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The Good, the Bad, and the Ugly of International Debt Market Data

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Abstract

Comprehensive granular data on firms' access to international credit markets and its determinants is instrumental in answering a wide set of questions in international macroeconomics and finance. We describe how to put together data on primary market issuance and secondary market pricing, how to track debt securities over their lifetimes on firms' balance sheets, and how to match bond-level information to financial statements of the ultimate corporate parents. We illustrate the importance of using comprehensive data on corporate bonds over their lifecycle by documenting a high propensity of early maturity, procyclicality of the propensity to prepay, and a resulting procyclicality of effective time-to-maturity.

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1 Introduction

The decade and a half since the global financial crisis (GFC) has seen a rapid increase in marketable debt securities around the globe.[1] This rapid rise of the share of non-financial corporate firm financing provided by potentially flighty and less-regulated non-bank financial intermediaries through international debt markets creates financial vulnerabilities for borrowers in the countries receiving the debt financing. Country-level aggregate data may not accurately reflect vulnerabilities engendered through debt market borrowing as individual firms' exposures may be hidden when the borrowers are concentrated in a particular part of the firm population or when firms use foreign subsidiaries to raise debt market financing. Moreover, exposed firms may differ in the levels of maturity, currency, and liquidity mismatch taken on through bond issuance.

With these considerations in mind, the academic literature has increasingly focused on using granular data for capturing credit market conditions over time and across countries. Depending on the specific research question asked and geographies considered, different strands of the literature make disparate choices in terms of the types of data, datasets, and matching techniques across datasets. However, a systematic description of different types of data on credit instrument issuances and amount outstandings, secondary market pricing of those instruments, and financial statements of credit instrument issuers in a global context has so far been missing in the literature. This paper remedies this gap, serving as a guide in putting together a comprehensive database covering these different aspects of international credit market access and pricing, and provides baseline statistics on what is covered in each type of data.

This exercise shows the *good*, the *bad*, and the *ugly* of international debt market data. On the good side, by putting together primary and secondary market data, as well as data on

[1] For example, Aldasoro, Hardy, and Tarashev (2021) show that international debt securities of non-financial corporate issuers from advanced economies grew from 3.9% to 6.8% of GDP between 2009 and 2020, while the international debt securities of non-financial corporate issuers from emerging market economies grew from 1.2% to 2.2% of GDP over the same time period. See also the time series of issuance in Figure 1.

amount outstandings and issuer financial information, we can address a number of important questions. On the bad side, while data quality and availability have improved dramatically, coverage and representativeness of data available is still far from ideal. Finally, due to data limitations, especially in terms of firm and instrument identifiers, the process of putting together these data presents a number of challenges – the ugly.

On the positive side, a comprehensive granular dataset of firms' access to credit markets and its determinants opens the door to answering a wide set of questions related to corporate debt markets and their impact on real outcomes. For instance, adding bond-level amount outstandings to firm balance sheet data and thus obtaining information on maturity and currency structure of firms' liabilities, Elias (2021) tracks firms' debt instruments over the instruments' lifetime to explore whether firms actively manage their maturity structure to reduce their exposure to rollover risk. In Boyarchenko and Elias (2024c), we use the broad cross-country panel of secondary market credit spreads, bond returns, and ultimate parent financial characteristics constructed in the current paper to document the existence of a global credit cycle that is distinct from both the global financial cycle and the credit cycle local to each economy. Although we have a relatively short time series of secondary market bond observations (starting in 1998), using granular data on corporate bond returns allows us to instead identify predictive relationships from cross-sectional information. Similarly, in Boyarchenko, Elias, and Mueller (2023), we use the granular data on bond and loan pricing from this paper to construct instruments for the effect of borrowing costs on the composition of lenders to the non-financial corporate sector across a range of economies.

Comprehensive granular data on firms' access to credit markets also allows us to study how the global credit cycles affects firm-level decisions. For example, in Boyarchenko and Elias (2024a), we investigate how the global and local credit cycles affect firms' willingness and ability to access debt markets, and the impact credit market access has on their profitability and investment decisions. Focusing on the composition of debt, in the companion Boyarchenko and Elias (2024b) paper, we use the data on primary market issuances, security-

level amount outstanding over time, and firm financial statements to study the determinants of debt capital structure management.

On the negative side, while data quality has improved substantially over the last 20 years, the available data still have some drawbacks. First, worldwide firm-level financial information is only available for large –and for the most part public– firms, required to file financial statements.[2] This lack of representativeness may limit the ability to draw conclusions about the whole population of firms. Second, we document that the match rate even for bonds from advanced economy (AE) issuers – which have a higher match rate than issuers in emerging market economies (EM) – is between 60% and 80%. This means that for a significant number of bonds we cannot find an issuer with publicly-filed financial statements. Third, even for the bonds that can be matched to firm-level financial information, data on commonly used financial variables is not always available.[3] Moreover, bond-level data, such as the callability schedule and coupon reset formulas (for floating rate bonds) may not always be available.

The most challenging part of the exercise conducted in this paper is the matching procedure itself. The main obstacle is the complexity of firm- and bond-level identifiers. For example, the firm-level identifiers included in financial statement data usually refer to the equity issued by the firm, while the firm-level identifiers included in primary bond market data refer to the debt instruments issued by the firm. To the extent that the firm issues debt and equity instruments using different 6-digit CUSIPs, such differences will impact negatively the match rate. In addition, firm-level identifiers may change over time through restructuring and merger and acquisition activity. If datasets differ in whether firm-level identifiers are reported on an as-of-date basis or a historical basis, this may again lead to missed matches. In this paper, we build a comprehensive point-in-time mapping between operating firms

[2]While datasets that include both private and public firms exist, such as ORBIS, they have their own limitations, such as survivorship bias. The information on private companies in such datasets is collected from regulatory filings of local authorities.

[3]Indeed, Bryzgalova, Lerner, Lettau, and Pelger (Forthcoming) show that firm characteristics are missing for a substantial fraction of even U. S. equity observations.

(that is, firms at the top level of the organization structure) and their subsidiaries and the associated security-level identifiers. This allows us to put information in different datasets on an equal footing, and to accurately ascribe debt borrowing to the ultimate parent nation.

The spirit of our paper is similar to Kalemli-Ozcan, Sorensen, Villegas-Sanchez, Volosovych, and Yesiltas (Forthcoming) in that we provide a detailed guide for researchers on how to put together disparate international debt market datasets, and provide an illustrative application of the resulting comprehensive data. Using data on debt security amount outstandings over time we document that a large fraction of corporate bonds, especially corporate bonds issued by firms in advanced economies, are repaid earlier than their original stated maturity. Thus, primary market data alone is not sufficient to track debt amount outstanding over time. Moreover, we show that, while original time-to-maturity is procyclical with respect to the global financial cycle, so is the propensity to prepay debt early. Thus, debt issued when the VIX is high not only has a shorter original time-to-maturity on average but is also more likely to be prepaid more than a year before the contractual maturity date.

Granular data on corporate bond issuance and outstanding have been used to answer a variety of questions in international macroeconomics and finance. One set of questions relates to global liquidity provision through debt markets and the uses of those proceeds. Putting together primary market issuances and firm balance sheets, Bruno and Shin (2017) document that non-financial corporates around the world engage in carry trades by issuing USD-denominated bonds and using the proceeds to hold local currency instruments. Using similar data, De Gregorio and Jara (2023) argue that, alternatively, increasing cash holdings can also be consistent with a "safe to invest" motive for issuing lower-cost debt. Calomiris, Larrain, Schmukler, and Williams (2019) show that firms increase the size of their issuances to enjoy a size-related yield discount (since qualifying for inclusion in a bond index on average reduces offering yields by 100 bps), and invest the excess proceeds in cash. Similarly to Bruno and Shin (2017), Calomiris et al. (2019) also find evidence that suggests that non-financial corporates engage in carry trades. Bruno and Shin (2020) further show that balance sheet

vulnerabilities to currency depreciations are in part explained by such carry trade activity by non-financial corporate issuers: it is not the issuance of non-local currency debt per se but rather the use of the proceeds of that debt to invest in local currency assets that exposes firms' valuations to currency depreciations.

In the U. S. context, Acharya and Steffen (2020) and Darmouni and Siani (2022) study the use of bond offering proceeds in 2020 for firms that were able to issue after the introduction of the Corporate Credit Facilities, and argue that the proceeds of new issuances were used to repay bank credit lines (drawn down at the start of the COVID-19 pandemic) and to build cash reserves. Boyarchenko, Kovner, and Shachar (2022) put together data on primary market issuances, secondary market trading and firm debt outstanding to show that investment grade firms issued opportunistically to refinance existing debt after the Corporate Credit Facilities were introduced.

An important related question is what type of firms are able to access international debt markets. Didier, Levine, and Schmukler (2014) explore the characteristics of firms issuing bonds in international capital markets, and find that the majority of financing through marketable debt goes to the largest public companies, with the median bond issuing firm more than 36 times larger than the median non-issuing firm. The ability to access international debt markets leads these largest firms to have higher asset, sales, and employment growth rates. Exploring how access to bond markets in Europe has changed since the global financial crisis, Darmouni and Papoutsi (2022) document that borrower composition shifted to smaller, riskier firms, which used the proceeds raised in public debt markets to increase investment. These trends are in-line with the rapid decrease since 1990s in issuance costs for Eurobonds, as shown in Peristiani and Santos (2010).

Once bonds are issued in the primary market, they can be retraded in secondary markets. An important strand of the corporate bond literature focuses on the differential predictive information in secondary market credit spreads for future real activity. Using granular data on secondary market quotes and traded prices matched to firm fundamentals, Gilchrist and

Zakrajšek (2012) and Gilchrist and Mojon (2018) argue that controlling for firm characteristics and interest rate duration are important for uncovering predictability of real activity by credit spreads in the U. S. and European settings, respectively.

Although primary market data provide a useful first look at corporate bonds and their issuers, bond amount outstanding can change over the bond's lifetime through corporate actions such as reopenings, (partial) calls, and (partial) defaults. While firm balance sheet data provides summary measures of total (long) term debt outstanding, instrument-level amount outstanding information is necessary to capture details of the composition of firms' outstanding marketable debt. Choi, Hackbarth, and Zechner (2018) leverage data on instrument-level amount outstanding to study the effect that the full maturity structure of debt outstanding has on the maturity choice for new debt issuances. Similarly, using instrument-level amount outstanding to accurately measure the currency composition of debt outstanding, Adams and Verdelhan (2022) argue that firms' exposure to currency risk through their liabilities passes-through to their profits and creates a strong correlation of their equity prices with exchange rates. Elias (2021) uses both the maturity and currency composition of firms' outstanding debt to explore how these dimensions affect firms' rollover risk during capital flow reversal episodes.

Focusing on issuers in the U. S., Rauh and Sufi (2010) show that there is substantial cross-firm heterogeneity in the complexity of debt structure, with lower-credit-quality firms more likely to have subordinated marketable debt. Moreover, Xu (2018) documents that lower-credit-quality firms are more likely to use the call provisions in corporate bonds to actively manage the maturity structure of their debt, leading to a procyclical maturity structure for those types of firms. Using a broad cross-section of firms in the U. S., Colla, Ippolito, and Li (2013) argue that debt specialization of U. S. firms has also increased over time, with more than three quarters of firms borrowing using only one type of debt instrument.[4] In the international context, John, Kaviani, Kryzanowski, and Maleki (2021) link the degree of

[4]See also a summary of the debt structure literature in Colla, Ippolito, and Li (2020).

debt specialization to country-level creditor protection, with firms in countries with stronger creditor protection having more concentrated debt structures.

The data exercise in this paper is complementary to the mapping of international capital flows undertaken in Coppola, Maggiori, Neiman, and Schreger (2021) and subsequent papers.[5] In the context of mapping securities to the country of their issuers' ultimate corporate parent, Coppola et al. (2021) provide a method for assigning an ultimate parent to each security issuer (see Section A.III.B of their Online Appendix). The security-ultimate parent mapping we construct in this paper is similar in spirit to the exercise described in their paper but relies on different data sources for the point-in-time ultimate parent information.

The rest of the paper is organized as follows. We describe the data on primary market issuances, and how to create a comprehensive dataset covering both U. S. and non-U. S. corporate bond issuances in Section 2. Section 3 then discusses data on secondary market quotes and whether bonds quoted in the secondary market are representative of the overall corporate bond issuances. We document differences between bond amount outstandings and bond issuances in Section 4. We match bond market data to firm financial statements in Section 5, comparing the financial statement information provided through different commercial databases. Section 6 concludes.

2 Primary bond market data

We begin with data on primary market issuances. In creating a broad dataset of bond primary market issuances, we include both original issuances and issue re-openings. While issue re-openings are only available to firms with existing corporate bonds outstanding, re-openings do represent the cost of borrowing for those firms and should thus be included when measuring primary market conditions.

[5]See also the Global Capital Allocation Project, https://www.globalcapitalallocation.com

2.1 International primary market data

We use SDC Platinum New Issues database (SDC) to capture primary market activity for issuers outside of the United States. SDC reports bond and issuer characteristics as of the time of a new bond issuance – or the reopening of an existing bond issuance–, including issuer and parent domicile, issuer industry, currency of issuance, offering amounts, coupon type, rate, and payment frequency, bond seniority, and call and put provisions. SDC coverage starts in 1980 and our sample runs through the end of 2022. We clean SDC as follows (summarized in Table A.1).

1. **Package deals.** Some bonds are issued in a package, with same bond characteristics but offering amount split across multiple deal IDs.

   What do we do? Within a package and issuer, we identify bonds that have the same offering date, maturity date, coupon characteristics, principal offered in all markets, and proceeds raised in all markets, and sum up the principal offered in this market and proceeds raised in this market within such groups. We then keep one observation per each grouping. This removes 40,662 duplicate observations.

2. **Multiple issuers per package.** Some packages have issuers with different 6 digit CUSIPs, suggesting multiple issuers issuing with the same package id.

   What do we do? We drop packages with multiple issuers. This removes 12 observations.

3. **Multiple deal IDs per issuer-bond.** Some bonds have multiple observations with the same ISIN/9 digit CUSIP, same 6 digit CUSIP, offering date and maturity date but different deal IDs. Such bonds are primarily issued by financials (securitizers) and federal agencies.

   What do we do? We drop bonds with multiple observations with the same ISIN/9 digit CUSIP, same 6 digit CUSIP, offering date and maturity date. This removes 9,100 observations.

4. **Bond re-openings.** Some issuers choose to reopen an existing bond issuance – increasing the amount outstanding of the bond while keeping the rest of the bond characteristics the same – instead of issuing new bonds. In SDC, such reopenings are recorded as new deals, with new deal IDs.

   What do we do? We identify reopenings as observations with the same ISIN/9 digit CUSIP, same 6 digit CUSIP, and maturity date but different offering dates, restricting to bonds in which the number of unique observations per bond equals the number of unique offering dates per bond. For the purposes of creating a dataset of bond characteristics to be used in conjunction with secondary market prices, we keep one observation (the initial offering) per reopening grouping. For the purposes of tracking amounts offered and offering spreads over time, we keep all the observations in a reopening grouping.

5. **Multiple observations per ISIN/9 digit CUSIP**. Some bonds have multiple observations per ISIN/9 digit CUSIP that are not reopenings and not maturity extensions. Such bonds are primarily issued by financials (securitizers) and federal agencies.

   What do we do? We drop bonds with multiple observations with the same ISIN/9 digit CUSIP that are not identified as reopenings. This removes 3,023 observations.

6. **Multiple issue types per ISIN/9 digit CUSIP**. Some bonds have multiple observations per ISIN/9 digit CUSIP that report different issue types in different observations. Such bonds are primarily issued by financials (securitizers) and federal agencies.

   What do we do? We drop bonds with multiple observations with the same ISIN/9 digit CUSIP with multiple issue types. This removes 708 observations.

7. **Other duplicates**. Some bonds in SDC have neither ISIN nor 9 digit CUSIP reported.

   What do we do? We identify duplicates amongst such bonds based on 6 digit CUSIP, offering date, maturity date, and coupon characteristics (coupon rate for fixed coupon bonds, and floating rate index and basis point spread to floating rate index for floating

rate bonds). Dropping duplicates along these dimensions removes 16,535 observations.

Table 1 summarizes the SDC's coverage of issuances by non-financial and financial corporations with more than 1 year maturity. Across the full sample of countries, there are more than 161,500 unique fixed rate bonds issued by 35,139 unique non-financial corporate issuers and more than 203,000 unique fixed rate bonds issued by 23,196 unique financial corporate issuers. While floating rate bond issuance is somewhat more prevalent amongst financial issuers (80,635 unique floating rate bonds for financial issuers, 17,910 unique floating rate bonds for non-financial issuers), floating rate bonds remain relatively rare, especially for issuers in emerging market economies. Comparing the results in Table 1 to summary statistics reported in other work for Dealogic – an alternative primary debt market database frequently used in research on international debt markets – we see that SDC has similar or better coverage.[6]

2.2 U. S. primary market data

We supplement the primary market pricing and bond characteristics data on international corporate bonds from SDC with primary market pricing and bond characteristics data for U. S. corporate bonds from Mergent FISD (Mergent). Mergent provides comprehensive coverage for publicly offered U. S. debt securities. Mergent tracks issuer and bond characteristics over the lifetime of the bond, including issuer and parent domicile, issuer industry, currency of issuance, offering amounts, coupon type, rate, and payment frequency, bond seniority, and call and put provisions. We identify re-openings in Mergent using the amount outstanding history table, selecting amount outstanding changes identified as reopenings by Mergent.[7] Mergent coverage begins in 1950, though there are only 2,873 unique non-financial corporate bonds with maturity greater than a year in the pre-1980 sample, and reliable data on changes

[6]Compare, for example, the country coverage reported in Table 1 to that reported in Kirti (2018), which includes both non-financial corporate bonds and government bonds.

[7]Note that there is a small number of increases in amount outstanding that are not identified by Mergent to be reopenings.

in amount outstanding begins in 1995. As with SDC, we end our Mergent sample at the end of 2022.

2.3 Consolidating U. S. and international primary market data

We create a consolidated dataset of global primary market data by combining the information captured in SDC with that captured in Mergent. Since the same bond may appear in both datasets, we merge the two together using bond-level identifiers and offering characteristics. We start by merging based on ISINs or 9 digit CUSIPs (giving preference to the matches based on ISINs) and recorded issuance date. Since Mergent assigns the settlement date as the observation date for issue reopenings, we consider a Mergent and an SDC observations to be a potential match if the observation date in Mergent is the same as either the issue date or the payment date in SDC.

This procedure results in a many-to-many potential mapping between Mergent and SDC. To disambiguate among the many-to-many matches, we first retain matches that correspond to the closest match between the offering amounts reported in both datasets, requiring that the difference in offering amounts reported is no more than 30%.[8] Among the remaining many-to-many matches, we first select the matches where the offering date in Mergent coincides with the payment date (not the issue date) in SDC, and then matches where the offering price reported in both datasets is the same. We drop any matches that cannot be disambiguated following this procedure.

Our consolidated database of primary market corporate bond issuances thus contains 311,702 unique bonds (10,589 unique issuers) captured only in Mergent, 435,109 unique bonds (61,617 unique issuers) captured only in SDC, and 55,417 unique bonds (9,265 unique issuers) captured in both datasets. It is worth noting that ISIN/9 digit CUSIP information is missing for some observations in SDC, especially earlier in the sample and for bonds issued

[8] In a few instances, the total offering amount in Mergent corresponds to the sum across multiple observations in SDC that have the same settlement date but issuance dates less than a week apart. In these cases, we add up the SDC observations to a single observation and consider that to be a true match to Mergent.

by Japanese issuers. To the extent that some of the bonds with missing issue-level identifiers are also present in Mergent, the consolidated dataset will double count those bonds. We use the overlapping sample of bonds to verify that, for bonds present in both Mergent and SDC, the two databases provide similar information on primary market pricing and bond characteristics.

Table 2 summarizes the coverage across countries of the consolidated primary issuance dataset for non-financial issuers and issues with a maturity of over a year. Three features of the consolidated dataset are worth noting. First, the median size of the issuances captured in both datasets is larger than the median size of the issuances that are reported in only one of SDC or Mergent, suggesting that the overlapping coverage is dominated by larger issues. Second, comparing the number of unique bonds and issuers across countries, we see that, on average, U. S. issuers captured in Mergent have more bonds per issuer than either those captured only in SDC or issuers outside the U. S. Finally, floating rate data for issuers in emerging market economies is captured almost exclusively by SDC. Figure 1 plots the time series of the annual total offering amount (in USD equivalents) of non-financial corporate, fixed-coupon bonds across advanced and emerging market economies. While issuance by firms domiciled in the U.S. continues to be outsized relative to issuance in the rest of the world, non-financial corporate debt issuance has been steadily increasing globally over the last two decades, and especially since the global financial crisis.

Turning next to the industry composition of the consolidated dataset, in Table 3 we see that, among non-financial issuers, most issuers and bond issues are in the manufacturing and utilities sectors. Outside of the U. S., construction and services sectors issuers also issue a substantial number of bonds.

Finally, Table 4 reports the currency composition of the consolidated primary market dataset. USD-denominated issues represent almost half of the overall sample. The median size of Euro-denominated bonds is larger than those denominated in other currencies, and the prevalence of floating-rate bonds is higher among Euro-denominated bonds.

One characteristic of new bond issuances that differs noticeably between U. S. and the rest of the world is the time-to-maturity at issuance. Figure 2a[9] shows that U. S. issuances tend to have longer maturities than issuances in the rest of the world, with the majority of U. S. issuances concentrated in the 5 to 10 years segment and 10 years being the most common maturity for fixed coupon issuances. In contrast, in the rest of the world, the most common maturity is 3 years, and 40% of issuances have maturity of 3 years or lower. U. S. issuances also seem to be concentrated around standard U. S. Treasury maturities. Turning to floating rate issuances in Figure 2b, the distribution of maturities is more similar between U. S. and non-U. S. issuances, with around 70% of issuances having maturity of 3 years or less, and the remaining issuances concentrated at the 5, 10, 15 and 30 year maturity.

To investigate the cross-country differences in original time-to-maturity of fixed coupon, non-financial corporate bonds more formally, we estimate the relationship between time-to-maturity, the VIX, and bond and firm characteristics

$$\text{TTM}_{b(f),t} = \alpha_f + \alpha_c + \alpha_{\mathcal{K}} + \beta \text{VIX}_t + \gamma' X_{b(f),t} + \epsilon_{b(f),t}, \tag{1}$$

where α_f, α_c, and $\alpha_{\mathcal{K}}$ are firm and ultimate parent, currency, and ultimate parent country fixed effects, respectively, VIX_t is the level of the VIX as of the date of issuance, and $X_{b(f),t}$ is a vector of bond and firm characteristics, including (log) coupon, (log) issuance amount (in USD equivalents), a dummy for callability and issuer 2 digit SIC industry. Table 5 reports the estimated coefficient on the VIX from (1) for advanced economies and emerging market economies. The relationship between time-to-maturity at issuance and the VIX is negative in most advanced economies, so that original time-to-maturity is procyclical with the global financial cycle in these economies. This relationship is both statistically and economically significant. While a median fixed coupon bond is issued with 7 years original time-to-maturity in advanced economies, a one standard deviation increase in the VIX corresponds

[9]The figure plots the fraction of bonds within each category – bonds issued by U. S. issuers and bonds issued by issuers outside the U. S. – issued with a given maturity. Thus, for example, the blue bars, representing the distribution of maturities for the sample of bonds issued by U. S. issuers, add up to 1.

to a shortening of maturities by 0.5 years. In contrast, there does not appear to be a strong relationship between the time-to-maturity at issuance for issuers in emerging market economies.

In general, corporate bonds may not survive to the contractual maturity, through corporate actions such as selective default, debt restructuring, and full or partial calls. Figure 3 shows that, while still relatively rare in bonds issued by issuers in emerging market economies, call provisions – which provide firms with a contractual right to recall its debt prior to maturity – are becoming increasingly common, with almost 80% of U. S. bonds, more than 50% of bonds in other AE countries, and more than 20% of bonds in EM countries being issued callable by the end of the sample.

3 Secondary bond market data

Firms' ability and willingness to access primary debt markets is shaped by a variety of factors, including secondary market credit spreads on both their own and related firms' credit spreads. For example, primary market offering spreads are often determined on a "matrix-pricing" basis, with secondary market spreads on existing comparable bonds of the same firm or firms with a similar credit rating operating in the same industry used as the benchmark in determining yields at issuance. Secondary market prices and spreads, moreover, contain information about the global credit cycle and the local deviations from the global credit cycle in their own right.

3.1 Sample

We use secondary bond market quotes from ICE Global Bond Indices, and define our universe of corporate bonds to be the underlying constituents from the ICE Global Corporate (G0BC) and the ICE Global High Yield Corporate (HW00) Indices. The two indices track the performance of investment grade and speculative grade (high yield), respectively, corporate debt

publicly issued (including 144a securities) in major domestic and eurobond markets. To qualify for inclusion in the respective index, securities must have an average rating of above (below) investment grade, at least 18 months original maturity, at least one year remaining time to maturity (as of each monthly rebalance date), a fixed coupon schedule[10] and a minimum amount outstanding. The high yield index includes issues denominated in either USD, EUR, GBP, or CAD, with minimum amount outstanding of USD 250 million, EUR 250 million, GBP 250 million, and CAD 100 million, respectively. The investment grade index additionally includes bonds denominated in AUD (minimum AUD 100 million), CHF (minimum CHF 100 million), JPY (minimum 20 billion), and DKK (1 billion). Data on ICE Global Indices starts in January 1998; as before, we end our sample at the end of 2022. ICE constituents data is available daily for the covered time period. Since our primary applications of this data are understanding the composition of the constituent universe relative to primary market issuances and understanding the dynamics of global credit cycles, we focus on monthly observations, selecting data as of the third Wednesday of each month to reduce volatility in quotes due to month-end rebalancing.

Table 6 summarizes the coverage of ICE Global Corporate Index and the ICE Global High Yield Corporate Index of bonds issued by non-financial and financial corporations[11] by country. Bonds issued by U. S. issuers represent the majority of the sample, especially for non-financial issuers and even more so for high yield non-financial issuances. More generally, a larger fraction of U. S. bonds included in the two indices are issued by non-financials, while the split between financial and non-financial issuers is more even for the other countries captured by the indices.

Bonds issued by firms in the three largest European issuer countries (Netherlands, France,

[10]Bonds with a fixed coupon schedule include fixed coupon bonds (including zero coupon bonds), pay-in-kind, and fixed-to-floating rate securities, provided that they are callable within the fixed rate period and are at least one year away from the last call date within the fixed rate period (so that the minimum effective time to maturity is at least one year).

[11]To be consistent with industry classifications in the primary bond market data, we define financials to be any issuer that either has "Financial" as a Level 2 industry or has "Industrials" as a Level 2 industry and "Real Estate" as a Level 3 industry according to ICE classifications.

and Germany) have larger median face value (in USD equivalents) than bonds issued by U. S. firms. In terms of the median OAS spread, Japan stands out for its low spread for investment grade bonds, with the median spread for non-financials at 22 basis points (bps) and the median spread for financials at 29 bps.

Turning to the currencies of the bonds included in the two indices, Table 7 shows that USD is the dominant currency of bonds included in either index, followed by the EUR. Mirroring the patterns in the distribution of bond sizes across countries, the median EUR-denominated bond is larger than the median USD-denominated bond ($751 million vs $500 million). Similarly, investment grade JPY-denominated bonds have substantially lower OAS than bonds denominated in other currencies.

3.2 Merging primary and secondary market bond data

While the constituents data for ICE Global Indices provides some information on the characteristics of the individual bonds included, not all characteristics (such as the coupon payment frequency or the call schedule) are included. We thus merge the secondary bond market quotes provided by ICE for index constituents with the consolidated primary market issuance and bond characteristics dataset described in Section 2, first based on the ISIN and then based on the 9 digit CUSIP. In cases where one ICE index constituent is matched to multiple primary market bond characteristic observations, we resolve the multiple matches based on also matching the reported issuance and maturity dates. We are able to match 86.4% of all ICE observations to primary market observations, corresponding to 85.1% percent of unique bonds matched. Out of the almost 3.3 million ICE observations matched to primary market data, 19% are matched to primary market observations in Mergent alone, 34% are matched to primary market observations in SDC alone, and 48% are matched to primary market observations present in both Mergent and SDC.

The merged primary and second bond market data also allows us to investigate whether the constituent universe is representative of the universe of corporate bonds issued. Table 8

reports the coverage of fixed coupon corporate bond issuances by bonds ever included in ICE Global Corporate Index and the ICE Global High Yield Corporate Index. The table shows that, although the number of bonds included in ICE is low relative to the overall number of bonds issued, the median size of bonds in ICE is much larger than the median size of bonds that are never included in these two ICE indices, so that the ICE universe covers a large fraction of amount issued. The median offering yield of bonds included in ICE is also somewhat lower than the median offering yield of bonds not included in ICE, suggesting that the bonds included are somewhat safer. This is also in-line with the results in Calomiris et al. (2019), who document an index-inclusion premium (and, hence, a reduction in credit spreads) in the pricing of corporate bonds.

Table 9 shows that the distribution of industries included in ICE is similar to that of the primary issuance universe. Moreover, bonds included in ICE are consistently large across industries relative to bonds not included in ICE, suggesting that the size differences highlighted above are not driven by any one industry.

Examining the distribution of bonds across currencies, in Table 10 we see that, amongst bonds included in ICE, those issued in EUR and USD have the largest median offering amount. Moreover, the bonds issued in currencies excluded by ICE Index methodology from being included in the corporate indices are significantly smaller. The median offering yield of bonds issued in those currencies is also systematically higher than that of bonds included in ICE.

Finally, Figure 4 shows that the differences in initial maturities documented in Figure 2 between bonds issued by U. S. and non-U. S. issuers are concentrated in bonds not included in ICE. Combined with the size differences between bonds included and not included in ICE described in Tables 8–10, this suggests that the differences in initial maturities are driven by smaller bonds.

To sum up, the universe of ICE index constituents is larger, has lower offering yields, and has longer maturities than the universe of bonds not included in the two ICE Global Indices

that we consider. Thus, the two ICE Global Indices cover a large fraction of the global bond offering amount issued but the secondary market quoted spreads for the index constituents may not be representative of the overall secondary market credit spreads.

4 Data on debt securities outstanding

While data on primary market issuance provides a measure of access to credit markets over time, firms' real activity may be affected not just by their ability to issue new debt but also by their debt outstanding. Indeed, the decision to access primary market and the ability to access primary market themselves are likely affected by the outstanding composition of debt securities. Since debt securities do not necessarily survive until maturity – for example, a firm may choose to call a bond early if interest rates decline sufficiently or the firm's credit rating improves – primary market data alone is insufficient to track the firm-level composition of debt over time.

4.1 Sample

We collect data on debt securities outstanding 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 instrument captured in the database, we observe a number of security characteristics including the security type, interest rate, currency, maturity, security seniority and, crucially, amount outstanding. Each debt instrument appears in the dataset in each accounting statement filed over its lifetime (including in some cases for the fiscal period immediately after its maturity, with the security reported as having 0 amount outstanding).

We focus on retaining the most recent filing for each fiscal period, which reflects the most up-to-date information on the firm's debt instruments for a given fiscal period. Following the recommendations in the S&P Capital IQ Premium Financials documentation, we thus

retain observations that the Debt Capital Structure dataset indicates as being the latest filing for the fiscal period and the latest filing for instance.

While S&P Capital IQ provides an instrument-level identifier (component id) that tracks the instrument over time, there are instances in which the component id may not be constant.[12] We identify instruments that potentially have company ids that change over time by grouping instruments of the same firm that have the same coupon characteristics (fixed or floating; coupon rate value (for fixed rate securities); benchmark index and spread to benchmark index (for floating rate securities), maturity, seniority, collateral, and security optionality features (such as convertibility). For instruments that share these characteristics, appear only once per filing, and have multiple component ids associated with them, we reassign the earliest component id to the entire time series of that instrument.

Because debt securities of subsidiaries appear also on the consolidated balance sheet of the parent company, we restrict the sample to companies identified as "operating" as of the fiscal period end date to avoid double counting.[13] In addition, we restrict the sample to fiscal period end dates starting in 2001, when the debt securities data becomes more comprehensive.

4.2 Issuance vs amount outstanding

The use (and usefulness) of issuance data and data on amount outstandings may vary over the lifetime of the debt security. Because financial statements are filed infrequently, data on amount outstandings may not reflect new issuances in a timely manner. At the other extreme, because of refinancing and/or selective defaults, stated maturity date at the time of issuance may not accurately reflect future declines in amount outstanding (through, for example, partial calls) or, indeed, the effective maturity date of the instrument.

[12]Correspondence with S&P Capital IQ representatives suggests that this may happen for two reasons. First, changes implemented in the data collection process in 2010 can lead to an instrument having different component ids before and after 2010. Second, for securities that undergo registration rights changes over time, such as transitioning from a 144a registration to public trading, component ids may change as the registration rights change.

[13]We discuss the procedure for identifying operating firm historically in detail in Section 5.

The Debt Capital Structure dataset allows us to explore both of these potential concerns. First, for a subset of the securities captured in the dataset, Capital IQ reports the "start date" – the issuance date – of the instrument. Table 11 compares the reported start date and the first fiscal period end date in which an instrument appears for bank loans and corporate bonds. On average, more than 70% of bank loans and more than 81% of corporate bonds first appear on a filing within a year of the stated issuance date, suggesting that data on amount outstandings can be used to identify an instrument's issuance quarter/year, even in the absence of primary market data.

Figure 5 shows, however, that the converse is not true: both bank loans and corporate bonds rarely survive to the stated maturity of the instrument, so that primary market data on its own is not sufficient to track the evolution of a security's amount outstanding over time. More specifically, for each instrument in the Debt Capital Structure dataset, we identify the last fiscal period end date in which the instrument appears, excluding the overall end of the data sample,[14] and define the effective time-to-maturity as the difference between the last and the first fiscal period end date of the instrument and the original time-to-maturity as the difference between the stated maturity date and the first fiscal period end date of the instrument. Figure 5 plots the original time-to-maturity versus the effective time-to-maturity across countries in our sample, for a random 1% subsample of bank loans and corporate bonds with original time-to-maturity of at most 40 years that exit the sample before the firm exits the sample.

On average, around 52% of corporates bond exit the sample more than 1 year prior to stated maturity but only 37% of banks loans do. Figure 5 and Table 12 show, however, that there is substantial cross-country heterogeneity in how frequently the effective maturity is more than 1 year prior to the contractual maturity, with securities issued by firms in advanced economies more likely to exit the sample early than securities issued by firms in emerging market economies, especially corporate bonds. This is consistent with the higher fraction

[14] That is, instruments that still appear in the firm's last filing for fiscal year 2022 with a non-zero amount outstanding are considered to *not* have matured.

of bonds issued with call provisions by firms in advanced economies, as we saw in Figure 3. Table 12 also highlights that, for some countries, there are substantial differences in the early effective maturity probability between bonds and loans. Finally, focusing on corporate bonds, Figure 6 shows that the propensity for early effective maturity is not concentrated in any one currency of the issuance, a fact further borne out in the fraction of securities with effective maturity is more than 1 year prior to the contractual maturity summarized in Table 13.

The Capital IQ data on amount outstanding and observed early prepayment allows us to also investigate whether the procyclical time-to-maturity at issuance patterns we saw with the primary market data in Table 5 are similar for the effective time-to-maturity. More specifically, focusing on the subsample of fixed coupon, non-financial corporate bonds for which we observe the start date[15] of the instrument, we estimate a linear probability model for the probability of early prepayment as a function of the level of the VIX at the time of issuance, as well as the relationship between the effective time-to-maturity and the level of the VIX at the time of issuance. As in Table 5 (and specification (1)), we control for firm, currency, and country fixed effects, as well as the log coupon rate and the log amount outstanding (in USD equivalents) as of the first observation date for each instrument.

Panel (a) of Table 14 confirms that the procyclical pattern of the contractual time-to-maturity for issuers in advanced economies holds for the instruments in the Capital IQ Debt Capital Structure data, with a one standard deviation increase in the VIX corresponding to a shortening of original time-to-maturity of 0.25 years (relative to a median of 5 years). The original time-to-maturity for debt issued by firms in emerging market economies is slightly countercyclical in the Capital IQ Debt Capital Structure data. Panel (b) then shows the results from the linear probability regression of the instrument exiting the Capital IQ Debt Capital Structure data at least a year before the stated maturity date. For both

[15]In unreported results, we verify that using the VIX as of the quarter of the first fiscal period end date in which the instrument appears on the balance sheet yields similar results. We focus here on the sample with reported start dates to align as closely as possible to the empirical setting in Table 5.

advanced and emerging market economies, a higher level of VIX at the time of issuance corresponds to a higher probability to prepay the debt early. Finally, in panel (c), we see that the higher propensity to prepay debt issued when the VIX is high then translates into highly procyclical effective time-to-maturity, with a one standard deviation increase in the VIX corresponding to a shortening of effective time-to-maturity of 0.25 years (relative to a median 1.75 years) for firms in advance economies. Moreover, the effective time-to-maturity in emerging market economies is also procyclical, though the economic magnitude of the effect is small. Overall, Table 14 again highlights that information on debt instrument amount outstanding, especially information on when a debt instrument exits the firm's balance sheet, cannot be replicated from primary market issuance information alone.

5 Matching to firm characteristics

The final type of information necessary for understanding global corporate credit risk, credit risk pricing, and how access to credit affects real outcomes in an international context is the issuers' financial statements. In matching individual bonds issued (primary market data), quoted (secondary market data), or outstanding to firm financial statements, a number of decisions have to be made. The first is whether the matching happens at the parent or the issuer level. This choice is salient from an economic perspective to the extent that internal capital markets may not be frictionless and to the extent that the ultimate parent companies may not be based in the same geography as the borrowing issuer. Second, financial statements for international firms are available from a number of data providers, with different country coverage. In this paper, we compare the coverage of corporate bond issuers in two of the most commonly used datasets, Worldscope and Compustat –the combination of Compustat North America and Compustat Global. Finally, firms may file at different frequencies – quarterly, semiannually or annually. While annual filings provide the greatest coverage, quarterly filings provide the most up-to-date information on the firm's financial health.

5.1 Identifying companies that are ultimate parents

We match bond issuances, bond outstandings and secondary market bond quotes to balance sheet information for the ultimate parents of the bond issuers. From a theoretical perspective, Stein (1997) argues that the parent company plays an intermediation role in allocating resources across subsidiaries, since the parent company has control rights which allow it to engage in winner-picking. The predictions from Stein (1997) have been found to be borne out in the data in a number of different contexts (see e.g. Matvos and Seru, 2014; Almeida, Kim, and Kim, 2015; Buchuk, Larrain, Prem, and Urzúa Infante, 2020). Moreover, empirical evidence suggests the existence of group-wide optimization of financing costs (Dewaelheyns and Van Hulle, 2010), where subsidiary external debt is a substitute for internal borrowing from the parent company, and the location of the external debt issuance influenced by tax rates, the level of debt market development, and other features that lower costs of external financing (Desai, Foley, and Hines Jr, 2004). These findings all suggest that, from the perspective of identifying determinants of credit market access and the perceived riskiness of corporate bond issuances, parent company balance sheets provide the most salient information.

We rely on proprietary versions of two datasets from S&P Capital IQ Business Entity Cross Reference Service (BECRS) to identify which firms have ultimate parents (that are different from the firm itself) and firms at the top level of the organizational structure. The first is the "Company Foundation File", which provides descriptive data such as the entity name, the entity type (private or public company, investment firm, etc), and the entity status (operating, operating subsidiary, etc). Entities with "operating" status are those which are not controlled by any single company – so that no majority stake is held – or non-strategically controlled with a majority stake held by a financial buyer. We consider entities with operating status as being at the top level of their corresponding corporate structure.

The second is the ultimate parent – entity mapping file, which links an entity covered by the BECRS to the entity's ultimate parent. Under the S&P Capital IQ definition, an

ultimate parent is the company at the top of a corporate structure or the legal organization that is ultimately responsible for all associated entities below it. An entity rolls up to a parent when the parent has at least a 51% ownership stake in the entity; if two organizations jointly own 50% each of an entity, the entity remains its own parent. We verify that firms identified as ultimate parents in the ultimate parent – entity mapping file are also identified as being operating entities in the company foundation file, so that the top organizational structure level information is consistent across the two datasets.

The main drawback of the BECRS is that the cross-reference relationships reported are only valid as of the download date. That is, for example, an entity that was sold from ultimate parent A to ultimate parent B in 2021 will have ultimate parent B listed in data downloaded in 2023, and BECRS data alone would not be sufficient to capture the prior relationship to ultimate parent A. We address this drawback in two steps. First, instead of starting with the snapshot provided by a current (e.g. 2023) download from S&P Capital IQ, we start from the proprietary version of BECRS maintained by the Federal Reserve System, which saves daily snapshots of the BECRS data starting from January 15, 2017, on an on-going basis. That is, starting from January 15, 2017, we have point-in-time information on entity type and status and on the ultimate parents of entities in the BECRS data.

Second, to create a point-in-time version of the data prior to January 15, 2017, we start with the snapshot as of January 15, 2017, and identify corporate actions that would result in different entity status and/or different entity-ultimate parent pairings historically: bankruptcies, spin-offs, and merger and acquisition (M&A) activity, obtained from S&P Capital IQ transactions data (through the screener tool). We use the spin-off data to obtain the date at which entities that are reported as operating firms in January 2017 become operating firms, and what was the ultimate parent at the time of the spin-off. For example, PayPal, Inc., is listed as an operating firm as of the January 15, 2017, snapshot. We observe in the spin-off data that PayPal, Inc., was spun-off from eBay Inc., with a completion date of July 17, 2015. Using this information, we assign the operating firm status and itself as

the ultimate parent to historical PayPal, Inc., observations starting on July 17, 2015. Prior to July 17, 2015, we assign operating subsidiary status and eBay Inc. as the ultimate parent to historical PayPal, Inc., observations.

Similarly, we use the M&A data to track when entity-ultimate parent relationships start and end, and the bankruptcy information to identify when an entity enters into a "liquidating", "reorganizing", or "out of business" status. To the extent that entities, for example, are spun-off and then acquired by a different ultimate parent prior to January 15, 2017, using data on these three corporate action types jointly allows us to observe such ownership changes over time.

Complications arise when firms are acquired and then their acquirer undergoes corporate structure changes. For example, Tektronix, Inc. was acquired by Danaher Corporation on November 20, 2007 (so that the company status of Tektronix, Inc. changes from operating to operating subsidiary on November 20, 2007, and the ultimate corporate parent changes from Tektronix, Inc. to Danaher Corporation). Danaher Corporation then spun-off its specialty industrial businesses into a separate company, Fortive Corporation, on July 2, 2016. Tektronix, Inc., was one of the units included in the spin-off, so that starting on July 2, 2016, Tektronix, Inc., is an operating subsidiary of Fortive Corporation (the ultimate corporate parent of Tektronix, Inc. changes from Danaher Corporation to Fortive Corporation on July 2, 2016). Appendix A provides additional examples of complications that arise when using the corporate actions data. By processing information from historical M&A, spin-off and bankruptcy data jointly, our procedure is able to account for such complicated corporate structure evolutions.

The end result of this two-stage procedure is a database of S&P entities, whether the entity is an operating firm in its own right, and, if not, the entity's ultimate parent at any given moment in time. Throughout this procedure, we keep track of individual entities and their ultimate parents using the S&P company ID. According to S&P Capital IQ, the company ID remains invariant to changes in corporate ownership and name changes, and is

only retired if an entity fully ceases to exist.[16]

5.2 Matching between Compustat and Worldscope

We use company identifiers data from Capital IQ to assign Capital IQ company ids to firm-fiscal period end date observations. The company identifiers data provides ISINs, 9 digit CUSIPs and GVKEYs (Compustat identifiers) – for both debt and equity issuances – associated with a particular Capital IQ company ID for a specified date range. Using the identifier information in Compustat allows us to also infer a date-range specific SEDOL – company id mapping, which we use to supplement company identifiers data provided by Capital IQ directly. When more than one company ID are matched to the same firm-level ID from Worldscope for a given fiscal period end date, or vice versa, we resolve the multiple matches by first choosing the pairing that has the closest match in terms of total debt reported in Worldscope and in Capital IQ, and then the remaining many-to-many matches based on the nearest distance between company names in both datasets.

We begin by comparing the samples of firms captured in Compustat and Worldscope. We merge Compustat and Worldscope based on the fiscal period end date and Capital IQ company ids merged into both datasets. For both Worldscope and Compustat, we use the annual filings data (which gives us the greatest coverage in terms of the number of firms filing), and retain the latest available restatement of each annual filing. Table 15 reports the number of unique firm-years that are matched across both datasets, are unique to Compustat or are unique to Worldscope.[17] The table also reports the match rates separately for firms identified as ultimate parents following the procedure described above and firms identified to be subsidiaries at the time of the fiscal period end date. Comparing first the overall sample size between Worldscope and Compustat, we see that at both the subsidiary and the ultimate

[16]For example, if a company reorganizes internally, merging two of its subsidiaries, ceasing the operations of one of the subsidiaries in the process.

[17]Compustat North America has historical coverage prior to 1980. To make the comparison between Compustat and Worldscope fair, we exclude Compustat observations prior to 1980 for the purpose of these comparison tables.

parent level, Compustat has somewhat more firm-year observations than Worldscope, with around 234,000 firm-year observations remaining unmatched at the ultimate parent level from Compustat, but only around 179,000 observations remaining unmatched from Worldscope.

Comparing the match rates at the subsidiary and the ultimate parent level, we see the importance of using ultimate parent level information in matching across different datasets: the match rate at the ultimate parent level between Compustat and Worldscope is more than 66% but only 46% at the subsidiary level. One potential reason for the lower match rate of subsidiaries is that Compustat and Worldscope capture different subsidiaries of the same ultimate parent. For example, General Electric Company (ultimate corporate parent) appears in both Compustat and Worldscope. At the subsidiary level, Worldscope also captures General Electric de Chile, SA, while Compustat captures General Electric Capital Services and General Electric Canada Company. Thus, while the ultimate parent may appear in both datasets (and, hence, appear as a matched observation), the subsidiaries will not. For the rest of this section, we focus on the financial filings of the ultimate parent companies.

Turning to the cross-country comparison of Compustat and Worldscope coverage in Table 16, we see that, overall, Worldscope provides better coverage of European advanced economies and of some emerging market economies, while Compustat has better representation of firms in the U. S., South Korea, Japan, Australia, and, notably, significantly more coverage of firms in China and India. Thus, depending on the countries being studied, either Compustat or Worldscope may provide more extensive coverage.

A natural question to ask is whether Compustat and Worldscope provide similar information about firm financials for firms that are common to both datasets. Table 17 reports summary statistics for some key variables and financial ratios of interest for each dataset, together with the correlation between the values reported in both for firms in the overlapping sample between Compustat and Worldscope.[18] In both datasets, we define leverage

[18]We translate all level variables to USD million equivalents. Within each dataset, each level variable is trimmed at the 1% level of outliers before ratios are computed; each ratio is then subsequently trimmed at the 1% level as well.

as the ratio of total liabilities to total assets, profitability as the ratio of EBITDA to total assets, asset tangibility as the ratio of (net) property, plant, and equipment (PPE) to total assets, and market-to-book as the ratio of the sum of market value of equity and the book value of liabilities to total assets. Overall, the correlation between values reported in the two datasets are quite high – more than 90% for all the variables considered except for long-term debt maturing in 1 year. The values reported in Worldscope for the variables in levels are somewhat more right skewed, suggesting that Worldscope may capture larger firms than Compustat. The mean firm in Compustat has lower PPE and long-term debt (both total and maturing within one year) values reported but larger cash and short-term investments and larger overall total liabilities. This translates into overall higher riskiness for the average Compustat firm, with an average debt-to-asset ratio of 0.74 for Compustat and 0.99 for Worldscope.

Overall, the results in Tables 15 – 17 suggest that, while there are differences in country coverage between Compustat and Worldscope, there is substantial overlap between the two datasets at the ultimate parent company level and that, for firms that appear in both datasets, Compustat and Worldscope report similar information for key variables of interest. Thus, a plausible strategy to having the greatest cross-country coverage of firm financial statements is to combine the information on financial filings of ultimate parents from Compustat and Worldscope, retaining the full union of financial filing information between the two datasets. This is a strategy that we pursue, for example, in Boyarchenko and Elias (2024c), to get the widest possible cross-section of corporate bond returns.

5.3 Matching bond-level and firm financial statement data

As with the financial filings data, we use company identifiers data from Capital IQ to assign Capital IQ company ids to bond-date observations and the company id – ultimate parent company id mapping to assign (date-specific) ultimate parent company ids. For the primary market data, we first assign company ids based on instrument-level identifiers (ISIN and/or

9 digit CUSIP), then based on the ultimate parent 6 digit CUSIP and/or SEDOL reported in SDC Platinum, then based on the issuer 6 digit CUSIP and/or SEDOL. For the secondary market data, we assign company ids based on the instrument-level identifiers only.

We then match bond-date level data from either the primary, outstanding or secondary market data to financial statement data at the ultimate parent company – annual filing level. In the case of primary and secondary bond market data, we require that the fiscal period end date of the financial statement filing is at least 3 month prior to the bond observation date, so that the financial statement information is "observable" to the market as of the bond observation date. For financial filings that are restated, we use the latest filing for each fiscal period.

For some applications, such as computing default-adjusted spreads in Boyarchenko and Elias (2024c), financial filing data alone is not sufficient. We augment the data from financial filings with expected default frequency (EDFs) data from Moody's KMV CreditEdge (KMV). In particular, using the identifier mappings provided by KMV between KMV firm identifiers and external identifiers, we assign Capital IQ company ids to firm-level EDFs. We then retain the end-of-month observations (since historical data is only available as of the end of the month) for each company id, and match lagged monthly EDF observations to bond-date level data at the ultimate parent company id – month level.

Table 18 reports the country-level match rates for primary market issuances to firm financial filings at the ultimate parent level for firms captured only in Compustat, only in Worldscope, or in both. Three facts are striking about Table 18. First, at the ultimate parent level, the match rate to firm financial statements is substantial for issuers in both advanced and emerging market economies. Amongst the advanced economies, only South Korea has a match rate below 50%; when we restrict our sample of bond issuances to only issues by firms able to issue in major currencies[19] (Table 19), the match rate for South Korea rises to 62%. Similarly, among the emerging market economies, the match rate for bonds issued by issuers

[19]More specifically, we retain issuers that ever issue in a major currency, and keep all issues of those issuers once they access a major currency market.

in China is particularly low (18% overall) but rises to a more representative 28% match rate when we restrict the set of issuance currencies. The overall comparison between the full issuer sample match rate in Table 18 and the match rate restricted to issuers accessing debt markets in major currencies in Table 19 suggests that smaller, private issuers are the ones restricted to accessing debt markets in local currencies.

Second, out of the primary market issuances matched to firm financial statements, the majority are matched to firms that appear in both Compustat and Worldscope. That is, the 66% overlap at the ultimate parent level between Compustat and Worldscope we saw in Table 15 translates into an even higher rate of overlap for bond issuers. Finally, Table 18 shows that, even for the bonds matched ultimate parent characteristics, data on at least some characteristics is frequently missing, with information on EDFs, total assets (in USD equivalents), and leverage the most readily available.

Figure 7 plots the match rate between primary market issuances and firm financial filings for advanced economies, excluding South Korea, emerging market economies, excluding China, South Korea, and China over time. The average match rate for issuers in advanced economies has remained between 60% and 70% throughout our more than 40 year sample period. Throughout, the average match rate for issuers in advanced economies remains higher than for issuers in emerging market economies, but the match rate for issuers in emerging market economies increases steadily from around 30% before 1995 to between 50% and 60% over the last decade. This reflects the greater coverage of firms domiciled in emerging market economies in Compustat and Worldscope over time.

Finally, Table 20 reports the country-level match rates for secondary market quotes to firm financial filings at the ultimate parent level for firms captured only in Compustat, only in Worldscope, or in both. Not surprisingly, given the minimum bond size and issuance in major currency restrictions imposed by ICE in constructing the global bond indices, the match rates (at the bond-month level) for bonds included in ICE are even higher than for primary market issuances over all. As with the primary market issuances, the majority of

ICE observations are matched to firms that appear in both Worldscope and Compustat. The major exception are bonds issued by firms domiciled in Mexico, with a third of the matches only captured by firms appearing in Compustat.

6 Conclusion

Combining granular datasets on different aspects of international debt markets is complicated. This is why most papers only collect data on the aspects that are strictly necessary to answer the question at hand. In this paper, we conduct a comprehensive data exercise, putting together data on access to primary debt markets, secondary market quotes, debt outstanding, and firm financials. Putting together data in a comprehensive manner allows us to show a number of key facts.

First, secondary market quotes from ICE Global Indices cover a large fraction of the global bond offering amount issued but a small fraction of the number of global bonds issued. Bonds captured in ICE are larger, have longer maturities, and lower primary market offering yields than the universe of bonds not captured in ICE, suggesting that caution should be used in drawing implications for overall credit market pricing from secondary market quotes captured in ICE.

Second, using data on debt instruments outstanding at the firm-instrument level, we document that more than 50% of corporate bonds globally have an effective maturity more than one year shorter than the stated contractual maturity. Thus, information from primary market issuances alone are not sufficient to track the debt securities amount outstanding over time. While early prepayment is more common for issuers in advanced economies, as more bonds are issued with call provisions in emerging market economies over time, early prepayment is becoming more common for issuers in those countries as well.

Finally, from an economic perspective, one of the most salient choices to be made is whether we consider primary market access on an issuer or a parent level. To the extent that

internal capital markets are not frictionless and the extent to which firms use subsidiaries in other jurisdictions to issue corporate bonds at favorable rates in global currencies, the choice to match to the parent or the issuing subsidiary may imply a different relationship between firm financial characteristics and access to international debt markets. We construct a point-in-time mapping between ultimate parent companies and their subsidiaries, allowing us to match primary market issuances, secondary market quotes, and debt securities amount outstanding to firm financial filings at the ultimate parent level.

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Table 1: SDC Platinum New Issues database sample coverage. This table reports number of unique bonds and issuers, together with the median size of the bonds (in USD million), the first year a country is in the sample, and the number of year with non-missing observations for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. A unique issuer is identified based on the 6 digit CUSIP of the issuer. We exclude bonds with less than one year maturity.

(a) Non-financial corporations

	Fixed rate					Floating rate				
Country	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size
USA	1980	43	11,303	47,484	149.6	1980	43	1,581	3,454	100.0
South Korea	1985	38	7,456	33,232	5.8	1983	39	259	639	56.1
Japan	1980	43	1,790	13,917	96.9	1981	40	337	794	45.2
Canada	1980	43	1,068	4,391	155.9	1980	37	106	258	185.0
United Kingdom	1980	43	1,087	4,262	163.4	1981	38	198	729	75.0
Netherlands	1980	43	586	3,044	191.7	1980	41	143	672	105.9
France	1980	43	427	2,629	323.0	1980	42	126	434	218.5
Taiwan	1981	34	281	1,869	49.6	1992	15	45	85	29.2
Australia	1980	43	385	1,612	104.6	1980	36	126	289	104.7
Germany	1982	41	348	1,260	334.7	1982	27	65	243	293.1
Other AE	1980	43	2,580	8,684	124.5	1980	43	993	2,084	77.7
China	1987	29	4,017	23,599	135.6	1985	22	831	1,540	145.3
Malaysia	1987	34	365	2,667	22.6	1984	26	74	422	5.1
Thailand	1985	33	283	2,568	47.5	1991	27	62	135	62.2
India	1986	30	599	2,436	32.7	1983	28	87	155	35.6
Indonesia	1990	32	226	1,250	27.1	1989	16	41	53	20.8
Brazil	1988	34	456	962	103.0	1990	33	1,009	2,518	62.6
Mexico	1980	42	251	922	194.8	1982	36	278	641	55.8
Russia	1991	26	285	759	156.9	1996	15	90	240	89.5
Chile	1989	34	162	596	110.5	1991	16	40	69	66.7
Argentina	1988	34	195	544	40.0	1981	28	137	355	11.3
Other EM	1980	43	989	2,763	62.3	1980	39	541	2,051	0.7

(b) Financial corporations

	Fixed rate					Floating rate				
Country	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size
USA	1980	43	6,404	46,742	50.0	1980	43	1,923	23,547	100.0
South Korea	1983	37	1,264	24,533	26.5	1981	38	237	2,732	44.2
Japan	1981	42	433	5,339	98.5	1983	40	244	1,114	97.6
Canada	1980	43	545	4,102	140.8	1980	43	151	1,925	195.8
United Kingdom	1981	40	1,054	10,193	43.8	1983	40	504	6,104	64.0
Netherlands	1980	43	581	5,847	83.0	1980	43	305	2,457	100.0
France	1980	43	382	6,726	100.6	1980	43	211	3,409	118.5
Taiwan	1992	28	156	1,019	49.7	1987	25	82	371	28.3
Australia	1980	43	420	6,027	55.7	1984	39	300	3,521	148.8
Germany	1982	41	546	10,590	98.8	1984	38	260	5,744	119.7
Other AE	1980	43	3,308	29,776	51.6	1980	43	2,084	14,864	74.6
China	1985	36	3,946	24,781	141.0	1980	35	872	1,781	150.0
Malaysia	1984	34	405	3,750	25.1	1982	33	141	965	7.0
Thailand	1991	32	180	1,764	41.9	1988	33	56	204	59.4
India	1983	34	469	8,767	22.7	1980	33	139	769	14.5
Indonesia	1989	33	214	1,536	33.0	1987	25	76	152	43.9
Brazil	1990	33	255	824	83.5	1989	34	428	883	50.0
Mexico	1982	36	166	612	88.7	1980	36	247	1,110	50.2
Russia	1996	23	373	1,344	73.8	1997	20	104	212	83.3
Chile	1991	30	76	406	49.6	1980	22	29	77	27.6
Argentina	1981	33	139	510	17.9	1980	30	113	552	12.8
Other EM	1980	42	1,880	7,911	75.6	1980	43	1,226	7,797	41.9

Table 2: Consolidated primary market sample coverage. This table reports number of unique non-financial bonds and issuers, together with the median size of the bonds (in USD million), the first year a country is in the sample, and the number of year with non-missing observations for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. A unique issuer is identified based on the 6 digit CUSIP of the issuer. We exclude bonds with less than one year maturity.

(a) Fixed rate

	Mergent FISD only					Both Mergent FISD and SDC Platinum					SDC Platinum only				
Country	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size
USA	1950	70	5,135	27,138	16	1980	43	4,907	22,875	350	1980	43	9,089	24,952	60
South Korea	1992	20	28	49	348	1992	25	36	130	448	1985	38	7,432	32,683	6
Japan	1984	21	11	486	5	1988	28	25	150	500	1980	43	1,784	13,791	96
Canada	1966	56	325	677	194	1980	41	333	1,054	382	1980	43	967	3,424	122
United Kingdom	1975	32	165	349	289	1992	29	157	472	650	1980	43	1,040	3,819	137
Netherlands	1972	32	92	183	200	1991	31	106	266	700	1980	43	555	2,724	150
France	1976	21	49	84	400	1991	26	48	144	797	1980	43	423	2,523	303
Australia	1976	24	44	70	300	1983	31	57	146	500	1980	43	365	1,486	100
Taiwan	–	–	–	–	–	2020	3	1	7	999	1981	34	280	1,676	38
Germany	1985	14	29	43	265	2000	16	24	35	500	1982	41	339	1,218	332
Other AE	1974	33	228	436	317	1992	31	274	645	547	1980	43	2,456	7,964	110
China	1997	11	19	31	398	1996	17	48	125	717	1987	29	3,954	23,225	137
Malaysia	1993	11	9	21	493	1999	6	4	8	697	1987	34	361	2,651	23
Thailand	1996	4	5	8	249	2004	9	8	14	473	1985	33	279	2,552	47
India	1995	6	11	18	269	1997	9	24	41	500	1986	30	581	2,350	32
Indonesia	1996	11	14	23	254	1993	17	28	46	499	1990	32	213	1,213	26
Mexico	1993	29	87	214	260	1993	28	72	159	495	1980	42	224	760	150
Brazil	1993	29	88	141	248	1996	23	61	101	500	1988	34	433	860	97
Russia	1997	11	17	24	400	2002	15	19	33	650	1991	26	274	725	154
Chile	1995	23	27	55	298	1995	23	43	81	425	1989	33	148	496	86
Argentina	1985	23	49	82	126	1994	17	32	42	300	1988	34	185	485	31
Other EM	1960	63	542	937	83	1992	31	229	479	544	1980	43	886	2,275	46

(b) Floating rate

	Mergent FISD only					Both Mergent FISD and SDC Platinum					SDC Platinum only				
Country	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size
USA	1964	45	880	1,818	100	1984	38	620	1468	250	1980	43	1,210	2,151	52
South Korea	1996	4	5	5	200	1998	3	3	3	300	1985	39	255	624	56
Japan	1993	21	10	249	50	1994	18	3	255	100	1980	40	335	789	46
Canada	1984	17	27	44	180	1993	23	30	59	500	1980	37	89	210	156
United Kingdom	1995	15	28	44	150	1994	24	24	61	500	1980	38	193	658	59
Netherlands	1997	9	17	28	400	1999	15	17	27	500	1980	41	136	643	100
France	1980	8	16	21	115	2000	5	7	10	645	1980	42	124	425	211
Australia	1993	3	3	5	80	1995	5	5	6	688	1980	34	120	279	103
Taiwan	–	–	–	–	–	–	–	–	–	–	1981	14	44	82	29
Germany	2000	5	8	9	150	1996	1	1	1	100	1982	27	66	240	274
Other AE	1996	21	57	114	223	1996	18	30	39	500	1980	43	975	2,035	77
China	2000	3	3	3	550	2014	2	4	5	500	1987	22	839	1,550	145
Malaysia	–	–	–	–	–	–	–	–	–	–	1987	26	74	419	5
Thailand	–	–	–	–	–	–	–	–	–	–	1985	27	62	135	62
India	1997	1	1	1	25	–	–	–	–	–	1986	28	86	136	42
Indonesia	2002	1	1	1	124	–	–	–	–	–	1990	16	41	53	21
Mexico	1994	8	8	11	275	1994	7	6	9	250	1980	36	267	613	56
Brazil	1994	4	5	5	112	2003	1	2	2	265	1988	33	987	2,466	63
Russia	2003	1	1	1	297	–	–	–	–	–	1991	15	90	238	89
Chile	2019	1	1	1	450	2013	1	1	1	450	1989	16	39	68	68
Argentina	1994	5	7	10	70	–	–	–	–	–	1988	28	135	345	11
Other EM	1978	33	103	300	80	1992	7	7	10	225	1980	39	529	1,457	4

Table 3: Primary market issuance by industry. This table reports number of unique non-financial bonds and issuers, together with the median size of the bonds (in USD million), the first year an industry is in the sample, and the number of year with non-missing observations for each industry. A unique issuer is identified based on the 6 digit CUSIP of the issuer. We exclude bonds with less than one year maturity.

(a) Fixed rate

	Mergent FISD only					Both Mergent FISD and SDC Platinum					SDC Platinum only				
Industry	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size
Agriculture	1970	19	22	33	138	1984	24	27	36	200	1980	43	332	1,034	44
Construction	1979	38	113	452	75	1980	39	124	437	300	1980	43	2,816	15,132	77
Manufacturing	1955	65	2,265	8,847	40	1980	43	2,246	9,637	400	1980	43	13,007	49,020	45
Mining	1965	55	562	1,717	150	1980	43	646	2,122	498	1980	43	1,630	6,793	140
Public Administration	1996	11	23	42	83	1994	13	44	77	598	1993	27	38	199	81
Retail Trade	1960	58	415	1,421	50	1980	43	374	1,569	425	1980	43	1,587	5,683	57
Services	1967	54	934	3,544	20	1980	42	1,095	3,437	400	1980	43	4,172	13,301	51
Utilities	1950	70	1,700	11,162	25	1980	43	1,686	8,980	300	1980	43	6,691	36,150	98
Wholesale Trade	1969	51	244	620	100	1980	41	284	724	350	1980	43	2,073	6,538	14

(b) Floating rate

	Mergent FISD only					Both Mergent FISD and SDC Platinum					SDC Platinum only				
Industry	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size
Agriculture	1985	3	4	5	17	2005	1	1	1	14	1980	31	85	211	7
Construction	1984	9	9	15	50	1998	12	4	30	45	1980	39	504	1,139	71
Manufacturing	1979	38	348	859	100	1986	35	296	1,110	200	1980	43	2,391	5,159	63
Mining	1980	26	36	54	150	1985	22	38	59	500	1980	43	325	683	120
Public Administration	–	–	–	–	–	–	–	–	–	–	1993	10	9	13	183
Retail Trade	1964	30	77	120	80	1992	22	42	65	326	1980	42	370	843	57
Services	1983	29	102	155	100	1985	27	81	142	249	1980	43	937	2,089	45
Utilities	1980	37	348	630	160	1984	32	262	510	300	1980	43	1,786	4,428	91
Wholesale Trade	1986	16	25	36	50	1993	14	20	25	200	1980	42	298	1,051	15

Table 4: Primary market issuance by currency. This table reports number of unique bonds and issuers, together with the median size of the bonds (in USD million), the first year a country is in the sample, and the number of year with non-missing observations for each country for the top 10 currencies. Currencies ranked based on total number of unique non-financial corporate fixed-rate bonds issued in that currency. "EUR" includes both Euro and Euro-precursor currencies. A unique issuer is identified based on the 6 digit CUSIP of the issuer. We exclude bonds with less than one year maturity.

	Fixed rate					Floating rate				
Currency	First year	Years	Issuers	Bonds	Median size	First year	Years	Issuers	Bonds	Median size
USD	1950	70	20,003	89,174	103	1964	46	3,352	7,676	100
KRW	1994	29	7,452	32,403	6	1994	24	182	399	53
CNY	1998	23	3,951	23,024	135	2001	20	831	1,547	145
JPY	1980	43	1,379	12,069	98	1985	38	277	1,056	36
EUR	1980	43	3,678	10,853	321	1984	39	1,181	2,649	145
CHF	1982	41	1,419	2,968	69	1985	30	106	127	27
MYR	1990	33	360	2,621	22	1991	22	63	408	5
CAD	1975	43	739	2,553	147	1993	27	60	124	147
THB	1991	32	273	2,545	47	1994	22	54	120	61
INR	2001	22	569	2,261	30	2002	20	73	118	35
Other	1980	43	2,939	9,665	67	1981	42	2,377	5,939	43

Table 5: Procyclicality of original time-to-maturity. This table reports the estimated coefficient from the bond-level regression of original time-to-maturity (in years) on the VIX (divided by 100) at the time of issuance. All regressions include issuer, ultimate parent, country, industry, and issuance currency fixed effects, as well as log coupon rate, log offering amount (in USD equivalents) and a dummy for callability. Sample includes fixed coupon, non-financial corporate bonds only. Standard errors clustered at the ultimate parent level reported in parentheses below the point estimates.*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Advanced economies

	US	KR	JP	CA	GB	NL	FR	TW	AU	DE	All
VIX	-9.53	-1.66	-1.91	-16.79	-4.88	-7.37	-6.53	-0.38	-7.27	-9.70	-6.07
	(0.81)***	(0.41)***	(0.98)*	(2.25)***	(2.08)**	(1.64)***	(1.53)***	(0.75)	(2.20)***	(2.66)***	(0.45)***
Adj. R-sqr.	0.31	0.31	0.31	0.28	0.28	0.24	0.23	0.12	0.43	0.13	0.37
W/in adj. R-sqr.	0.11	0.01	0.06	0.09	0.02	0.04	0.04	0.05	0.03	0.05	0.06
N. of obs	46575	15826	10500	3735	3179	2180	1824	1306	1063	865	92870
N. of clusters	2789	1411	739	352	354	219	166	108	134	108	6597

(b) Emerging market economies

	CN	MY	TH	IN	ID	MX	BR	RU	CL	AR	All
VIX	1.59	-6.75	-0.79	1.45	-1.06	-10.83	-5.99	-11.94	-11.29	-0.68	0.61
	(0.31)***	(7.09)	(1.79)	(2.52)	(1.35)	(6.43)*	(3.72)	(4.45)***	(8.77)	(3.60)	(0.52)
Adj. R-sqr.	0.32	0.63	0.48	0.44	0.44	0.08	0.15	0.26	-0.07	0.18	0.51
W/in adj. R-sqr.	0.05	0.28	0.16	0.05	0.05	0.05	0.09	0.04	-0.04	0.07	0.05
N. of obs	13548	1980	1985	1539	1042	578	400	393	165	306	23458
N. of clusters	1692	160	136	200	110	75	75	67	32	62	2819

Table 6: ICE Global Bond Indices sample coverage. This table reports number of unique bonds and issuers, together with the median size of the bonds (in USD million), the median OAS (in bps), the first year a country is in the sample, and the number of year with non-missing observations for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. A unique issuer is identified based on the 6 digit CUSIP of the issuer.

(a) Non-financial corporations

	Investment grade						High yield					
Country	First year	Years	Issuers	Bonds	Median size	Median OAS	First year	Years	Issuers	Bonds	Median size	Median OAS
USA	1998	25	3,558	19,213	499	119	1998	25	4,644	14,139	350	419
South Korea	1999	24	181	325	400	110	1999	21	17	23	230	320
Japan	1998	25	1,521	2,619	275	22	2004	17	18	30	763	354
Canada	1998	25	541	2,442	230	141	1998	25	384	956	300	430
United Kingdom	1998	25	1,308	2,052	549	114	1998	25	622	859	410	456
Netherlands	1998	25	536	783	642	87	1998	25	245	340	453	447
France	1998	25	1,176	1,488	782	91	1998	25	411	481	585	376
Taiwan	2005	14	11	29	700	115	2012	3	1	1	226	412
Australia	1998	25	534	665	319	120	1998	25	44	71	400	515
Germany	1998	25	1,066	1,584	787	89	1998	25	332	387	500	334
Other AE	1998	25	1,919	2,660	661	112	1998	25	1,031	1,312	502	413
China	1999	15	393	579	522	144	2000	21	135	147	372	564
Malaysia	1998	25	42	58	500	145	2009	7	4	4	300	448
Thailand	1998	25	22	39	400	186	2000	19	8	10	250	698
India	2007	16	53	74	500	198	2005	18	67	90	500	416
Indonesia	2012	11	23	64	900	248	1998	17	54	68	477	468
Brazil	1998	25	112	321	750	202	1998	24	112	236	375	548
Mexico	2008	15	91	172	774	282	1998	20	179	320	614	432
Russia	2004	19	84	141	960	262	2003	20	96	153	600	382
Chile	1998	25	59	163	499	195	2002	20	31	50	404	424
Argentina	1999	6	3	4	300	347	1998	13	37	72	400	782
Other EM	1998	25	259	462	750	188	1998	25	387	595	500	506

(b) Financial corporations

	Investment grade						High yield					
Country	First year	Years	Issuers	Bonds	Median size	Median OAS	First year	Years	Issuers	Bonds	Median size	Median OAS
USA	1998	25	2,819	9,607	500	114	1998	25	597	1,409	400	409
South Korea	2002	21	103	161	400	121	2002	17	6	12	500	217
Japan	1998	25	1,122	2,053	500	29	2009	13	30	40	743	367
Canada	1998	25	396	1,552	382	96	1998	22	35	56	161	399
United Kingdom	1998	25	1,421	1,955	545	141	2001	21	229	259	398	489
Netherlands	1998	25	1,317	1,662	509	61	1999	20	38	50	499	343
France	1998	25	1,301	1,526	680	112	2008	15	55	60	628	398
Taiwan	2005	10	2	2	500	238	–	–	–	–	–	–
Australia	1998	25	992	1,312	370	98	1998	7	4	4	340	588
Germany	1998	25	1,434	1,788	429	82	1998	21	81	87	574	353
Other AE	1998	25	2,666	3,208	633	121	1998	24	586	624	551	381
China	1998	16	494	573	500	149	2006	17	501	556	400	701
Malaysia	1998	24	28	28	400	123	1998	7	3	3	200	298
Thailand	2005	18	18	31	500	133	2002	14	8	10	267	228
India	2006	17	67	90	500	203	2005	17	37	44	350	350
Indonesia	2012	11	9	9	500	165	1998	13	30	33	300	607
Brazil	2002	21	23	35	750	234	1998	21	27	38	392	661
Mexico	2004	10	33	56	775	310	2008	15	49	91	500	384
Russia	2004	15	44	65	780	348	2005	18	77	105	500	511
Chile	1998	25	38	47	300	154	2007	14	2	2	500	471
Argentina	–	–	–	–	–	–	1998	13	10	16	207	826
Other EM	1998	25	656	772	500	150	1998	24	255	356	500	483

Table 7: ICE Global Bond Indices sample coverage by currency. This table reports number of unique bonds and issuers, together with the median size of the bonds (in USD million), the median OAS (in bps), the first year a country is in the sample, and the number of year with non-missing observations for each currency included in the ICE Global Bond Indices. "EUR" includes both Euro and Euro-precursor currencies. A unique issuer is identified based on the 6 digit CUSIP of the issuer.

(a) Non-financial corporations

	Investment grade						High yield					
Country	First year	Years	Issuers	Bonds	Median size	Median OAS	First year	Years	Issuers	Bonds	Median size	Median OAS
USD	1998	25	4,595	22,593	500	125	1998	25	5,924	16,833	375	427
CAD	1998	25	481	2,001	185	135	1998	25	150	270	178	427
EUR	1998	25	4,452	5,926	751	95	1998	25	2,176	2,421	511	401
GBP	1998	25	1,130	1,276	463	121	1998	25	410	441	378	424
JPY	1998	25	1,336	2,281	265	21	–	–	–	–	–	–
AUD	1998	25	645	666	170	110	–	–	–	–	–	–
CHF	2020	3	192	216	250	63	–	–	–	–	–	–

(b) Financial corporations

	Investment grade						High yield					
Country	First year	Years	Issuers	Bonds	Median size	Median OAS	First year	Years	Issuers	Bonds	Median size	Median OAS
USD	1998	25	4,004	12,644	500	119	1998	25	1,662	2,798	415	459
CAD	1998	25	468	1,523	276	95	1998	22	28	38	123	301
EUR	1998	25	5,066	6,102	677	99	1998	25	669	691	567	397
GBP	1998	25	1,560	1,723	452	141	2001	21	243	257	322	532
JPY	1998	25	1,343	2,132	429	27	–	–	–	–	–	–
AUD	1998	25	1,238	1,323	165	104	–	–	–	–	–	–
CHF	2020	3	499	510	201	72	–	–	–	–	–	–
DKK	2020	3	1	1	633	242	–	–	–	–	–	–

Table 8: Coverage of primary market issuances in secondary market quotes. This table reports number of unique non-financial bonds and issuers, together with the median size of the bonds (in USD million), and the median offering yield (in bps) for bonds ever included and bonds that are never included in ICE Global Bond Indices for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. A unique issuer is identified based on the 6 digit CUSIP of the issuer. We exclude bonds with less than one year maturity, non-fixed coupon bonds, and bonds maturing prior to 1999.

(a) Non-financial issuers

	Included in ICE				Not included in ICE			
Country	Issuers	Bonds	Median size	Median offering yield	Issuers	Bonds	Median size	Median offering yield
USA	4,067	26,856	450	561	7,541	35,749	75	688
South Korea	51	248	390	332	6,921	27,978	5	530
Japan	108	1,168	274	146	1,121	9,805	96	111
Canada	517	2,846	249	556	733	1,834	93	600
United Kingdom	396	1,626	549	475	856	2,684	98	451
Netherlands	222	1,218	650	403	299	1,185	124	463
France	175	1,187	698	325	343	1,277	165	434
Australia	117	474	320	440	299	1,085	90	514
Taiwan	1	7	999	147	279	1,669	39	180
Germany	118	568	648	254	265	681	151	479
Other AE	667	2,369	569	446	1,936	5,526	100	444
China	119	302	496	440	3,934	23,075	133	520
Malaysia	6	21	598	504	356	2,653	23	502
Thailand	13	25	398	466	271	2,510	47	399
India	37	82	500	466	579	2,318	31	900
Indonesia	33	79	544	550	208	1,192	25	925
Mexico	74	351	563	622	191	624	150	796
Brazil	68	165	535	699	387	744	114	879
Russia	37	81	625	656	269	698	150	875
Chile	49	144	492	520	139	484	85	620
Argentina	28	65	300	884	157	452	29	888
Other EM	299	841	500	600	724	2,250	45	745

(b) Financial issuers

	Included in ICE				Not included in ICE			
Country	Issuers	Bonds	Median size	Median offering yield	Issuers	Bonds	Median size	Median offering yield
USA	1,706	13,651	298	518	4,090	109,927	48	550
South Korea	27	147	327	328	1,177	22,347	27	268
Japan	71	905	388	130	358	3,758	91	94
Canada	225	1,503	320	345	365	12,697	106	525
United Kingdom	379	1,561	534	425	816	29,297	24	631
Netherlands	206	1,275	551	410	328	4,202	63	491
France	124	1,199	557	293	321	6,044	77	420
Australia	174	1,082	219	442	319	4,474	39	409
Taiwan	3	8	598	204	156	1,000	49	201
Germany	123	816	363	425	433	7,640	100	400
Other AE	769	3,369	499	361	2,601	31,207	50	315
China	217	549	300	650	3,852	24,029	139	511
Malaysia	18	40	400	327	388	3,639	25	460
Thailand	11	24	498	432	172	1,680	40	369
India	20	43	498	457	466	8,596	23	895
Indonesia	16	21	300	490	191	1,487	33	880
Mexico	32	63	400	672	134	493	83	779
Brazil	38	96	499	576	205	510	100	820
Russia	41	82	500	695	358	1,256	64	830
Chile	15	63	296	326	71	363	41	345
Argentina	9	19	187	864	112	413	13	1150
Other EM	527	1,231	497	464	1,413	5,392	65	490

Table 9: Coverage of primary market issuances in secondary market quotes by industry. This table reports number of unique non-financial bonds and issuers, together with the median size of the bonds (in USD million), and the median offering yield (in bps) for each industry. A unique issuer is identified based on the 6 digit CUSIP of the issuer. We exclude bonds with less than one year maturity.

	Included in ICE				Not included in ICE			
Industry	Issuers	Bonds	Median size	Median offering yield	Issuers	Bonds	Median size	Median offering yield
Agriculture	31	64	200	800	302	956	48	560
Construction	198	877	350	546	2,603	13,913	80	520
Manufacturing	2,362	14,031	499	488	10,933	42,868	45	546
Mining	725	3,515	499	625	1,381	5,971	141	634
Public Administration	46	126	442	463	40	184	78	389
Retail Trade	371	2,268	498	525	1,287	5,006	60	636
Services	1,257	5,154	450	529	3,496	12,744	55	494
Utilities	2,001	13,352	400	499	6,008	36,546	91	582
Wholesale Trade	276	1,088	400	596	1,871	5,872	10	455

Table 10: Coverage of primary market issuances in secondary market quotes by currency. This table reports number of unique bonds and issuers, together with the median size of the bonds (in USD million), and the median offering yield (in bps) for each currency for the top 10 currencies. Currencies ranked based on total number of unique non-financial corporate fixed-rate bonds issued in that currency. "EUR" includes both Euro and Euro-precursor currencies. A unique issuer is identified based on the 6 digit CUSIP of the issuer. We exclude bonds with less than one year maturity.

(a) Non-financial issuers

	Included in ICE				Not included in ICE			
Currency	Issuers	Bonds	Median size	Median offering yield	Issuers	Bonds	Median size	Median offering yield
USD	5,736	32,104	492	571	10,629	43,805	80	675
KRW	–	–	–	–	6,941	27,782	5	532
CNY	–	–	–	–	3,951	23,024	135	520
JPY	125	993	255	128	1,236	9,783	95	105
EUR	1,215	4,980	657	300	2,031	4,154	175	493
CHF	64	155	213	87	638	1,453	110	292
MYR	–	–	–	–	355	2,614	22	500
CAD	350	1,642	194	481	383	705	87	544
THB	–	–	–	–	266	2,508	47	398
INR	–	–	–	–	569	2,261	30	900
Other	344	827	414	536	2,505	8,387	59	575

(b) Financial issuers

	Included in ICE				Not included in ICE			
Currency	Issuers	Bonds	Median size	Median offering yield	Issuers	Bonds	Median size	Median offering yield
USD	3,209	18,331	325	508	7,221	164,839	50	570
KRW	–	–	–	–	1,176	21,379	26	267
CNY	1	2	448	222	3,977	26,627	116	465
JPY	137	900	284	71	1,003	8,310	49	132
EUR	1,280	5,627	563	362	2,813	18,039	109	413
CHF	164	511	193	50	714	4,253	149	243
MYR	–	–	–	–	388	3,532	24	465
CAD	268	1,256	199	409	353	1,050	115	417
THB	–	–	–	–	180	1,690	40	370
INR	–	–	–	–	474	8,675	22	895
Other	473	1,104	407	511	3,293	21,995	29	425

Table 11: First observation date vs reported start dates. This table reports the fraction of instrument-level observations for which the first observed fiscal period end date is a year or less later than the reported start date in Capital IQ Debt Structures database for bank debt and bonds for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country.

(a) Bank debt

	> 1 year	≤ 1 year
US	19.52	80.48
KR	28.66	71.34
JP	29.67	70.33
CA	15.19	84.81
GB	28.33	71.67
NL	37.73	62.27
FR	48.56	51.44
TW	24.36	75.64
AU	18.97	81.03
DE	37.59	62.41
Other AE	32.18	67.82
CH	29.80	70.20
MY	31.52	68.48
TH	26.22	73.78
IN	46.87	53.13
ID	36.78	63.22
BR	37.40	62.60
MX	31.75	68.25
RU	29.27	70.73
CL	19.25	80.75
AR	14.16	85.84
Other EM	35.12	64.88
Total	29.65	70.35

(b) Bonds

	> 1 year	≤ 1 year
US	9.31	90.69
KR	19.30	80.70
JP	25.38	74.62
CA	13.73	86.27
GB	18.89	81.11
NL	17.60	82.40
FR	34.03	65.97
TW	25.13	74.87
AU	15.91	84.09
DE	12.78	87.22
Other AE	27.59	72.41
CH	14.25	85.75
MY	16.89	83.11
TH	7.84	92.16
IN	46.24	53.76
ID	17.05	82.95
BR	30.76	69.24
MX	22.10	77.90
RU	32.11	67.89
CL	16.93	83.07
AR	15.71	84.29
Other EM	22.40	77.60
Total	18.05	81.95

Table 12: Initial time to maturity vs effective time to maturity. This table reports the fraction of instrument-level observations for which the effective time-to-maturity is at least a year earlier than the time-to-maturity at issuance in Capital IQ Debt Structures database for bank debt and bonds for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. Effective maturity identified as the last fiscal period end date that the instrument appears with non-zero amount outstanding in the data; observations where the last fiscal period end date of the instrument coincides with the last fiscal period end date of the company are excluded.

(a) Bank debt

	Contractual	Early
US	38.61	61.39
KR	61.43	38.57
JP	67.61	32.39
CA	47.80	52.20
GB	31.06	68.94
NL	33.31	66.69
FR	36.56	63.44
TW	46.10	53.90
AU	52.56	47.44
DE	35.52	64.48
Other AE	49.19	50.81
CH	71.98	28.02
MY	41.10	58.90
TH	45.18	54.82
IN	37.26	62.74
ID	49.76	50.24
BR	52.30	47.70
MX	46.02	53.98
RU	54.57	45.43
CL	79.41	20.59
AR	72.68	27.32
Other EM	59.85	40.15
Total	62.97	37.03

(b) Bonds

	Contractual	Early
US	42.41	57.59
KR	60.49	39.51
JP	61.58	38.42
CA	43.21	56.79
GB	29.06	70.94
NL	34.41	65.59
FR	32.58	67.42
TW	44.33	55.67
AU	28.75	71.25
DE	39.83	60.17
Other AE	42.42	57.58
CH	55.17	44.83
MY	37.94	62.06
TH	63.43	36.57
IN	45.23	54.77
ID	59.85	40.15
BR	55.15	44.85
MX	34.18	65.82
RU	37.88	62.12
CL	37.97	62.03
AR	68.04	31.96
Other EM	51.39	48.61
Total	48.58	51.42

Table 13: Initial time to maturity vs effective time to maturity by currency. This table reports the fraction of instrument-level observations for which the effective time-to-maturity is at least a year earlier than the time-to-maturity at issuance in Capital IQ Debt Structures database for bank debt and bonds across different currencies of the instruments. "Local" currency instruments are those issued in the issuer's country's currency. Effective maturity identified as the last fiscal period end date that the instrument appears with non-zero amount outstanding in the data; observations where the last fiscal period end date of the instrument coincides with the last fiscal period end date of the company are excluded.

(a) Bank debt

	Contractual	Early
Local, USD	38.69	61.31
Local, EUR	44.67	55.33
Local, not USD/EUR	65.19	34.81
Foreign, USD	63.76	36.24
Foreign, EUR	46.17	53.83
Foreign, not USD/EUR	58.94	41.06
Total	62.97	37.03

(b) Bonds

	Contractual	Early
Local, USD	44.16	55.84
Local, EUR	40.49	59.51
Local, not USD/EUR	53.51	46.49
Foreign, USD	42.26	57.74
Foreign, EUR	33.54	66.46
Foreign, not USD/EUR	35.80	64.20
Total	48.58	51.42

Table 14: Procyclicality of propensity to prepay. This table reports the estimated coefficient from the bond-level regression of original time-to-maturity (panel a), dummy of early prepayment (panel b), and effective time-to-maturity (panel c) on the VIX (divided by 100) at the time of issuance. All regressions include ultimate parent, country, industry, and issuance currency fixed effects, as well as log coupon rate and log offering amount (in USD equivalents). Sample includes fixed coupon, non-financial corporate bonds in Capital IQ Debt Structures database with reported offering (start) dates only. Standard errors clustered at the ultimate parent level reported in parentheses below the point estimates.*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Original time to maturity

	US	AE excluding US	EME
VIX	-0.02	-1.54	0.98
	(0.96)	(0.34)***	(0.51)*
Adj. R-sqr.	0.43	0.44	0.53
W/in adj. R-sqr.	0.04	0.02	0.03
N. of obs	8466	33493	20776
N. of clusters	1362	2552	1450

(b) Early prepayment

	US	AE excluding US	EME
VIX	0.47	0.30	0.80
	(0.08)***	(0.07)***	(0.08)***
Adj. R-sqr.	0.43	0.30	0.35
W/in adj. R-sqr.	0.03	0.01	0.02
N. of obs	8484	33476	20802
N. of clusters	1362	2555	1463

(c) Effective time to maturity

	US	AE excluding US	EME
VIX	-2.77	-1.76	-0.55
	(0.44)***	(0.21)***	(0.25)**
Adj. R-sqr.	0.45	0.58	0.45
W/in adj. R-sqr.	0.05	0.06	0.04
N. of obs	7852	31970	19106
N. of clusters	1301	2472	1392

Table 15: Matching between Compustat and Worldscope for ultimate parents and subsidiaries. This table firm-year observation counts for firms in Compustat, Worldsope, or in the matched Compustat-Worldscope sample, for firms identified as being at the highest level of the organization structure and for subsidiary firms. Compustat includes Compustat North America and Compustat Global. Both datasets are at an annual frequency.

Source	Subsidiary	Ultimate parent	Total
Compustat only	140,572	234,119	374,691
Both	194,529	819,610	1,014,139
WS only	84,360	179,155	263,515
Total	419,461	1,232,884	1,652,345

Table 16: Cross-country coverage in Compustat and Worldscope. This table reports firm-year observation counts for firms at the highest level of organization structure for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on the total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. Compustat includes Compustat North America and Compustat Global. Both datasets are at an annual frequency.

Country	Compustat only	Both	WS only
United States	69,782	164,085	42,390
South Korea	11,412	35,707	4,849
Japan	13,684	97,989	5,453
Canada	10,940	27,399	26,207
United Kingdom	5,161	34,994	9,638
Netherlands	456	3,519	940
France	939	14,763	5,402
Taiwan	1,944	35,284	4,758
Australia	6,090	31,055	3,221
Germany	1,524	15,377	3,757
Other AE	15,143	103,323	18,799
China	16,652	69,645	3,893
Malaysia	2,321	19,685	1,847
Thailand	737	13,857	1,377
India	42,610	49,229	3,800
Indonesia	959	8,476	808
Mexico	303	2,724	703
Brazil	1,140	7,069	1,418
Russia	441	3,010	6,863
Chile	468	3,039	655
Argentina	175	1,488	460
Other EM	22,569	77,978	26,432

Table 17: Financial information in Compustat and Worldscope. This table reports summary statistics for key accounting variables from Compustat and Worldscope, together with correlations between the values reported in each dataset. Level variables reported in USD million. Each level variable is trimmed at the 1% level for outliers before ratios are computed; each ratio is then subsequently trimmed at the 1% level as well. Compustat includes Compustat North America and Compustat Global. Both datasets are at an annual frequency.

	Mean	Std. dev.	p10	p25	p50	p75	p90	N. obs.	Correlation
Total assets									
Compustat	1448.58	5141.60	4.87	23.92	114.47	541.47	2607.17	978,438	1
Worldscope	1442.06	5068.61	5.12	26.04	121.24	557.78	2616.08	964,351	
Total liabilities									
Compustat	1000.36	3919.29	1.46	8.62	49.19	284.87	1599.30	977,677	1
Worldscope	995.26	3854.61	1.43	9.12	51.91	296.26	1617.83	960,163	
Long-term debt maturing in 1 year									
Compustat	27.89	105.97	0.00	0.00	0.66	7.50	48.29	797,691	0.88
Worldscope	43.38	165.58	0.00	0.00	0.79	11.18	75.65	639,296	
Total long-term debt									
Compustat	236.68	892.78	0.00	0.01	4.17	54.06	422.96	963,414	0.98
Worldscope	256.82	960.25	0.00	0.00	5.20	64.97	463.52	971,817	
Cash and short-term investments									
Compustat	123.19	406.77	0.13	1.52	11.32	58.58	245.39	987,409	0.98
Worldscope	99.06	299.91	0.20	1.70	11.21	55.42	214.01	911,689	
Property, plant, and equipment (Net)									
Compustat	248.98	833.26	0.18	2.41	19.44	105.45	492.61	960,051	0.99
Worldscope	263.98	873.17	0.25	3.06	22.10	116.33	526.49	948,744	
EBITDA									
Compustat	100.75	339.09	-2.00	0.24	7.22	40.95	209.12	968,114	0.97
Worldscope	105.04	344.04	-2.83	0.59	9.17	48.08	224.54	871,356	
Log total assets									
Compustat	4.72	2.43	1.58	3.17	4.74	6.29	7.87	978,438	1
Worldscope	4.73	2.50	1.63	3.26	4.80	6.32	7.87	964,351	
Profitability									
Compustat	0.04	0.22	-0.10	0.01	0.07	0.13	0.19	934,052	0.90
Worldscope	0.02	0.33	-0.14	0.02	0.08	0.14	0.20	847,078	
Asset tangibility									
Compustat	0.26	0.23	0.01	0.06	0.21	0.41	0.62	933,981	0.96
Worldscope	0.27	0.24	0.01	0.06	0.22	0.43	0.65	928,175	
Leverage									
Compustat	0.74	27.67	0.15	0.31	0.51	0.71	0.90	972,566	0.99
Worldscope	0.99	24.26	0.14	0.30	0.51	0.72	0.91	953,825	
M/B									
Compustat	1.77	1.85	0.73	0.92	1.18	1.84	3.24	681,897	0.96
Worldscope	1.95	2.62	0.74	0.94	1.19	1.88	3.44	814,912	

Table 18: Country-level match rates between primary market data and firm financial statements. This table reports the percentage match rates in terms of number of unique non-financial corporate bonds issued for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies, and the remaining emerging market economies. Countries ranked based on the total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. Compustat includes Compustat North America and Compustat Global.

		Matched to:				Percent of matched with non-missing:						
Country	Not matched	Compustat only	Both	WS only	Total matched	EDFs	Assets	Leverage	M/B	Profitability	Asset tangibility	All
USA	31%	4%	61%	4%	69%	70%	80%	79%	68%	68%	64%	35%
South Korea	65%	4%	29%	2%	35%	80%	77%	77%	75%	65%	68%	54%
Japan	27%	1%	64%	7%	73%	85%	78%	77%	74%	62%	59%	43%
Canada	34%	2%	58%	6%	66%	70%	87%	87%	74%	73%	67%	39%
United Kingdom	32%	3%	63%	2%	68%	78%	70%	70%	57%	57%	58%	33%
Netherlands	33%	3%	60%	5%	67%	78%	59%	58%	47%	40%	44%	22%
France	40%	1%	53%	6%	60%	75%	69%	69%	51%	51%	54%	34%
Australia	41%	2%	55%	3%	59%	79%	80%	80%	65%	68%	66%	43%
Taiwan	26%	0%	67%	7%	74%	91%	88%	88%	77%	84%	81%	72%
Germany	35%	6%	56%	3%	65%	76%	51%	51%	39%	37%	42%	22%
Other AE	48%	3%	46%	3%	52%	76%	80%	80%	67%	71%	66%	46%
China	82%	0%	17%	0%	18%	85%	88%	88%	83%	83%	76%	65%
Malaysia	56%	1%	42%	1%	44%	85%	93%	93%	88%	90%	83%	70%
Thailand	30%	1%	68%	2%	70%	94%	95%	95%	92%	91%	89%	83%
India	38%	1%	60%	1%	62%	87%	90%	90%	81%	82%	76%	64%
Indonesia	56%	0%	44%	0%	44%	83%	97%	97%	94%	88%	97%	72%
Mexico	48%	10%	39%	4%	52%	70%	75%	75%	65%	64%	65%	49%
Brazil	50%	2%	45%	3%	50%	61%	86%	86%	77%	77%	79%	43%
Russia	60%	1%	39%	1%	40%	69%	75%	75%	60%	53%	49%	25%
Chile	45%	1%	52%	2%	55%	70%	87%	87%	81%	78%	67%	45%
Argentina	62%	1%	35%	3%	38%	69%	78%	75%	64%	61%	57%	32%
Other EM	63%	3%	32%	2%	37%	70%	76%	76%	65%	67%	61%	40%

Table 19: Country-level match rates between primary market data and firm financial statements, conditional on issuance in major currencies. This table reports the percentage match rates in terms of number of unique bonds issued for non-financial corporate bonds that have access to major currency (USD, EUR, GBP, JPY, AUD, CAD, CHF, DKK) markets for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies, and the remaining emerging market economies. Countries ranked based on the total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. Compustat includes Compustat North America and Compustat Global.

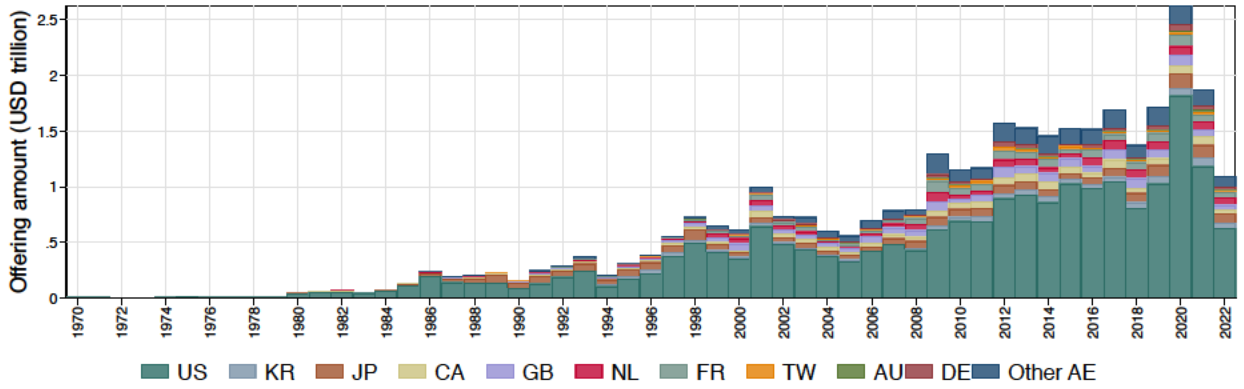
Country	Not matched	Compustat only	Both	WS only	Total matched
USA	31%	4%	61%	4%	69%
South Korea	38%	0%	61%	1%	62%
Japan	27%	1%	64%	7%	73%
Canada	34%	2%	58%	6%	66%
United Kingdom	32%	3%	63%	2%	68%
Netherlands	33%	3%	60%	5%	67%
France	40%	1%	53%	6%	60%
Australia	41%	2%	55%	2%	59%
Taiwan	11%	0%	89%	0%	89%
Germany	35%	6%	57%	3%	65%
Other AE	47%	3%	47%	4%	53%
China	72%	0%	28%	0%	28%
Malaysia	32%	0%	66%	2%	68%
Thailand	36%	1%	59%	4%	64%
India	28%	0%	71%	1%	72%
Indonesia	70%	0%	30%	0%	30%
Mexico	45%	14%	37%	4%	55%
Brazil	42%	2%	52%	4%	58%
Russia	46%	2%	51%	0%	54%
Chile	34%	1%	63%	2%	66%
Argentina	62%	1%	33%	3%	38%
Other EM	58%	5%	35%	2%	42%

Table 20: Country-level match rates between secondary market data and firm financial statements. This table reports the percentage match rates in terms of number of unique bond-months quoted for non-financial corporate bonds for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies, and the remaining emerging market economies. Countries ranked based on the total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country. Compustat includes Compustat North America and Compustat Global.

Country	Not matched	Compustat only	Both	WS only	Total matched
United States	24%	2%	71%	3%	76%
South Korea	38%	0%	62%	0%	62%
Japan	38%	1%	61%	0%	62%
Canada	32%	2%	61%	5%	68%
United Kingdom	25%	2%	72%	1%	75%
Netherlands	30%	3%	66%	1%	70%
France	40%	0%	59%	0%	60%
Taiwan	0%	0%	100%	0%	100%
Australia	36%	2%	59%	2%	64%
Germany	16%	6%	77%	1%	84%
Other AE	24%	3%	71%	2%	76%
China	70%	0%	30%	0%	30%
Malaysia	49%	0%	51%	0%	51%
Thailand	9%	1%	90%	0%	91%
India	33%	0%	65%	2%	67%
Indonesia	79%	0%	21%	0%	21%
Mexico	39%	19%	41%	1%	61%
Brazil	34%	0%	66%	0%	66%
Russia	29%	2%	69%	0%	71%
Chile	41%	0%	57%	2%	59%
Argentina	36%	1%	60%	3%	64%
Other EM	47%	4%	45%	3%	53%

Figure 1. Primary market bond issuance over time. This figure plots the time series of the total offering amount (in USD equivalents) of non-financial corporate, fixed-coupon bonds issued by issuers domiciled in a country within a year for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country.

(a) Advanced economies



(b) Emerging market economies

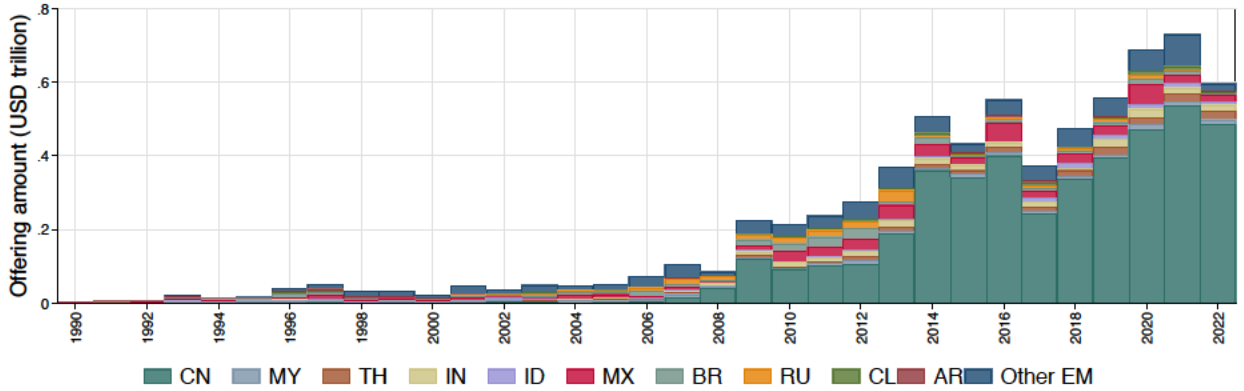
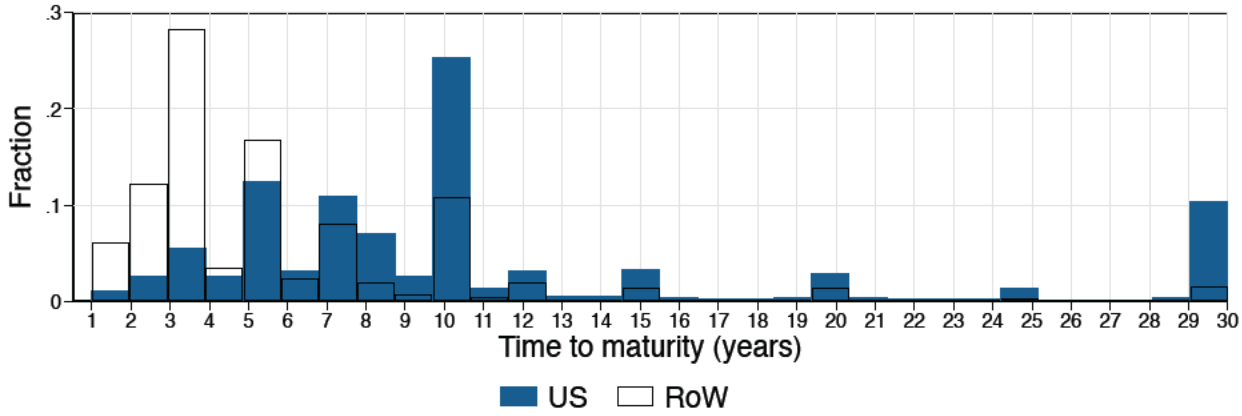


Figure 2. Distribution of initial time to maturity. This figure plots distribution of time-to-maturity at issuance for bonds issued by non-financial corporate issuers, for U. S. issuers and issuers located in the rest-of-the-world (RoW). The figure plots the fraction of bonds within each category – bonds issued by U. S. issuers and bonds issued by issuers outside the U. S. – issued with a given maturity. Thus, for example, the blue bars in each panel, representing the distribution of maturities for the sample of bonds issued by U. S. issuers, add up to 1.

(a) Fixed rate



(b) Floating rate

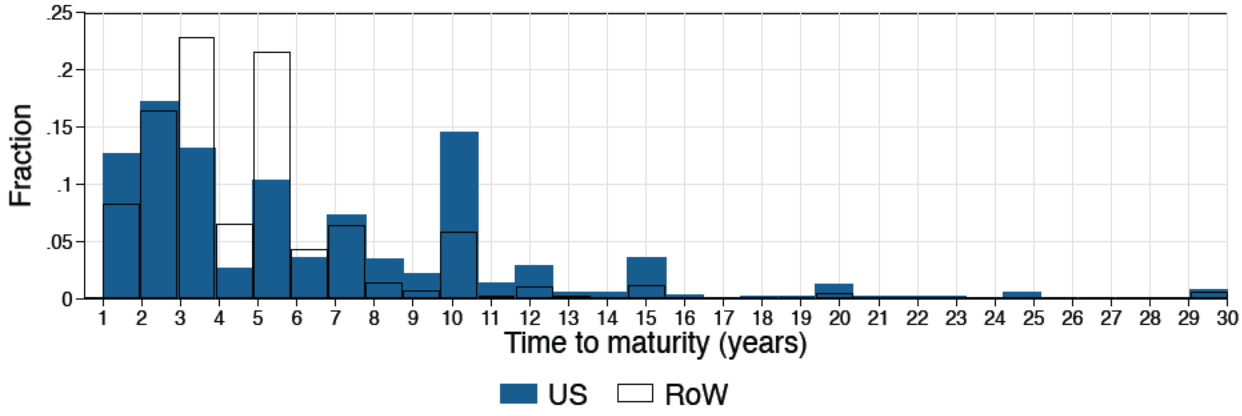
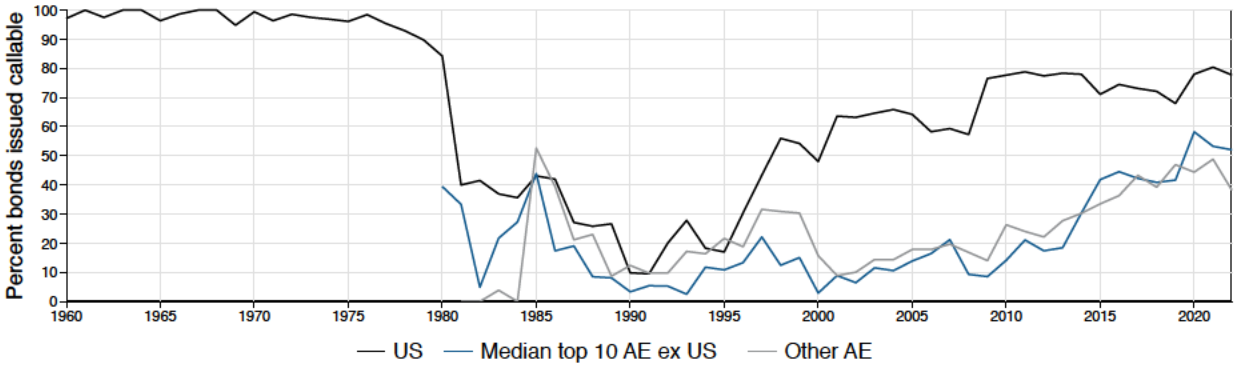


Figure 3. Fraction of bonds issued with call provisions. This figure plots the time series of the fraction of non-financial corporate, fixed-coupon bonds issued with call provisions by issuers domiciled in a country within a year for each country for the top 10 advanced economies, the top 10 emerging market economies, the remaining advanced economies and the remaining emerging market economies. Countries ranked based on total number of unique non-financial corporate fixed-rate bonds issued by issuers domiciled within the country.

(a) Advanced economies



(b) Emerging market economies

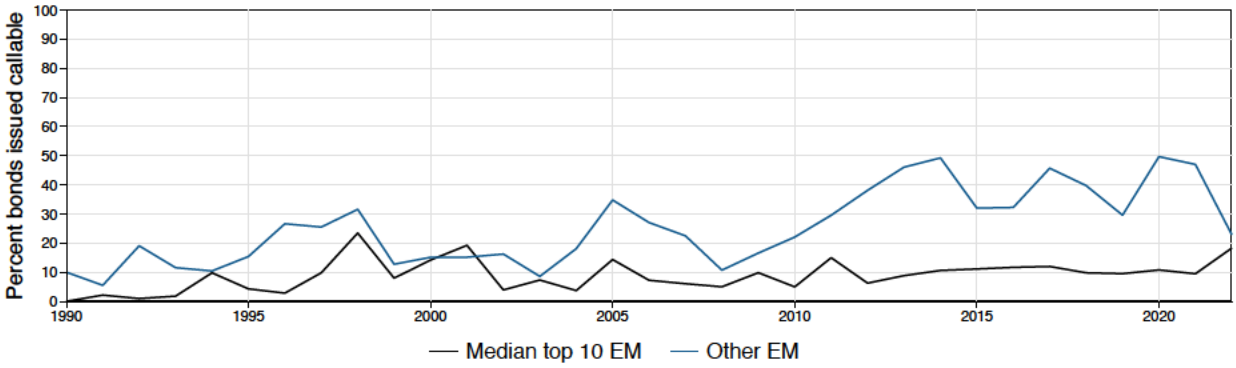
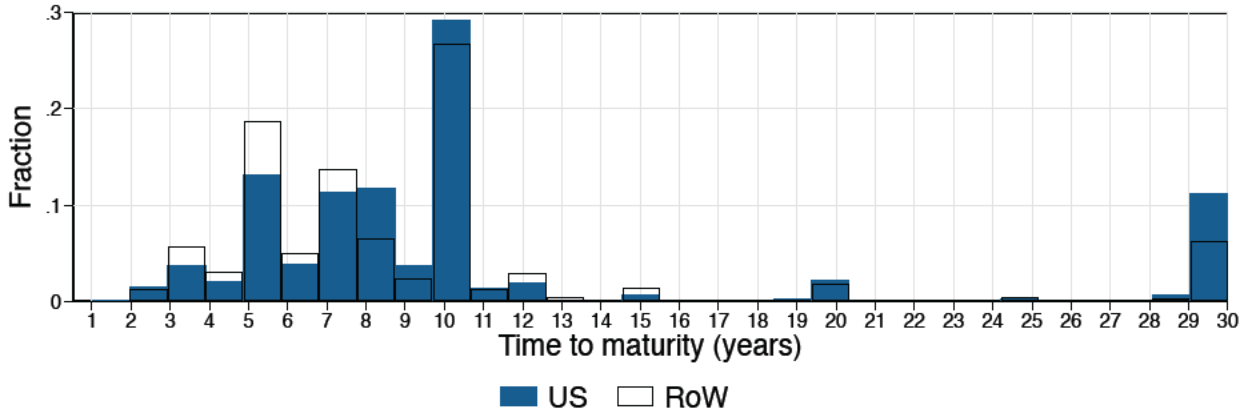


Figure 4. Distribution of initial time to maturity for bonds appearing in ICE Global Corporate Bond Indices. This figure plots distribution of time-to-maturity at issuance for bonds issued by non-financial corporate issuers, for U. S. issuers and issuers located in the rest-of-the-world (RoW). "Included in ICE Global Corporate Bond Indices" are primary market issuances that are ever included in either the ICE Global Corporate Bond Index or the ICE Global High Yield Corporate Bond Index. The figure plots the fraction of bonds within each category – bonds issued by U. S. issuers and bonds issued by issuers outside the U. S. – issued with a given maturity. Thus, for example, the blue bars in each panel, representing the distribution of maturities for the sample of bonds issued by U. S. issuers, add up to 1.

(a) Included in ICE Global Corporate Bond Indices



(b) Not included in ICE Global Corporate Bond Indices

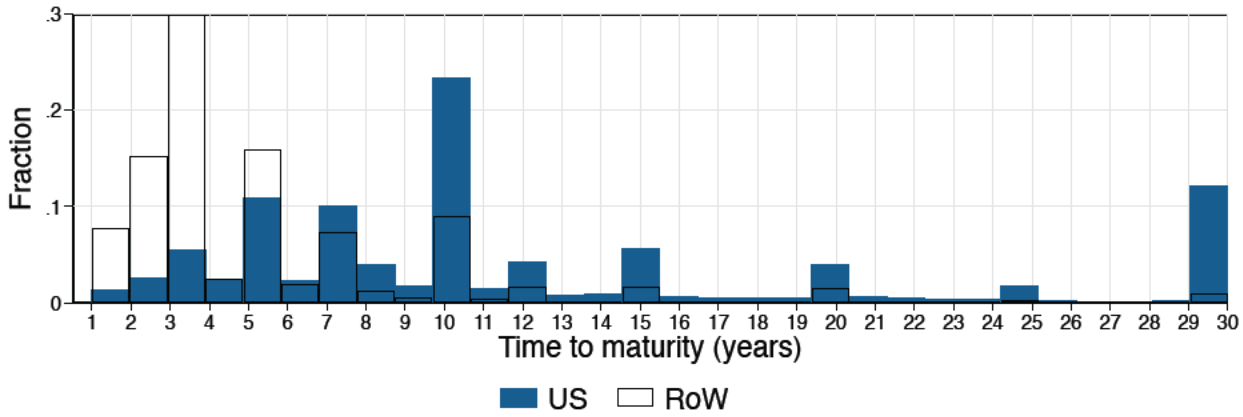
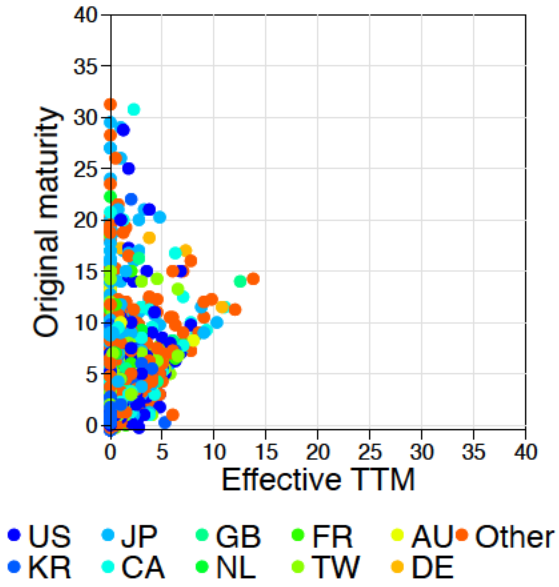
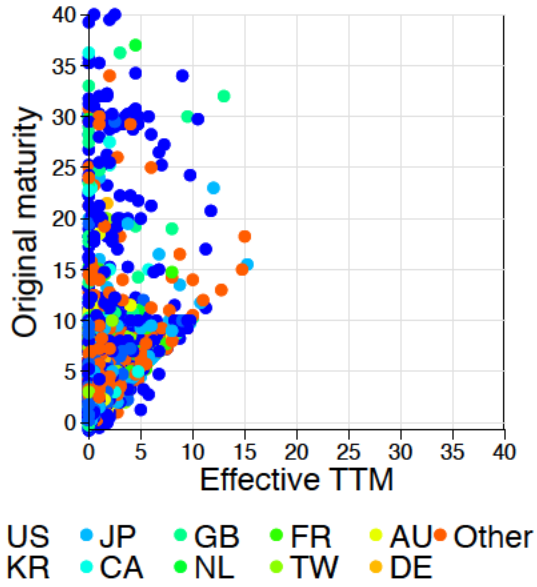


Figure 5. Distribution of initial time to maturity vs effective time to maturity. This figure plots distribution of time-to-maturity at issuance versus the effective time-to-maturity for bank loans and corporate bonds captured in the Capital IQ Debt Capital Structure dataset. Effective maturity identified as the last fiscal period end date that the instrument appears with non-zero amount outstanding in the data; observations where the last fiscal period end date of the instrument coincides with the last fiscal period end date of the company are excluded. For ease of exposition, we plot a random 1% subsample of the raw data.

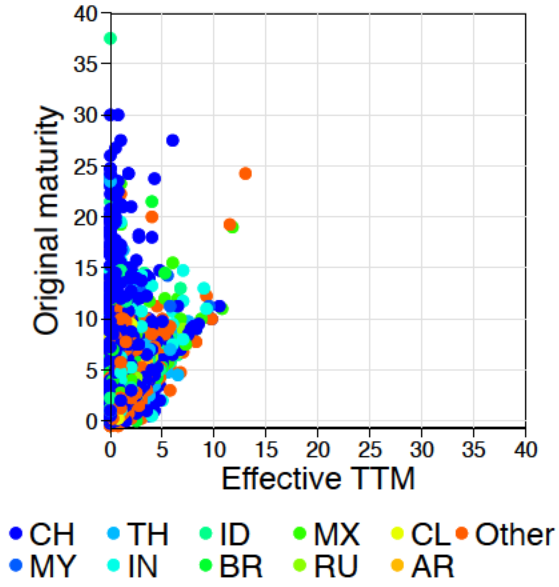
(a) Bank debt, AE



(b) Bonds, AE



(c) Bank debt, EM



(d) Bonds, EM

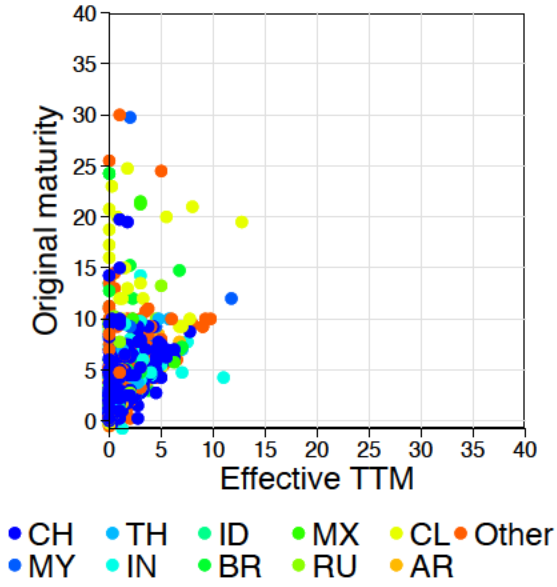


Figure 6. Distribution of initial time to maturity vs effective time to maturity by currency. This figure plots distribution of time-to-maturity at issuance versus the effective time-to-maturity for corporate bonds captured in the Capital IQ Debt Capital Structure dataset. Effective maturity identified as an instrument leaving the dataset, prior to the latest available fiscal period end date in the data. "Local" currency bonds are those issued in the issuer's country's currency. Effective maturity identified as the last fiscal period end date that the instrument appears with non-zero amount outstanding in the data; observations where the last fiscal period end date of the instrument coincides with the last fiscal period end date of the company are excluded. For ease of exposition, we plot a random 1% subsample of the raw data.

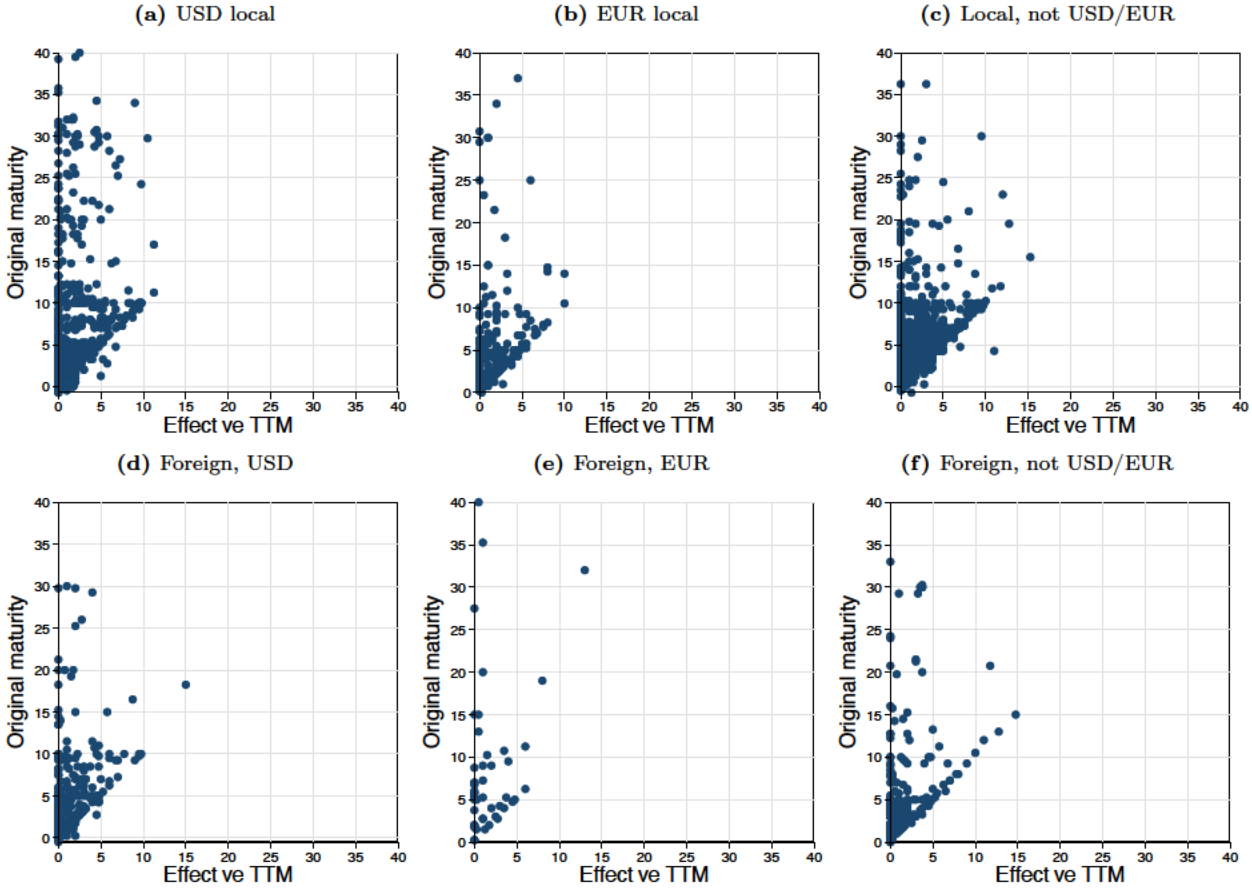
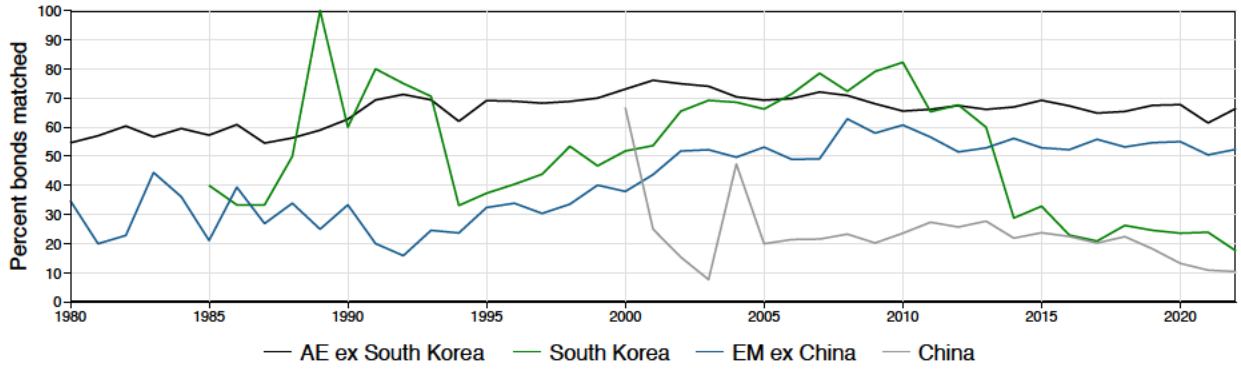


Figure 7. Merge rates between primary market data and firm financial statements over time. This figure plots the time series of the percentage match rates in terms of number of observations for non-financial corporate bonds for advanced economies (AE) and emerging market economies (EM).



A Examples of corporate actions

In this appendix, we provide a few representative examples of complications that can arise when using corporate actions data to estimate historical firm – ultimate corporate parent relationships.

1. **Company A spins-off company B but the spin-off is done gradually.** Frontline Ltd. spins off Ship Finance International Limited in pieces (7 times), first one in June 16, 2004 and the last one in March 22, 2007).

   What do we do? We treat the final spin-off date as the date on which company B becomes its own ultimate parent.

2. **Ultimate parent company A acquires company B but ultimate parent in 2017 is company C.** Alex Brown Inc. is acquired by Bankers Trust New York Corporation on September 1, 1997, but the ultimate parent listed in the snapshot data as of January 15, 2017 is Deutsche Bank Aktiengessellschaft. Bankers Trust New York Corporation was acquired by Deutsche Bank Aktiengessellschaft on June 4, 1999.

   What do we do? We use M&A transactions to identify when the ultimate parent company A is acquired by ultimate parent company C, and change the ultimate parent – firm relationship for companies A and B to end when company A is acquired. We repeat this process iteratively until we can no longer find M&A transactions where the ultimate parent companies are targets.

3. **Ultimate parent company A acquires company B and ultimate parent company C buys ultimate parent company A on the same date.** ATW Automation Inc acquires Advanced Assembly Automation, Inc, on July 13, 2014. Thompson Street Capital Manager LLC acquires ATW Automation Inc on July 13, 2014.

   What do we do? We assign ultimate parent company C to both ultimate parent company A and company B starting with the (common) acquisition date.

4. **Ownership of company A transferred between two subsidiaries of the same ultimate parent company B, and company A spun-off on the same date.** Brake Parts Inc. is sold to Global Brake & Chassis Group and is spun-off from Affinia Group on November 30, 2012.

   What do we do? We retain the spin-off observation only, and treat the spin-off date as the date on which company A becomes its own ultimate parent.

Table A.1: Data cleaning for SDC Platinum New Issues database. This table reports number of observations, unique issuers, and unique debt packages, together with the median size of the bonds (in USD million) as each filter is sequentially applied to the SDC Platinum New Issues database. A unique issuer is identified based on the 6 digit CUSIP of the issuer.

Sample	N. obs	N. issuers	N. packages	Median size
Full sample	924,650	102,046	786,097	54.00
Coalescing package deals	879,721	102,046	786,097	60.00
Dropping multiple issuers per package	879,709	102,044	786,095	60.00
Dropping multiple deal IDs per issuer-bond	870,619	101,991	777,307	60.00
Dropping multiple observations per ISIN/9 digit CUSIP	865,348	101,677	773,194	60.00
Dropping multiple issue types per ISIN/9 digit CUSIP	865,088	101,663	772,952	60.00
Dropping other duplicates	848,579	101,217	757,655	61.50