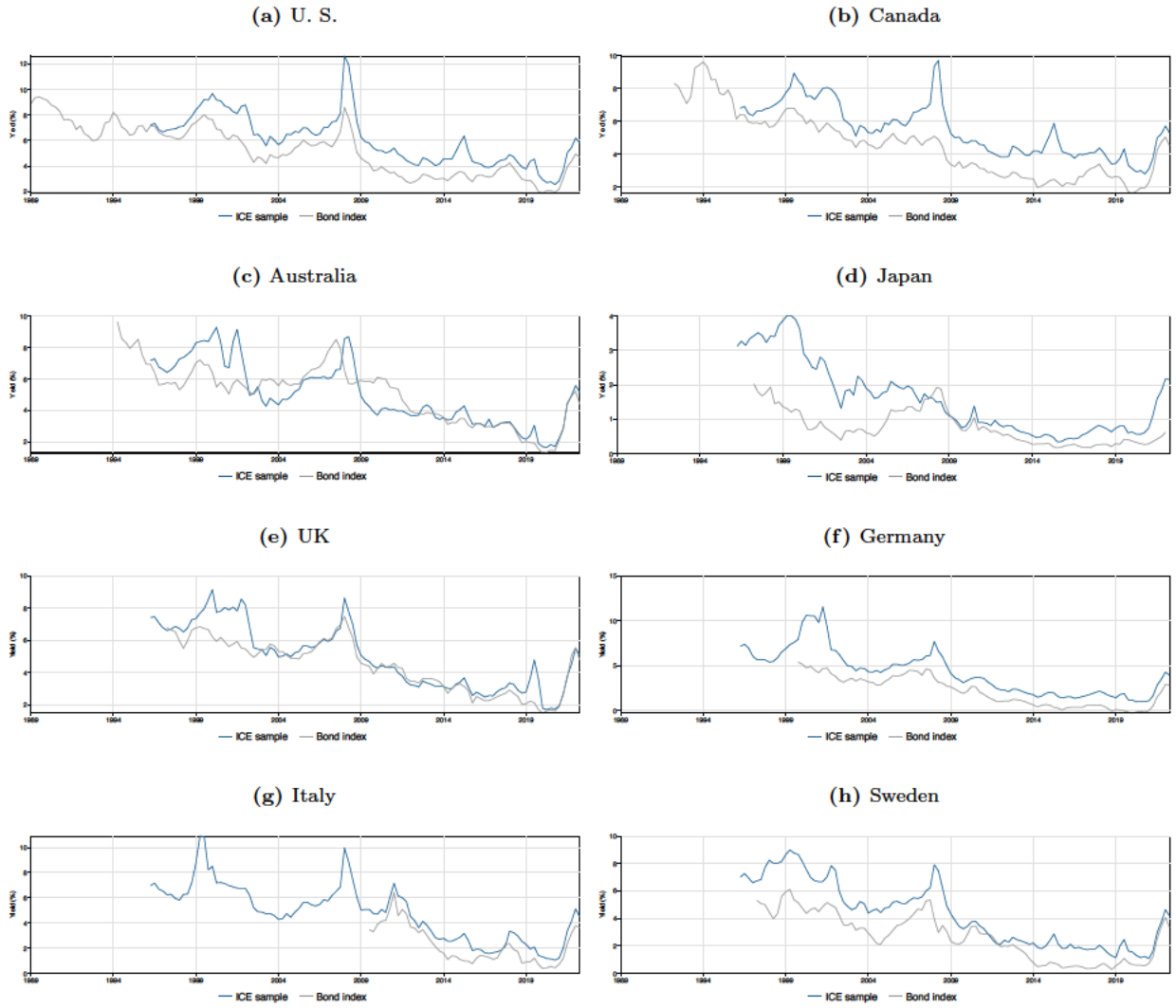


Figure A.6. Country-level primary market bond credit spreads. This figure plots the time series of average duration-matched and default adjusted bond offering credit spreads. Bond offering yield information from the union of SDC Platinum New Issues database and Mergent FISD. Bond sample includes fixed-coupon rate bonds issued by non-financial firms only. "EU4" are Germany, France, Spain and Italy; "Other EU" are the remaining member countries of the European Union.

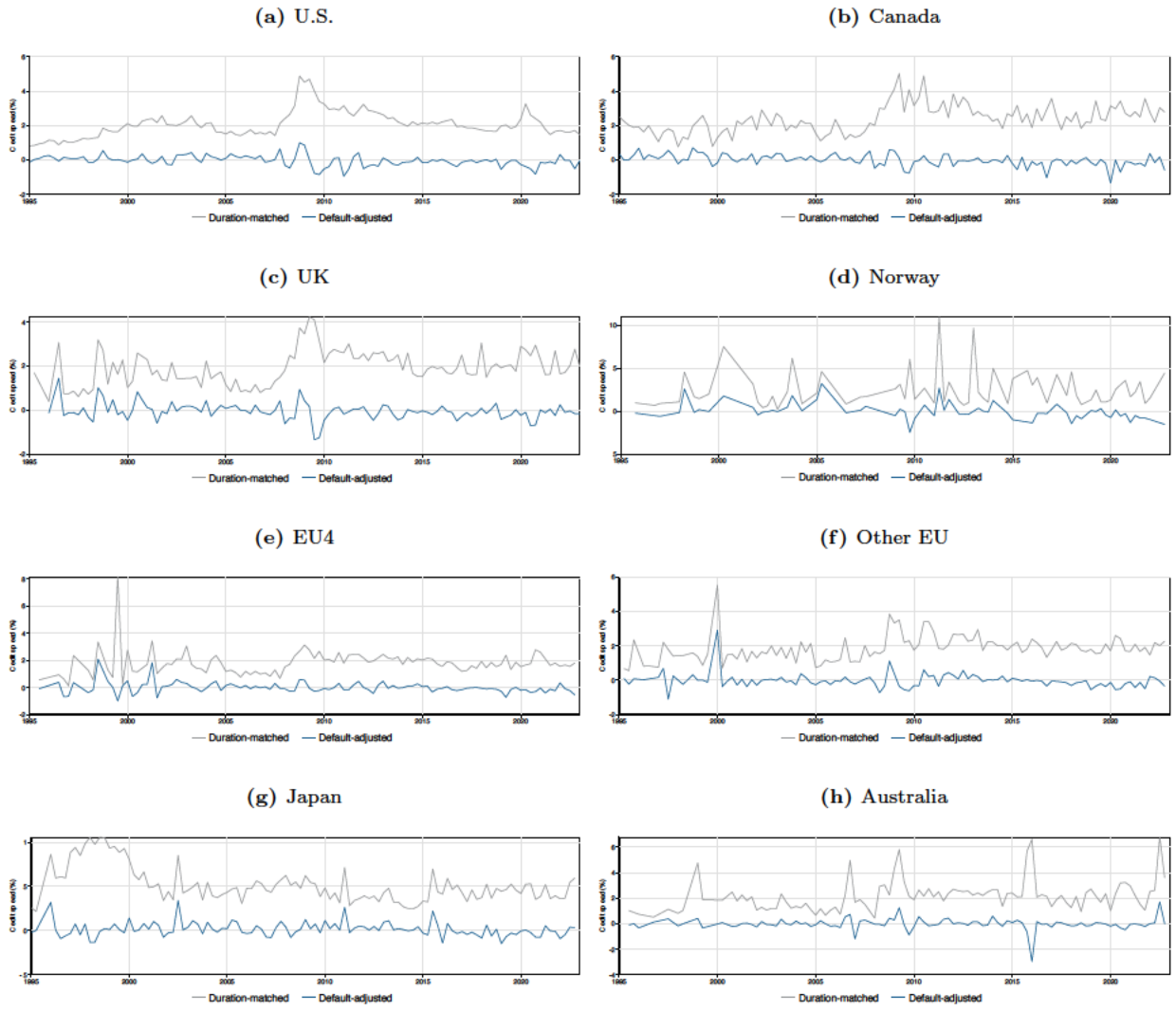
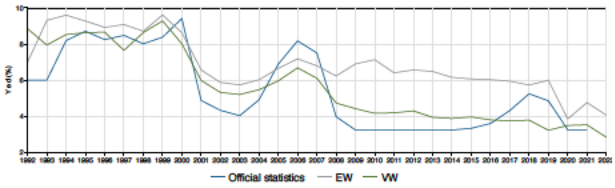
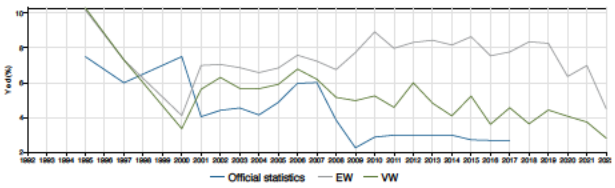


Figure A.7. Country-level loan rates. This figure plots the time series of equal-weighted and face-value-weighted average loan interest rates from Capital IQ Debt Capital Structure together with the bank lending rates reported in the IMF's International Finance Statistics and the ECB's MFI Interest Rate Statistics. Capital IQ loan sample includes fixed-rate loans to non-financial firms only. "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries.

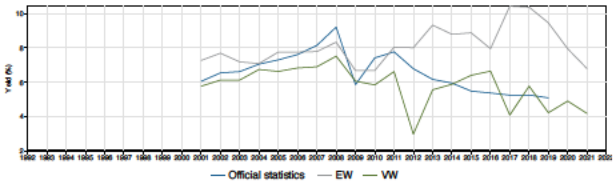
(a) U. S.



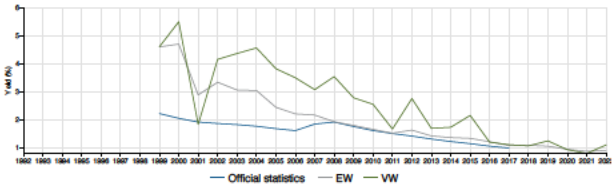
(b) Canada



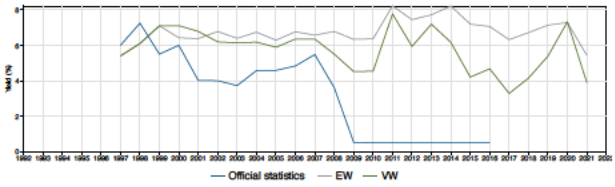
(c) Australia



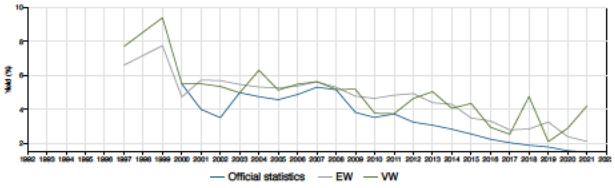
(d) Japan



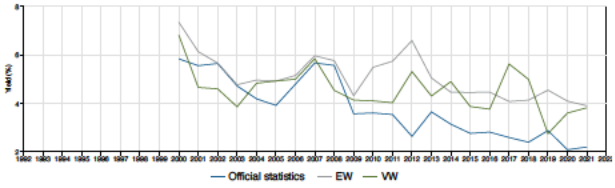
(e) UK



(f) Core Europe



(g) Nordics/Baltics



(h) Other Europe

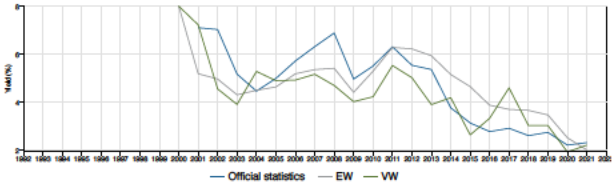


Figure A.8. Distribution of primary bond market GIV weights. This figure plots the distribution of face-value weights used in computing country-group-level primary bond market default-adjusted credit spread GIV. Bond offering yield information from the union of SDC Platinum New Issues database and Mergent FISD. Each point in the distribution is a bond-month. Bond sample includes fixed-coupon rate bonds issued by non-financial firms only. "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries.

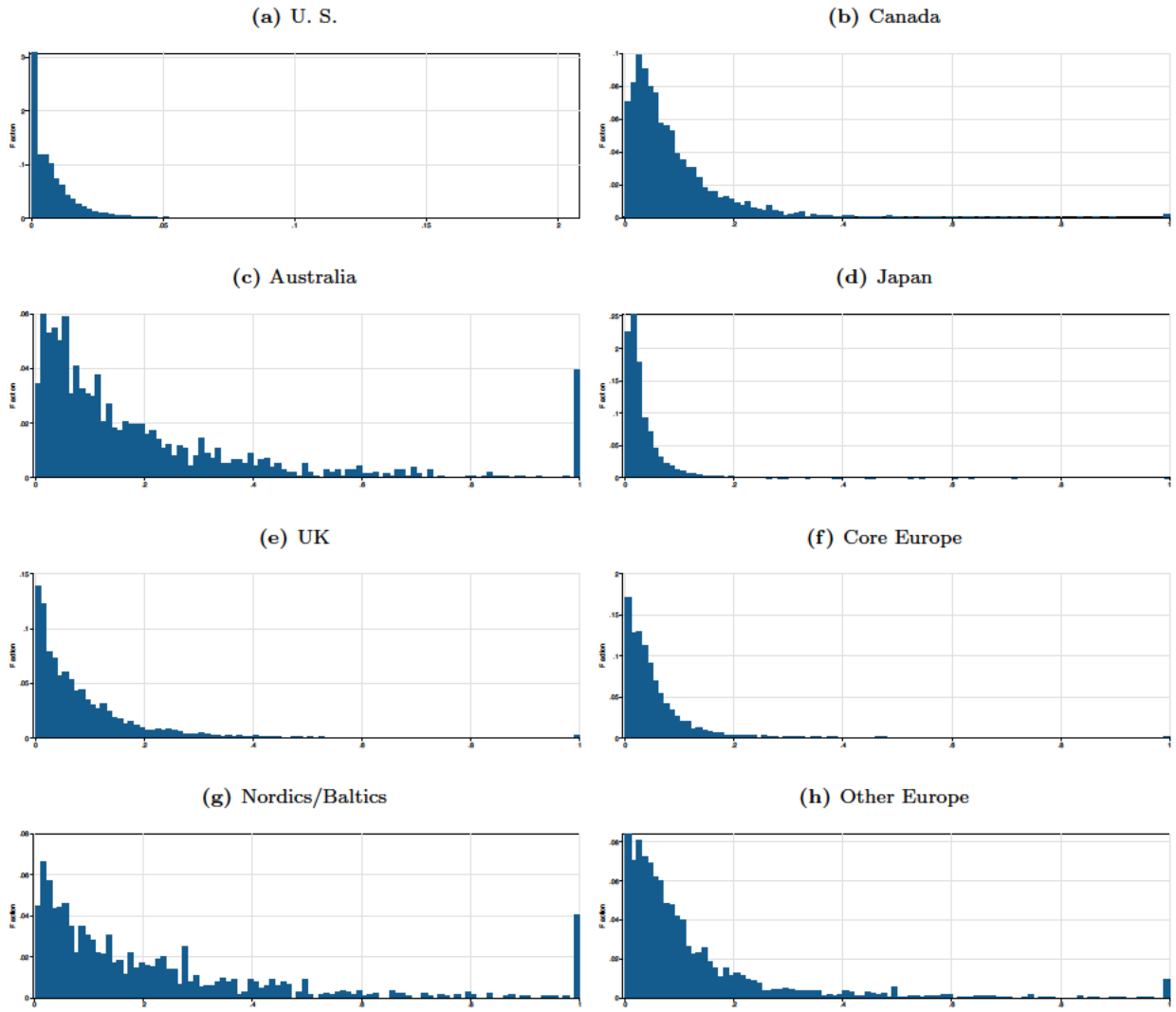


Figure A.9. Distribution of secondary bond market GIV weights. This figure plots the distribution of face-value weights used in computing country-group-level secondary bond market default-adjusted credit spread GIV. Secondary market bond yields from ICE global bond indices. Each point in the distribution is a bond-month. ICE corporate bond sample includes fixed-coupon bonds to non-financial firms only. "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries.

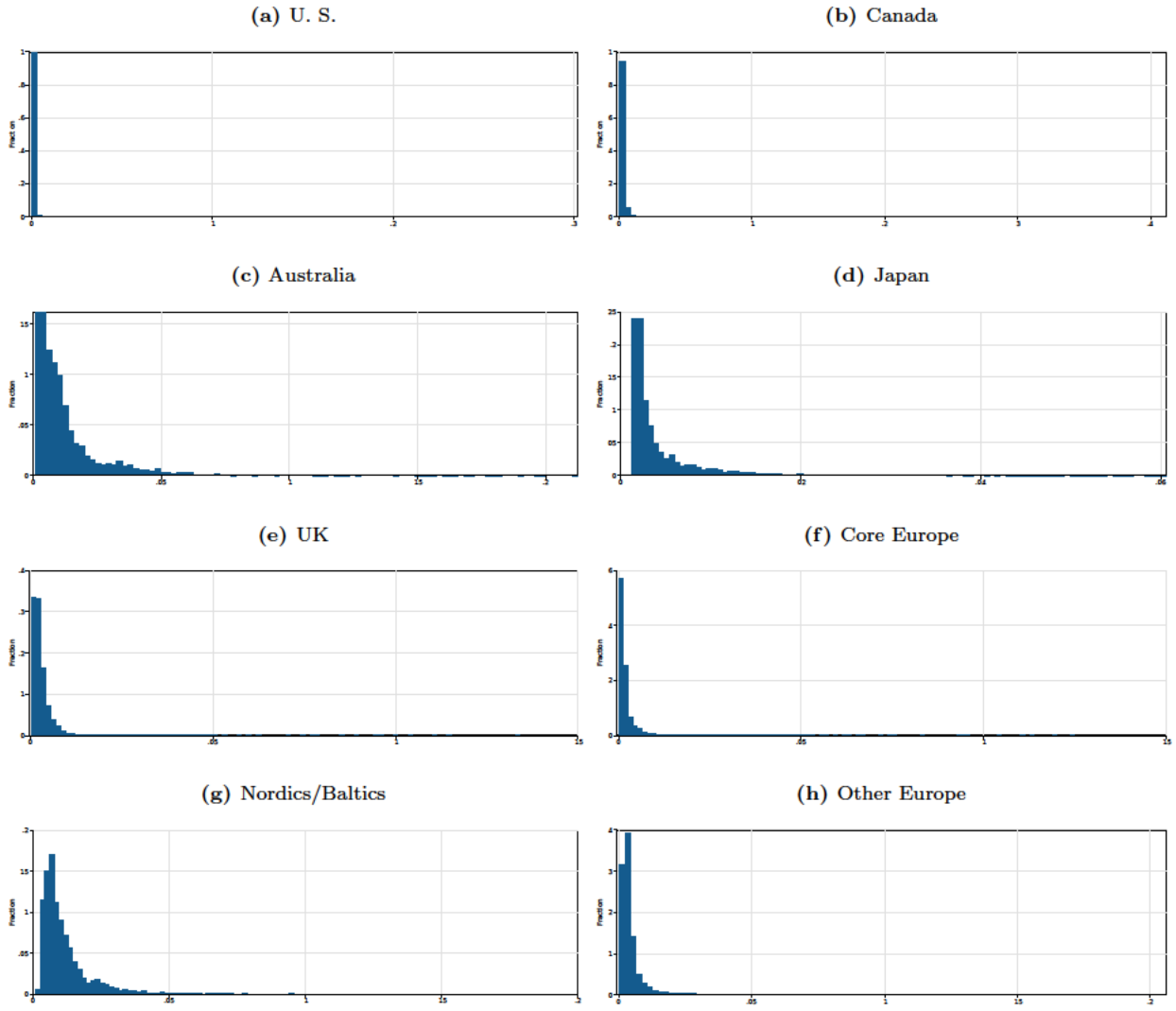


Figure A.10. Distribution of loan GIV weights. This figure plots the distribution of face-value weights used in computing country-group-level loan interest rate GIV. Loan interest rates from Capital IQ Debt Capital Structure. Each observation in the distribution is a loan-year. Capital IQ loan sample includes fixed-rate loans to non-financial firms only. "Core Europe" is France, Germany, Belgium and the Netherlands. "Nordics/Baltics" is Denmark, Norway, Sweden, Finland, Lithuania, Latvia and Estonia. "Other Europe" are all other European Union countries.