# Capital structure of start-up firms: an international comparison

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**Abstract**

This study explores the capital structure of start-up firms by focusing on debt financing. We examine how start-up firms alter capital structure over time and whether the capital structure of start-up firms in Japan differs from that in other countries. We provide evidence that start-up firms in Japan tend to rely on debt financing rather than on equity financing. We also find that the debt finance ratio of start-up firms in Japan increases over time after founding. Additionally, we estimate the determinants of the equity and debt finance and trade credit ratios, using regression models. The estimation results provide support for the higher ratio of debt finance for start-up firms in Japan. Moreover, the results reveal that start-up firms with more fixed assets are more likely to use debt financing.

Keywords: Capital structure; Debt finance; Equity finance; Start-up; Trade credit
JEL classification codes: F34; G32; M13

# 1. Introduction

Whereas the emergence of start-up firms is considered to stimulate the stagnant economy in some developed countries including Japan, many, although not all, entrepreneurs often face difficulties in raising capital when starting their business. In recent years, some measures promoting new ventures, especially for start-up financing, have been implemented in these countries, probably because these measures are expected to foster start-up firms with growth potential, which contribute to economic growth through job creation and innovation.[1] At the same time, the fact that such measures for start-up financing have been introduced in these countries suggests that start-up financing is one of the most important issues in promoting a new business.[2] Indeed, it is not easy for external providers of capital, including banks, to provide large capital for start-up firms because most start-up firms have a shorter operating history and lack a financial track record. Even if start-up firms cannot obtain sufficient capital at founding, they may be able to raise more capital after founding and alter their capital structure. By continuing their business, many start-up firms establish credibility to external providers of capital. Put differently, how start-up firms establish their capital structure after founding would engage in sustainable business practices, which will lead to business expansion.

This study explores the capital structure of start-up firms by focusing on debt financing that plays a vital role in start-up financing. We examine how start-up firms alter capital structure over time and whether the capital structure of start-up firms in Japan differs from that in other countries. While Honjo (2015) focused only on debt financing of start-up firms in Japan, this study undertakes a cross-country comparison of capital structure. We provide evidence that start-up firms in Japan tend to rely on debt financing rather than on equity financing. We also find that the debt finance ratio increases over time after founding. Additionally, we estimate the determinants of the equity and debt finance and trade credit ratios, using regression models. The estimation results provide support for the higher ratio of debt finance

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[1] In Japan, for example, Japan Finance Corporate provide new business development loans, called "Loans to Foster Growth of New Businesses," which targets firms that have undertaken new or businesses with high potential within the past seven years.
[2] According to the *2014 White Paper on Small and Medium Enterprises in Japan*, with regard to the results of inquiring into the kinds of issues confronted by entrepreneurs who considered giving up on starting a business, "fund procurement" is the highest among the issues (Small and Medium Enterprise Agency, 2014: Fig. 3-2-29).

for start-up firms in Japan. Moreover, the results reveal that start-up firms with more fixed assets are more likely to use debt financing.

The reminder of the article is organized as follows. In the next section, we provide the research background by reviewing the literature. Section 3 explains data used in this article. Section 4 shows the descriptive statistics for capital structures of start-up firms in Japan and other countries including Japan. In Section 5, we provide empirical results for capital structure using a regression estimation. Finally, we provide our concluding remarks.

## 2. Research background

### 2.1. Capital structure

Firms raise capital through equity and debt financing. Equity financing is listed in the net asset section and includes a new share issuance, which involves giving ownership shares of the firm. On the other hand, debt financing is listed in the liabilities section and includes corporate bonds. Undoubtedly, bank loans are the most common of debt financing from external capital markets. In fact, many firms rely on bank loans when commencing business. [3] Additionally, trade credit (payable), such as accounts payable and notes payable, can be viewed as debt financing. Trade credit enable sellers to finance buyer purchases at lower cost than financial institutions in intermediate goods markets, which is a contractual device for dealing with capital market imperfections (e.g. Smith 1987). In other words, suppliers and contractors provide debt financing for the firm during a certain period of time by means of trade credit.

To date, how firms choose their capital structure — that is, combination of equity and debt — has been debated in the literature. The theory of capital structure began with the celebrated articles of Modigliani and Miller (1958, 1963), which suggested under what conditions capital structure is irrelevant. Under the perfect capital markets, firms would choose their favorable capital structure. However, in reality, capital markets are imperfect and information asymmetries arise between firms and external providers of capital, including banks. Imperfection in capital markets creates agency and monitoring costs, which causes an additional cost of financing. Such information asymmetries are relatively large at founding because

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[3] Storey and Greene (2010) argued that among businesses using external funding sources, more than 90% use bank loans and the remainder use some form of public loans or grants.

start-up firms lack financial track records and, therefore, start-up firms are more vulnerable to financing constraints (e.g., Binks and Ennew 1997). Not surprisingly, the cost of financing at founding becomes a large burden on start-up firms that do not have sufficient earnings because of high administrative costs per financing.

Since the appearance of Modigliani and Miller (1958, 1963), much attention has been paid on how firms choose their capital structure. In the literature on corporate finance, a number of studies have argued financing of firms, including the optimal capital structure.[4] There are two typical hypotheses about capital structure: pecking order and trade-off theories. The pecking order theory is described in Myers (1984) and Myers and Majluf (1984). In the pecking order theory, information asymmetries significantly affect firms' financing decisions, and firms' financing policies follow a hierarchy with a preference for internal over external finance and for debt over equity. While the pecking order theory mainly highlights hierarchical financing based on the cost of financing, the trade-off theory emphasizes the balance between debt and equity — more specifically, the trade-off between interest tax shield and the cost of financial distress. In the trade-off theory, firms balance the marginal present values of tax shields against the costs of finance distress and, therefore, profitable firms should have higher leverage to offset corporate taxes. Bradley et al. (1984) indeed showed that optimal leverage is related inversely to expected costs of financial distress and to the amount of non-debt tax shields. They concluded that their findings support the modern balancing trade-off theory of capital structure.

Some empirical studies have investigated the financing and capital structure of firms. Shyam-Sunder and Myers (1999) examined traditional capital structure models against the alternative of a pecking order model of corporate financing. They concluded that the pecking order is a much better first-cut explanation of the debt-equity choice, at least for the mature, public firms in their sample. However, Frank and Goyal (2003) provided no evidence that supports the pecking order and found that net equity issues track the financing deficit more closely than do net debt issues, contrary to the pecking order theory. Helwege and Liang (1996) also found that firms that capital markets do not follow the pecking order when choosing the type of security to offer. Hence, it is still unclear how firms determine their capital structure.

Additionally, some studies have examined capital structure from the

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[4] For more discussions on capital structure, see, for example, Harris and Raviv (1991) and Myers (2001).

perspective of international comparison. Rajan and Zingales (1995), for example, investigated the determinants of capital structure choice by analyzing the financing decisions of public firms in the G-7 countries. They found that firm leverage is similar across the G-7 countries at an aggregate level, and the differences are not easily explained by institutional differences previously thought important. Fan et al. (2012) examined how the institutional environment influences capital structure and debt maturity choices of firms in 39 developed and developing countries. They found that a country's legal and tax system, corruption, and the preferences of capital suppliers explain a significant portion of the variation in leverage and debt maturity ratios. Specifically, firms in more corrupt countries and those with weaker laws tended to use more debt, especially short-term debt.

It is important to note that these studies do not necessarily focus on the financing of start-up firms. In this respect, little is known about the capital structure of start-up firms. Considering that the literature on capital structure stems from market imperfections caused by information asymmetries between firms and external providers of capital, it is worth discussing stat-up financing because information asymmetries are more pronounced during the start-up stage. Further investigation on the capital structure of start-up firms contributes to better understanding of financing in imperfect capital markets.

## 2.2. Start-up financing

As Berger and Udell (1998) stated, small businesses are thought of as having a "financial growth cycle" in which financial needs and options change as the business grows, gains further experience, and becomes less informationally opaque. As Cassor (2004) emphasized, this growth cycle suggests that type of financing alternatives available to firms varies throughout the life of the business as a result of information asymmetries, scale, demand for finance, and asset structure.

When commencing business, many start-up firms rely on limited sources of finance, which primarily comprise the personal wealth of founders (entrepreneurs) and that of family and friends (e.g. Storey and Greene, 2010). In fact, start-up financing often tends to be restricted to "FFF" (founders, family, and friends). However, since the amount of funds from FFF seems limited, start-up firms with a greater demand must rely not only on internal suppliers but also on external suppliers of capital, including banks.

As already mentioned, firms raise capital through equity and debt financing. Equity financing has advantages over debt financing for high-tech investment, since equity financing does not require collateral or increase the probability of financial distress and investors' upside returns are not bounded (Carpenter and Petersen 2002a). However, although private equity capital, including venture capital, plays a key role in start-up financing, especially for high-tech start-ups, such capital funds tend to finance innovative firms in innovative industries including biotechnology and information and communications technology (ICT) industries (e.g. Huyghebaert et al. 2007; Cosh et al. 2009). Rather, debt financing is a more common financial source for most start-up firms (e.g., Storey and Greene 2010).[5] In particular, bank loans are typical financial instruments in many countries, including Japan, where private equity capital by individual investors such as business angels is not yet fully developed.[6]

As discussed, start-up financing is one of the most important issues in promoting a new business. Under the perfect capital markets, external providers of capital, including banks, could correspond to the demand of firms with growth potential. However, even if a start-up firm has growth potential, external providers of capital do not necessarily provide capital for the firm because of information asymmetries between the firm and external providers of capital. In particular, information asymmetries are more pronounced during the start-up stage. Therefore, it is inevitable that external providers of capital hesitate to provide large capital for unknown start-up firms. Because of a substantial risk of their business, the cost of external financing becomes higher for start-up firms. More importantly, it is essential that start-up firms face business uncertainty. In other words, entrepreneurs themselves do not fully predict the outcomes of business, still less do external providers of capital. Such uncertainty, as well as information asymmetries, induces a higher cost of start-up financing.

Conversely, start-up firms can reduce business uncertainty by continuing the business even when the uncertainty is so high at founding. According to Jovanovic's (1982) learning perspective, start-up firms have an opportunity to obtain their type (ability) related to know-how and knowledge. At the same time, business continuity enables firms to establish the relationship with external providers of capital by

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[5] However, Carpenter and Petersen (2002b) found that high-equity finance firms, although they are smaller, tend to grow much faster than typical small firms.

[6] For more discussions on start-up financing, including venture capital and angel investors, see, for example, Denis (2004).

mitigating the information asymmetries, which will produce the effects of the relationship banking. That is, the learning effect reduces not only business uncertainty but also information asymmetries. For this reason, we consider that start-up firms have an opportunity to access external capital markets by continuing business. Put differently, if the cost of financing was time invariant, firms would keep using the same financial sources after founding.  As the financial growth cycle suggests, indeed, financial sources are variable, depending on the firm's growth stage. Whereas start-up financing is restricted, entrepreneurs may start business using only the restricted finance than using other financial sources. Rather, start-up firms expect to access alternative financial sources after founding and alter their capital structure, depending on firm age. By doing so, they may be able to achieve the optimal capital structure.

Although not many, some studies have estimated the determinants of financing for start-up firms. Cassar (2004), for example, investigated the determinants of capital structure and the use of financing around business start-up using data on new businesses in Australia, and found that firm start-up size is positively related to the use of leverage, long-term leverage, outside financing, and bank financing. Moreover, Huyghebaert et al. (2007) find that firms in industries with high historical start-up failure rates and entrepreneurs who tend to highly value private benefits of control use less bank debt, using data on 325 start-ups firms in Belgium. More recently, Robb and Robinson (2014) examined capital structure choices that entrepreneurs make in their firms' initial year of operation using US data from the Kauffman Firm Survey. They found that firms rely heavily on external debt sources, such as bank financing, and less extensively on friends-and-family-based funding sources, and emphasized that the reliance on external debt underscores the importance of credit markets for the success of nascent business activity.

In addition to bank loans, trade credit is one of the most important financial sources in short-term external financing. Huyghebaert (2006), for example, found that start-ups use more trade credit when financial constraints are large, when suppliers have a financing advantage over banks in financing high-risk firms, when entrepreneurs value private benefits of control, and when transaction costs are important. Huyghebaert and Van de Gucht (2007) also investigated the choice between bank debt and trade credit in start-up firms and found that firms in industries with high historical start-up failure rates and entrepreneurs who tend to

highly value private benefits of control are less likely to use bank debt. Moreover, Agostino and Trivieri (2014) empirically investigate the signalling hypothesis of trade credit, and their findings suggest that the availability of credit suppliers is crucial to foster access to institutional funding for newly founded firms and that banks consider suppliers a reliable source of information on firms' financial conditions even after several years of lending relationships. Furthermore, regarding trade credit of start-ups, Ikeda and Honjo (2015) reveal that the use of bank loans negatively affects the use of trade credit in start-up firms.

Generally, trade creditors (suppliers) have superior information about the firm than external providers of capital. Therefore, trade credit is considered an important financial channel for firms facing higher information asymmetry with external providers of capital, including banks. Not surprisingly, start-up firms are arguably the most informationally opaque and, therefore, they have much difficulty in obtaining intermediated external finance (Berger and Udell 1998). Trade credit plays a significant role in start-up financing, and how trade credit differs from debt financing in capital markets would lead to a better understanding of the capital structure of start-up firms.

## 2.3. Debt financing in Japan and other countries

The above studies have provided deeper insights into how firms raise capital and choose financial sources. They also indicate that debt financing, including bank loans, play a critical role in start-up financing. However, financing — especially, start-up financing — may depend heavily on the country's financial system including economic policies. As Fan et al. (2012) emphasized, the institutional environment influences capital structure and debt maturity choices of firms. However, little attention has been paid to the difference in start-up financing between countries. There is a paucity of research on the capital structure of start-up firms across countries.

It is well recognized that Japan has special characteristics for a corporate financing system. Black and Gilson (1998) emphasize that Japan has a bank-centered capital market rather than stock-market-centered capital market. Traditionally, Japanese main banks and German universal banks have been seen to play a central corporate governance role in monitoring management (e.g., Aoki, 1994; Roe, 1994).[7]

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[7] However, Miwa and Ramseyer (2002) argued that Japan was not a bank-centered economy; instead,

In contrast, the US has a well-developed stock market with an associated market for corporate control that figures prominently in corporate governance. In these countries, such as Japan and Germany, debt financing seems to play a more prominent role during the start-up stage.

From the perspective of macro-finance, we can realize the special characteristics of the financial system in Japan. Figure 1 illustrates financial assets held by households in Japan, the Euro area, and the US. In Japan, "Currency and deposits" account for more than half, indicating that many householders tend to save their personal wealth in bank accounts. However, "Equity" accounts for less than 10%. In contrast, "Equity" in the US accounts for more than 30%, which is much larger than in Japan. In the Euro area, the distribution appears to be similar to Japan's one, but the percentage of "Currency and deposits" is lower than in Japan. These indicate that householders are more likely to use bank loans in Japan and the Euro area loans while they are more likely to use equity in the US. Additionally, Figure 2 describes financial liabilities owed by private nonfinancial corporations. In Japan and the Euro area, the percentage of "Borrowings" account for about 30%. In contrast, the percentage of "Borrowings" in the US is much smaller than in Japan and the Euro area.[8]

The results suggest that householders' cash is more likely to circulate to firms through debt financing in Japan and the Euro area. Therefore, it is plausible that debt financing has a significant role in the flow of funds in these countries, compared with the US.

## 3. Data

### 3.1. Data source

Since most start-up firms are privately held, we require a database that contains information on unlisted firms. For this puroprose, we use a database, Orbis, which is provided by Bureau van Dijk Electronic Publishing (BvD) and contains information on over 200 million private held firms worldwide. However, Orbis generally covers

firms relied overwhelmingly on equity finance and Japan was not an economy where firms with access to bank credit outperformed their rivals. Instead, firms earned no advantage from such access. During the first half of the last century, Japanese firms obtained almost all their funds through decentralized, competitive capital markets.

[8] It is important to note that, although "Equity" on average occupies to some extent liabilities and equity in the firm, this figure includes established public firms with large size and represents the current figures, which presumably differs from the figures during the start-up stage.

up to ten years' history of firms; therefore, we cannot trace long-term information on firms using this database. We accessed Orbis in March 2016 and obtained financial statements from 2006 to 2015.[9] For cross-country comparison, we choose the following European countries, France, Germany, Italy, Spain and the UK, partly because, as discussed, debt financing seems to play a prominent role during the start-up stage.[10]

To construct the sample of start-up firms, we focus only on firms of which financial statements from the first accounting year are available in the Orbis. While data on firms founded in 2006 are obtainable for up to ten years, those founded in 2015 are obtainable for one or two years. That is, the observation periods depend on the founding years of firms. To observe change in capital structure over time, we require data on financial statements for some years after founding. However, the number of firms is smaller as the observation window is longer. Accordingly, to secure a sufficient sample size, we measure five years after founding as the observation period, which is regarded as start-up period in this study. As a result, we constructed the data set of firms founded during the period of 2006–2010. Our data set contains firms' financial statements for five years after founding.[11]

We target start-up firms in some industries, such as Manufacturing, Wholesale and retail trade, and Information and communication, following Nomenclature of Economic Activities, Rev.2 (hereafter, NACE). On the other hand, we do not include those classified into Finance and insurance (NACE code: K) in the data set because financial statements in these industries differ from those in non-financial industries. In addition, firms classified into some industries, such as Agriculture, forestry and fishing (NACE code: A), Electricity, gas, steam and air conditioning supply (NACE code: D), Public administration and defense (NACE code: O), and Education (NACE code: P), and Human health and social work activities (NACE code: Q) are not included in the data set because there are special regulations for incorporation in these industries, depending on the country's policies. Moreover, Activities of

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[9] At that time, Orbis compiled data on Japanese firms provided by Tokyo Shoko Research (TSR); therefore, data used in this study seem to be compatible to those provided by TSR.
[10] Originally, we tried to construct the sample of firms in the G-7 countries: Canada, France, Germany, Italy, Japan, the UK, and the US. However, Orbis does not sufficiently cover data on firms in North America (i.e., Canada and the US), compared with European countries. For this reason, we chose the above five European countries, based on the 2015 GDP. The following is the Netherlands, but we did not include the country because data on debt finance for most firms were not available.
[11] If possible, we should correct data on start-up firms, based on starting a business rather than founding a firm (incorporation). However, it is not easy to clarify the date of starting a business from a database. Therefore, we constructed our sample, based on incorporation.

households as employers; undifferentiated goods- and services-producing activities of households for own use (NACE code: T) and Activities of extraterritorial organizations and bodies (NACE code: U) are not included in the data set.

Moreover, some legal forms are available in the country. In this article, therefore, we focus only on public and private limited companies, mainly because they are a typical legal form in Japan and financial data on limited companies (e.g., joint-stock corporations) are more obtainable.

## 3.2. Data collection

Table 1 summarizes the data collection, including download and screening criteria. Financial data are measured by US dollar based on the exchange rate at that time. Based on the download criteria, we obtained the data set of start-up firms for five accounting years using the Orbis. Then, from the data set, we excluded some firms as outliers. First, we excluded firms of which financial statements, except for the first accounting year, are not measured by 12 months because of change in their accounting dates. Second, we excluded firms of which total assets are not positive from the first through to the fifth accounting year. Third, we excluded firms of which total finance is not positive from the first through to the fifth accounting year.

The data set includes firms with extremely large size. Among them, the subsidiaries and affiliated firms of existing firms tend to be larger, and these firms may have different capital structure. In particular, existing firms were restructured and some were founded through the merger. Therefore, we specified subsidiaries and affiliated firms, following information on independence (corporate governance) provided by the Orbis and excluded these firms from the data set.

Even though subsidiaries and affiliated companies are excluded from the sample, we cannot deny that newly founded firms by restructuring existing organizations are still included in the sample. Indeed, established large corporations conducted restructuring around the 2000s in Japan (e.g., Honjo and Ikeda, 2014). In practice, firms in the largest size group, of which total finance at the first accounting year is less than 10 million US dollars, account for over 1% in the countries other than France. Taking into account the possibility of outliers, we exclude the largest size group from the data set in all the countries.

Furthermore, firms for which variables of closing accounting date, equity finance, debt finance, trade credit, total finance, fixed assets, and total assets are

available from the first through to the fifth accounting year.

Based on the data screening criteria, we constructed the sample of start-up firms. The sample consists of balanced paned data, and financial statements in the sample are observed for five years after founding. The number of firms for Japan is more than 4 thousand, and the number of frim-year observations is more than 20 thousand. The total number of firm-year observations for the six countries is nearly 1 million.

## 3.3. Variables

We measure equity and debt finance, including trade credit, using data from Orbis. In this study, equity finance ($E$) is measured by issued share capital. In addition, debt finance ($D$) is defined as short-term financial debt, including short-term loans and bonds and part of long-term financial debt payable within the year, plus long-term liabilities.[12] Moreover, trade credit ($TC$), which indicates accounts payable, is measured by debt to suppliers and contractors (i.e., trade creditors).

Furthermore, to normalize equity and debt finance, including trade credit, we define total finance ($TF$), which is measured by the sum of issued share capital, short-term liabilities, and long-term liabilities. It is important to note that total assets are not used to normalize equity and debt finance because total assets include current net income that represents internal finance. In this study, equity and debt finance and trade credit divided by total finance are defined as the equity and debt finance and trade credit ratios, respectively.

Table 2 summarizes the definition of variables used in this study.

## 3.4. Sample

For the final sample, the numbers of firms for Japan, France, Germany, Italy, Spain, and the UK are 4032, 95244, 8571, 42950, 41093, and 2561, respectively. Table 3 presents the distribution of firms in the sample by total finance ($TF$) at the first accounting year. As shown in Table 3, firms of which total finance is no less than 100 thousand US dollars and less than 500 thousand US dollars at the first accounting year ($100\text{T} < TF < 500\text{T}$) account for more than half in Japan. Overall, the

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[12] Orbis contains long-term financial debt, which may be a more appropriate proxy for debt finance because long-term financial debt does not include other long-term liabilities and provisions. However, most data on long-term financial debt were missing for firms in the UK. Therefore, we used long-term liabilities instead of long-term financial debt.

percentage of smaller firms at the first accounting year in Japan appears lower than in the other countries. Since firms of which financial statements are not available in the data source were excluded from the sample, the data source may not relatively cover financial statements for private firms with small size. Probably, this causes a small percentage of firms with small size. Additionally, regulations governing a minimum paid-in capital requirement — more precisely, paid-in capital of no less than 10 million yen (approximately 91 thousand US dollars when 1 US dollar equals 110 yen) for a joint-stock corporation — were in effect from April 1990 through to April 2006 in Japan. This requirement was removed when the new Company Act was introduced in May 2006, but some firms still raise paid-in capital at the level of 10 million yen, and the legacy of the minimum paid-in capital requirement may still be continued. To take into account the difference in firm size across countries, we use the equity and debt finance and trade credit ratios, which are divided by total finance, in the cross-country investigation.

Table 4 provides the distribution of firms in the sample by industry. As shown in Table 4, the percentage of firms is considerably higher in the construction industry of Japan. This is because databases compiled by a credit investigation company in Japan (Tokyo Shoko Research) tend to target construction firms for credit investigation, and construction firms tend to disclose their financial statements more readily to enable them to receive public works. For the cross-country investigation, therefore, we will pay attention to the distribution of firms by industry.

## 4. Summary statistics

### 4.1. Equity and debt finance and trade credit

Table 5 presents the descriptive statistics for equity and debt finance and trade credit at the first accounting year. The mean equity finance at the first accounting year in Japan is 73 thousand US dollars, and the median equity finance in Japan is 49 thousand US dollars, which is the largest of the six countries. The results also indicate that many start-up firms in Japan have to some extent equity finance because of, as already mentioned, the legacy of the minimum paid-in capital requirement. While the mean debt finance is higher than the mean equity finance, the median debt finance is lower than the median equity finance in each country. The results indicate that while many start-up firms are more likely to use debt financing, the amount of debt finance depends on the firms. In other words, only a

few firms have larger capital in these countries. Additionally, the mean debt finance at the first accounting year in Japan is 173 thousand US dollars, and the median debt finance in Japan is 54 thousand US dollars, which is the largest of the six countries. The results indicate that start-up firms in Japan are more likely to rely on debt financing at founding.

Moreover, Table 6 presents the descriptive statistics for the equity and debt finance and trade credit ratios at the first accounting year. The mean ratio of equity finance in Japan is approximately 29%, which is lower than in Germany and Spain. The mean ratio of debt finance in Japan is approximately 32%, which is the largest among the countries. In addition, its median in Japan is also over 30%, which is not so different from the mean value, compared with the others. The results indicate that most start-up firms use debt financing, suggesting that start-up firms in Japan tend to rely on debt financing. In contrast, while a small portion of start-up firms use debt financing, they may use a large amount of debt at founding, especially in Spain and the UK.

4.2. Equity and debt finance and trade credit ratios over time

We describe how capital structure varies over time by describing the mean and median ratios of equity and debt finance and trade credit from the first through to the fifth accounting year. Tables 7, 8, and 9 shows the mean and median ratios of equity and debt finance and trade credit, respectively. Figures 3 to 8 illustrate the mean and median ratios over time in each country. For comparison, Figures 9 to 11 summarize the mean ratios of equity and debt finance and trade credit across the countries, respectively.

In Table 7 and Figure 3, we find that the mean and median ratios of equity finance in Japan decrease from the first through to the fifth accounting year. A similar trend can be seen in Figures 5 and 6 for Germany and Italy. Figure 9 shows the equity finance ratio across countries. Overall, there is little evidence that the equity finance ratio increase from the first accounting year. The results indicate that start-up firms tend to rely on financial sources alternative to equity financing after founding.

In contrast, in Table 8 and Figure 3, we find that the mean and median ratios of debt finance in Japan increases over time after founding, which is consist with Honjo (2015). As discussed, start-up firms in Japan tend to rely on debt financing at

founding and, as shown in this figure, they are more likely to increase debt financing after founding. However, an increase in the ratio of debt financing gradually diminishes with firm age. This trend can be seen more clearly when, as shown in Table 8 and Figure 10, the debt finance ratio of start-up firms in Japan is compared to that in the other countries.

Finally, in Table 9 and Figure 3, we find that the mean ratio of trade credit in Japan appears constant after founding and that its median ratio does not change over time. As shown in Table 9 and Figure 11, although the mean ratio of trade credit slightly increases in France, Germany, and Spain, the upward trend is not found in the other countries.

## 5. Regression estimation

From the international comparison, we provide evidence that start-up firms tend to rely on debt financing in Japan. However, as Tables 3 and 4 shows, the distribution of start-up firms considerably differs between the countries. Specifically, firms in the construction industry of Japan account for the substantial portion of the sample, and raised capital of start-up firms in Japan seems larger. In this respect, it is possible that the capital structure of start-up firms depends heavily on which type of firms are included in the country's sample.

For this reason, we clarify the difference in capital structure of start-up firms across countries, using regression estimation. While the equity and debt finance and trade credit ratios are used as the dependent variable, firm age, which is measured by a dummy variable, is used as the independent variable in the estimation. By doing so, we will examine how capital structure is associated with firm age. Additionally, the total assets ratio, which is defined as the ratio of fixed assets to total assets, is included in the regression model because it is conceivable that asset structure affects capital structure.

Table 10 presents the estimation results for the equity finance ratio. Similarly, Tables 11 and 12 present those for the debt finance and trade credit ratios, respectively. In columns of Tables 10, 11, and 12, we provide the estimation results by country. Regarding the estimation method, we use ordinary least squares estimation (OLS) and provide the estimation results in columns (i), (iii), (v), (vii), (ix), and (xi). In the regression model, we include industry and cohort dummies, in addition to the fixed assets ratio and dummies for firm age. The cohort dummies,

which represent the entry cohorts, are included to control for different founding years between firms. Additionally, we use fixed-effects estimation (FE) and provide the estimation results in columns (ii), (iv), (vi), (viii), (x), and (xii). By doing so, we take into account firm-specific effects. Overall, we obtain similar results, regardless the estimation method.

Regarding the equity finance ratio, Table 10 shows that all the coefficients of dummies for firm age are negative in all the countries, including Japan. The results indicate that the equity finance ratio is lower than at the first accounting year, suggesting that start-up firms in the countries decrease the equity finance ratio after founding. This finding implies that many start-up firms are less likely to use equity financing, including capital increases through new equity issuance. Not surprisingly, most start-up firms are privately held, whereas only a few achieve an initial public offering. Probably, it is difficult for start-up firms to gain access to private equity capital markets and, therefore, the role of equity financing is limited. Moreover, the fixed assets ratio has a negative effect on the equity finance ratio in Japan and France while it has a positive effect on the equity finance ratio in Italy, Spain, and the UK.

Moreover, regarding the debt finance ratio, Table 11 shows that all the coefficients of dummies for firm age are positive in Japan, in addition to Germany and Spain while they are negative in France and Italy. The results indicate that the debt finance ratio in Japan and Germany is lower than at the first accounting year, suggesting that start-up firms in the two countries increase the debt finance ratio after founding. In addition, we find that the coefficients of dummies for firm age slightly increase with firm age in columns (i), (ii), (v), and (vi) of Table 11, which indicates that the debt finance ratio increases over time after founding in Japan and Germany. Additionally, we find that the fixed assets ratio has a positive effect on the debt finance ratio in all the countries. This indicates that start-up firms with more fixed assets are more likely to use debt financing, suggesting that these firms tend to have collateral to secure bank loans.

Furthermore, in Table 12, we find that the coefficients of dummies for firm age are insignificant for the trade credit ratio in Japan. While these coefficients are positive for the trade credit ratio of start-up firms in France and Spain, they are negative in Italy. As shown in Table 9 and Figure 3, trade credit appears time-invariant in Japan. The results reveal that trade credit is independent on firm age at least in Japan.

Finally, we provide additional estimations for the equity and debt finance and trade credit ratios by combining the data in each country and adding dummies for the countries to the regression models. In Table 13, we show the estimation results using random-effects estimation (RE), in addition to OLS and FE. In the OLS and RE, the reference category for the country is Germany in which start-up firms have a larger ratio of debt finance, compared with the other European countries. As a result, while the coefficients of the dummy for Japan are negative for the equity finance ratio, they are negative for the debt finance ratio. The results provide support that start-up firms in Japan tend to rely on debt financing, rather than on equity financing.

## 6. Concluding remarks

This study explored the capital structure of start-up firms by focusing on debt financing. We examined how start-up firms alter capital structure over time and whether the capital structure of start-up firms in Japan differs from that in other European countries. We provided evidence that start-up firms in Japan tend to rely on debt financing rather than on equity financing. We also found that the debt finance ratio of start-up firms in Japan increases over time after founding. Additionally, we estimated the determinants of the equity and debt finance and trade credit ratios, using regression models. The estimation results provided support for the higher ratio of debt finance for start-up firms in Japan. Moreover, the results revealed that start-up firms with more fixed assets are more likely to use debt financing.

We believe that this study suggests two lines for further investigation. First, while this study estimated the determinants of capital structure of start-up firms using the simple linear regression models, it is necessary to provide a more sophisticated model to clarify the difference in the effects of the determinants across countries. Then, we provide rigorous reasons why the capital structure of start-up firms differs between countries. A better understanding of the difference across countries can provide us policies for start-up financing so as to promote entrepreneurship in such a stagnant economy.

## References

Agostino, M., & Trivieri, F. (2014). Does trade credit play a signalling role? Some

evidence from SMEs microdata. *Small Business Economics 42*, 131–151.

Aoki, M. (1994). Monitoring characteristics of the main bank system: an analytical and developmental view. In: Aoki, M., Patrick, H. (Eds.), *The Japanese Main Bank System: Its Relevance for Developing and Transforming Economies*. Oxford: Oxford University Press.

Berger, A. N., & Udell, G. F. (1998). The economics of small business finance: the roles of private equity and debt markets in financial growth. *Journal of Banking and Finance 22*, 613–673.

Binks, M. R., & Ennew, C. T. (1997). The relationship between U.K. banks and their small business customers. *Small Business Economics 9*, 167–178.

Black, B. S., & Gilson, R. J. (1998) Venture capital and the structure of capital markets: banks versus stock markets. *Journal of Financial Economics 47*, 243–277.

Bradley, M., Jarrell, G. A., & Kim, E. H. (1982). On the existence of an optimal capital structure: theory and evidence. *Journal of Finance 39*, 857–878.

Carpenter, R. E., & Petersen, B. C. (2002a). Capital market imperfections, high-tech investment, and new equity financing. *Economic Journal 112*, F54–F72.

Carpenter, R. E., & Petersen, B. C. (2002b). Is the growth of small firms constrained by internal finance? *Review of Economics and Statistics 84*, 298–309.

Cassar, G. (2004). The financing of business start-ups. *Journal of Business Venturing 19*, 261–283.

Cosh, A., Cumming, D., & Hughes, A. (2009). Outside entrepreneurial capital. *Economic Journal 119*, 14941–533.

Denis, D. J. (2004). Entrepreneurial finance: an overview of the issues and evidence. *Journal of Corporate Finance 10*, 301–326.

Fan, J. P. H., Titman, S., & Twite, G. (2012). An international comparison of capital structure and debt maturity choices. *Journal of Financial and Quantitative Analysis 47*, 23–56.

Frank, M. Z. & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics 67*, 217–248.

Harris, M., & Raviv, A. (1991). The theory of capital structure. *Journal of Finance 46*, 297–355.

Helwege, J., & Liang, N. (1996). Is there a pecking order? Evidence from a panel of IPO firms. *Journal of Financial Economics 40*, 429–458.

Honjo, Y. (2015). Start-up kigyo no shihon kosei [Capital structure of start-up firms]. *Soshiki Kagaku* [*Organization Science*] 49, 4–18.

Honjo, Y., & Ikeda, Y. (2014). Why do firms go private for restructuring? Evidence from Japan. IBRCU Working Paper Series, No. 30, Institute of Business Research, Chuo University.

Huyghebaert, N. (2006). On the determinants and dynamics of trade credit use: empirical evidence from business start-ups. *Journal of Business Finance and Accounting 33*, 305–328.

Huyghebaert, N., & Van de Gucht, L. M. (2007). The determinants of financial structure: new insights from business start-ups. *European Financial Management 13*, 101–133.

Huyghebaert, N., Van de Gucht, L., & Van Hulle, C. (2007). The choice between bank debt and trade credit in business start-ups. *Small Business Economics 29*, 435–452.

Ikeda, Y., & Honjo, Y. (2015). Trade credit or bank loans? Debt choice of start-up firms in Japan. IBRCU Working Paper Series, No. 35, Institute of Business Research, Chuo University.

Jovanovic, B. (1982). Selection and the evolution of industry. *Econometrica 50*, 649–670.

Miwa, Y., & Ramseyer, J. M. (2002) Banks and economic growth: Implications from Japanese history. *Journal of Law and Economics 45*, 127–164.

Modigliani, F., & Miller, M. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review 48*, 261–297.

Modigliani, F., & Miller, M. (1963). Corporate income taxes and the cost of capital: a correction. *American Economic Review 53*, 433–443.

Myers, S. C. (1984). The capital structure puzzle. *Journal of Finance 39*, 575–592.

Myers, S. C. (2001). Capital structure. *Journal of Economic Perspectives 15*, 81–102.

Myers, S. C., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information investors do not have. *Journal of Financial Economics 13*, 187–221.

Rajan, R. G., & Zingales, L. (1998). What do we know about capital structure? Some evidence from international data. *Journal of Finance 50*, 1421–1460.

Robb, A. M., & Robinson, D. T. (2014). The capital structure decisions of new firms. *Review of Financial Studies 27*, 153–179.

Roe, M. (1994). *Strong Managers, Weak Owners: The Political Roots of American Corporate Finance*. Princeton: Princeton University Press.

Shyam-Sunder, L. & Myers, S. C. (1999). Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics 51*, 219–244.

Small and Medium Enterprise Agency (ed.) (2014). *The 2014 White Paper on Small and Medium Enterprises in Japan.*
http://www.chusho.meti.go.jp/pamflet/hakusyo/ [accessed on April 19, 2017]

Storey, D. J., & Greene, F. J. (2010). *Small Business and Entrepreneurship*. Harlow: Pearson Education.

Table 1. Data collection

| Type | Conditions |
| --- | --- |
| (Download criteria) | |
| Year of incorporation | Firms founded from 2006 to 2010. |
| Industry | Manufacturing (C), Construction (F), Wholesale and retail trade; repair of motor vehicles and motorcycles (G), Transportation and storage (H), Accommodation and food service activities (I), Information and communication (J), Real estate activities (L), Professional, scientific and technical activities (M), Administrative and support service activities (N), Arts, entertainment and recreation (R), Other services (S) |
| Legal form | Public and private limited companies |
| (Data screening criteria) | |
| Number of account-months | Firms of which the number of account-months is 12 months from the second-accounting year to the fifth accounting year. |
| Total assets | Firms of which total assets are positive from the first through to the fifth accounting year. |
| Total finance | Firms of which total finance is positive from the first through to the fifth accounting year, and those of which total finance at the first accounting year is less than 10 million US dollars. |
| Initial equity finance | Firms of which equity finance is positive at the first accounting year |
| Others | Firms for which variables of closing accounting date, equity finance, debt finance, trade credit, total finance, fixed assets, and total assets are available from the first through to the fifth accounting year. |
| Independence | Firms that are not recognized as a subsidiary or an affiliated company by BvD. |

Notes: Figures in parentheses for "industry" are one-digit NACE codes. Firms of which independence category for "independence" is unknown are not excluded.

Table 2.  Definitions of variables

| Variable | Symbol | Definition |
|---|---|---|
| Equity finance | $E$ | Issued share capital (thousand US dollars) |
| Debt finance | $D$ | Short-term financial debt plus long-term liabilities (thousand US dollars) |
| Trade credit | $TC$ | Debt to suppliers and contractors |
| Total finance | $TF$ | Sum of equity finance, debt finance, and trade credit |
| Equity finance ratio | $E/TF$ | Equity finance divided by total finance |
| Debt finance ratio | $D/TF$ | Debt finance divided by total finance |
| Trade credit ratio | $TC/TF$ | Trade credit divided by total finance |
| Fixed assets ratio | $FA/TA$ | Sum of intangible assets, tangible assets, and other fixed assets, divided by total assets |
| Firm age | $AGE1$ | Dummy for the first accounting year |
| | $AGE2$ | Dummy for the second accounting year |
| | $AGE3$ | Dummy for the third accounting year |
| | $AGE4$ | Dummy for the forth accounting year |
| | $AGE5$ | Dummy for the fifth accounting year |
| Country | $JPN$ | Dummy for Japan |
| | $FRA$ | Dummy for France |
| | $GER$ | Dummy for Germany |
| | $ITA$ | Dummy for Italy |
| | $ESP$ | Dummy for Spain |
| | $GBR$ | Dummy for the UK |
| Cohort | ----- | Dummies for the founding years, 2006–2010 |
| Industry | ----- | Dummies for the industry classification codes based on one-digit NACE code. |

Notes: Equity finance, debt finance, trade credit, and total assets are measured by the exchange rate at that time.

Table 3. Distribution by total finance in the sample

| Total finance | Japan N | (%) | France N | (%) | Germany N | (%) | Italy N | (%) | Spain N | (%) | UK N | (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $TF < 10T$ | 13 | (0) | 3284 | (3) | 89 | (1) | 15 | (0) | 1699 | (4) | 263 | (10) |
| $10T \leq TF < 20T$ | 35 | (1) | 6994 | (7) | 81 | (1) | 4339 | (10) | 2077 | (5) | 258 | (10) |
| $20T \leq TF < 50T$ | 218 | (5) | 19352 | (20) | 1586 | (19) | 5765 | (13) | 5607 | (14) | 496 | (19) |
| $50T \leq TF < 100T$ | 617 | (15) | 19400 | (20) | 1529 | (18) | 5735 | (13) | 7221 | (18) | 350 | (14) |
| $100T \leq TF < 200T$ | 1125 | (28) | 17757 | (19) | 1635 | (19) | 7055 | (16) | 8522 | (21) | 294 | (11) |
| $200T \leq TF < 500T$ | 1197 | (30) | 16776 | (18) | 1734 | (20) | 8791 | (20) | 8963 | (22) | 317 | (12) |
| $500T \leq TF < 1M$ | 444 | (11) | 6822 | (7) | 885 | (10) | 5054 | (12) | 3622 | (9) | 223 | (9) |
| $1M \leq TF < 2M$ | 205 | (5) | 2839 | (3) | 485 | (6) | 3302 | (8) | 1826 | (4) | 158 | (6) |
| $2M \leq TF < 5M$ | 121 | (3) | 1679 | (2) | 363 | (4) | 2161 | (5) | 1134 | (3) | 139 | (5) |
| $5M \leq TF < 10M$ | 57 | (1) | 341 | (0) | 185 | (2) | 733 | (2) | 422 | (1) | 63 | (2) |
| Total | 4032 | (100) | 95244 | (100) | 8571 | (100) | 42950 | (100) | 41093 | (100) | 2561 | (100) |

Notes: *N* indicates the number of firms. *TF* indicates total finance. T and M indicate thousand and million US dollars, respectively (e.g., 10T means 10 thousand US dollars).

Figures in parentheses are percentages for each total finance in the country.

Table 4. Distribution by industry in the sample

| Industry | Japan N | (%) | France N | (%) | Germany N | (%) | Italy N | (%) | Spain N | (%) | UK N | (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manufacturing | 191 | (5) | 5713 | (6) | 918 | (11) | 4991 | (12) | 4307 | (10) | 151 | (6) |
| Construction | 2613 | (65) | 18202 | (19) | 982 | (11) | 8642 | (20) | 9169 | (22) | 278 | (11) |
| Wholesale & retail trade | 447 | (11) | 20002 | (21) | 1870 | (22) | 9139 | (21) | 11386 | (28) | 279 | (11) |
| Transportation & storage | 54 | (1) | 2832 | (3) | 435 | (5) | 1033 | (2) | 1576 | (4) | 42 | (2) |
| Accommodation & food service | 30 | (1) | 10330 | (11) | 296 | (3) | 2724 | (6) | 3250 | (8) | 128 | (5) |
| Information & communication | 176 | (4) | 4276 | (4) | 520 | (6) | 2047 | (5) | 1391 | (3) | 359 | (14) |
| Real estate | 151 | (4) | 6907 | (7) | 624 | (7) | 6197 | (14) | 1999 | (5) | 228 | (9) |
| Professional & technical | 269 | (7) | 15845 | (17) | 1816 | (21) | 4478 | (10) | 4823 | (12) | 499 | (19) |
| Administrative & support | 80 | (2) | 5208 | (5) | 700 | (8) | 2151 | (5) | 1688 | (4) | 431 | (17) |
| Arts & recreation | 14 | (0) | 1133 | (1) | 125 | (1) | 993 | (2) | 688 | (2) | 50 | (2) |
| Other service | 7 | (0) | 4796 | (5) | 285 | (3) | 555 | (1) | 816 | (2) | 116 | (5) |
| Total | 4032 | (100) | 95244 | (100) | 8571 | (100) | 42950 | (100) | 41093 | (100) | 2561 | (100) |

Notes: $N$ indicates the number of firms. Figures in parentheses are percentages for each industry in the country.

Table 5. Descriptive statistics for debt and equity finance and trade credit at the first accounting year

**Equity finance**

|  | Japan | France | Germany | Italy | Spain | UK |
|---|---|---|---|---|---|---|
| Mean | 73 | 39 | 86 | 53 | 100 | 89 |
| SD | 173 | 232 | 360 | 250 | 505 | 455 |
| 25% | 27 | 4 | 33 | 14 | 4 | 2 |
| Median | 49 | 10 | 35 | 15 | 5 | 2 |
| 75% | 65 | 14 | 37 | 29 | 27 | 8 |
| *N* | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

**Debt finance**

|  | Japan | France | Germany | Italy | Spain | UK |
|---|---|---|---|---|---|---|
| Mean | 173 | 125 | 207 | 236 | 118 | 237 |
| SD | 499 | 389 | 744 | 740 | 453 | 860 |
| 25% | 7 | 0 | 2 | 0 | 0 | 0 |
| Median | 54 | 13 | 16 | 3 | 0 | 0 |
| 75% | 137 | 87 | 96 | 115 | 58 | 29 |
| *N* | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

**Trade credit**

|  | Japan | France | Germany | Italy | Spain | UK |
|---|---|---|---|---|---|---|
| Mean | 127 | 35 | 19 | 126 | 38 | 34 |
| SD | 458 | 130 | 210 | 399 | 180 | 282 |
| 25% | 0 | 2 | 0 | 0 | 0 | 0 |
| Median | 18 | 8 | 0 | 8 | 0 | 0 |
| 75% | 80 | 26 | 0 | 84 | 18 | 0 |
| *N* | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

Notes: Figures in thousand US dollars. SD indicates standard deviation. *N* indicates the number of firms.

Table 6. Descriptive statistics for the ratios of debt and equity finance and trade credit at the first accounting year

Equity finance ratio

|  | Japan | France | Germany | Italy | Spain | UK |
|---|---|---|---|---|---|---|
| Mean | 0.286 | 0.177 | 0.372 | 0.300 | 0.211 | 0.190 |
| SD | 0.243 | 0.216 | 0.321 | 0.328 | 0.268 | 0.284 |
| 25% | 0.103 | 0.037 | 0.100 | 0.049 | 0.030 | 0.012 |
| Median | 0.215 | 0.092 | 0.260 | 0.142 | 0.087 | 0.056 |
| 75% | 0.394 | 0.223 | 0.623 | 0.481 | 0.283 | 0.222 |
| $N$ | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

Debt finance ratio

|  | Japan | France | Germany | Italy | Spain | UK |
|---|---|---|---|---|---|---|
| Mean | 0.324 | 0.292 | 0.227 | 0.221 | 0.189 | 0.188 |
| SD | 0.266 | 0.316 | 0.261 | 0.329 | 0.282 | 0.312 |
| 25% | 0.056 | 0.000 | 0.026 | 0.000 | 0.000 | 0.000 |
| Median | 0.304 | 0.186 | 0.106 | 0.023 | 0.000 | 0.000 |
| 75% | 0.535 | 0.563 | 0.374 | 0.390 | 0.340 | 0.300 |
| $N$ | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

Trade credit ratio

|  | Japan | France | Germany | Italy | Spain | UK |
|---|---|---|---|---|---|---|
| Mean | 0.180 | 0.157 | 0.013 | 0.217 | 0.126 | 0.028 |
| SD | 0.210 | 0.176 | 0.073 | 0.271 | 0.225 | 0.116 |
| 25% | 0.000 | 0.034 | 0.000 | 0.000 | 0.000 | 0.000 |
| Median | 0.100 | 0.095 | 0.000 | 0.081 | 0.000 | 0.000 |
| 75% | 0.299 | 0.218 | 0.000 | 0.383 | 0.160 | 0.000 |
| $N$ | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

Notes: SD indicates standard deviation. $N$ indicates the number of firms.

Table 7. Mean and median ratios of equity finance from the first through to the fifth accounting year

| Mean | | | | | | |
|---|---|---|---|---|---|---|
| Firm age | Japan | France | Germany | Italy | Spain | UK |
| 1 | 0.286 | 0.177 | 0.373 | 0.300 | 0.211 | 0.190 |
| 2 | 0.230 | 0.156 | 0.272 | 0.196 | 0.164 | 0.163 |
| 3 | 0.200 | 0.153 | 0.247 | 0.177 | 0.159 | 0.163 |
| 4 | 0.188 | 0.155 | 0.239 | 0.175 | 0.165 | 0.168 |
| 5 | 0.179 | 0.160 | 0.235 | 0.187 | 0.173 | 0.177 |
| *N* | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |
| Median | | | | | | |
| Firm age | Japan | France | Germany | Italy | Spain | UK |
| 1 | 0.215 | 0.092 | 0.256 | 0.142 | 0.087 | 0.056 |
| 2 | 0.166 | 0.083 | 0.164 | 0.082 | 0.062 | 0.043 |
| 3 | 0.140 | 0.081 | 0.141 | 0.072 | 0.060 | 0.042 |
| 4 | 0.126 | 0.083 | 0.131 | 0.071 | 0.062 | 0.044 |
| 5 | 0.117 | 0.086 | 0.126 | 0.075 | 0.065 | 0.049 |
| *N* | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

Note: *N* indicates the number of firms.

Table 8. Mean and median ratios of debt finance from the first through to the fifth accounting year

| Mean | | | | | | |
|---|---|---|---|---|---|---|
| Firm age | Japan | France | Germany | Italy | Spain | UK |
| 1 | 0.324 | 0.291 | 0.227 | 0.221 | 0.189 | 0.188 |
| 2 | 0.383 | 0.290 | 0.281 | 0.276 | 0.238 | 0.190 |
| 3 | 0.419 | 0.279 | 0.288 | 0.286 | 0.263 | 0.182 |
| 4 | 0.439 | 0.263 | 0.288 | 0.291 | 0.261 | 0.168 |
| 5 | 0.446 | 0.242 | 0.291 | 0.284 | 0.255 | 0.159 |
| *N* | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |
| Median | | | | | | |
| Firm age | Japan | France | Germany | Italy | Spain | UK |
| 1 | 0.304 | 0.186 | 0.106 | 0.023 | 0.000 | 0.000 |
| 2 | 0.384 | 0.211 | 0.195 | 0.133 | 0.094 | 0.000 |
| 3 | 0.437 | 0.200 | 0.204 | 0.164 | 0.151 | 0.000 |
| 4 | 0.462 | 0.180 | 0.204 | 0.181 | 0.153 | 0.000 |
| 5 | 0.464 | 0.151 | 0.209 | 0.169 | 0.140 | 0.000 |
| *N* | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

Note: *N* indicates the number of firms.

Table 9. Mean and median ratios of trade credit from the first through to the fifth accounting year

| Mean | | | | | | |
|---|---|---|---|---|---|---|
| Firm age | Japan | France | Germany | Italy | Spain | UK |
| 1 | 0.180 | 0.157 | 0.013 | 0.217 | 0.126 | 0.028 |
| 2 | 0.181 | 0.160 | 0.012 | 0.223 | 0.159 | 0.026 |
| 3 | 0.171 | 0.164 | 0.016 | 0.220 | 0.184 | 0.023 |
| 4 | 0.171 | 0.172 | 0.020 | 0.217 | 0.177 | 0.024 |
| 5 | 0.169 | 0.178 | 0.021 | 0.209 | 0.169 | 0.021 |
| $N$ | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |
| Median | | | | | | |
| Firm age | Japan | France | Germany | Italy | Spain | UK |
| 1 | 0.100 | 0.095 | 0.000 | 0.081 | 0.000 | 0.000 |
| 2 | 0.117 | 0.100 | 0.000 | 0.105 | 0.030 | 0.000 |
| 3 | 0.115 | 0.106 | 0.000 | 0.107 | 0.080 | 0.000 |
| 4 | 0.116 | 0.114 | 0.000 | 0.111 | 0.073 | 0.000 |
| 5 | 0.115 | 0.121 | 0.000 | 0.101 | 0.067 | 0.000 |
| $N$ | 4032 | 95244 | 8571 | 42950 | 41093 | 2561 |

Note: $N$ indicates the number of firms.

Table 10. Estimation results: equity finance ratio

| Variable | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (ix) | (x) | (xi) | (xii) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Japan | | France | | Germany | | Italy | | Spain | | UK | |
| | OLS | FE | OLS | FE | OLS | FE | OLS | FE | OLS | FE | OLS | FE |
| *FIX/TA* | -0.090*** | -0.022** | -0.057*** | -0.075*** | -0.047*** | -0.009 | 0.023*** | 0.017*** | 0.061*** | 0.011*** | 0.073*** | 0.007 |
| | (0.008) | (0.011) | (0.001) | (0.002) | (0.006) | (0.009) | (0.002) | (0.004) | (0.002) | (0.003) | (0.008) | (0.011) |
| *AGE*2 | -0.056*** | -0.056*** | -0.021*** | -0.021*** | -0.102*** | -0.101*** | -0.103*** | -0.103*** | -0.049*** | -0.048*** | -0.028*** | -0.028*** |
| | (0.005) | (0.003) | (0.001) | (0.000) | (0.004) | (0.002) | (0.002) | (0.001) | (0.002) | (0.001) | (0.008) | (0.003) |
| *AGE*3 | -0.085*** | -0.086*** | -0.024*** | -0.025*** | -0.127*** | -0.126*** | -0.123*** | -0.123*** | -0.054*** | -0.052*** | -0.028*** | -0.027*** |
| | (0.005) | (0.003) | (0.001) | (0.000) | (0.004) | (0.003) | (0.002) | (0.001) | (0.002) | (0.001) | (0.008) | (0.003) |
| *AGE*4 | -0.096*** | -0.098*** | -0.022*** | -0.022*** | -0.135*** | -0.134*** | -0.124*** | -0.124*** | -0.049*** | -0.047*** | -0.023*** | -0.023*** |
| | (0.005) | (0.003) | (0.001) | (0.001) | (0.004) | (0.003) | (0.002) | (0.001) | (0.002) | (0.001) | (0.008) | (0.004) |
| *AGE*5 | -0.105*** | -0.107*** | -0.018*** | -0.018*** | -0.140*** | -0.139*** | -0.112*** | -0.112*** | -0.040*** | -0.038*** | -0.012*** | -0.014*** |
| | (0.005) | (0.003) | (0.001) | (0.001) | (0.004) | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) | (0.008) | (0.004) |
| Industry | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| Cohort | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| *N*×*T* | 20160 | 20160 | 476220 | 476220 | 42855 | 42855 | 214750 | 214750 | 205465 | 205465 | 12805 | 12805 |
| F | 68*** | | 1337*** | | 211*** | | 647*** | | 1337*** | | 10*** | |
| Wald χ² | | 1250*** | | 3764*** | | 2193*** | | 9015*** | | 3594*** | | 116*** |

Notes: Figures in parentheses are robust standard errors. FE represents fixed-effects estimation. *N*×*T* represents the number of observations. Industry represents industry dummies. Cohort represents cohort dummies. F represents F-value. The reference category for firm age is the first accounting year (*AGE*1).

Table 11. Estimation results: debt finance ratio

| Variable | (i) OLS | (ii) FE | (iii) OLS | (iv) FE | (v) OLS | (vi) FE | (vii) OLS | (viii) FE | (ix) OLS | (x) FE | (xi) OLS | (xii) FE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Japan | | France | | Germany | | Italy | | Spain | | UK | |
| *FIX/TA* | 0.423*** | 0.323*** | 0.519*** | 0.490*** | 0.265*** | 0.187*** | 0.023*** | 0.017*** | 0.316*** | 0.247*** | 0.204*** | 0.154*** |
| | (0.009) | (0.013) | (0.002) | (0.002) | (0.007) | (0.012) | (0.002) | (0.004) | (0.002) | (0.004) | (0.009) | (0.014) |
| *AGE*2 | 0.056*** | 0.057*** | -0.002** | -0.002** | 0.055*** | 0.054*** | -0.103*** | -0.103*** | 0.041*** | 0.043*** | 0.001 | 0.001 |
| | (0.006) | (0.003) | (0.001) | (0.001) | (0.004) | (0.002) | (0.002) | (0.001) | (0.002) | (0.001) | (0.008) | (0.004) |
| *AGE*3 | 0.087*** | 0.089*** | -0.011*** | -0.011*** | 0.066*** | 0.065*** | -0.123*** | -0.123*** | 0.061*** | 0.064*** | -0.008 | -0.007 |
| | (0.005) | (0.004) | (0.001) | (0.001) | (0.004) | (0.003) | (0.002) | (0.001) | (0.002) | (0.001) | (0.008) | (0.005) |
| *AGE*4 | 0.105*** | 0.107*** | -0.025*** | -0.025*** | 0.068*** | 0.066*** | -0.124*** | -0.124*** | 0.057*** | 0.061*** | -0.020** | -0.020*** |
| | (0.006) | (0.004) | (0.001) | (0.001) | (0.004) | (0.003) | (0.002) | (0.001) | (0.002) | (0.001) | (0.008) | (0.005) |
| *AGE*5 | 0.109*** | 0.112*** | -0.042*** | -0.043*** | 0.072*** | 0.070*** | -0.112*** | -0.112*** | 0.050*** | 0.054*** | -0.026*** | -0.027*** |
| | (0.006) | (0.004) | (0.001) | (0.001) | (0.004) | (0.003) | (0.002) | (0.002) | (0.002) | (0.001) | (0.008) | (0.006) |
| Industry | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| Cohort | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| *N×T* | 20160 | 20160 | 476220 | 476220 | 42855 | 42855 | 214750 | 214750 | 205465 | 205465 | 12805 | 12805 |
| F | 201*** | | 11389*** | | 153*** | | 647*** | | 1601*** | | 71*** | |
| Wald $\chi^2$ | | 1617*** | | 46204*** | | 867*** | | 9015*** | | 7808*** | | 168*** |

Notes: Figures in parentheses are robust standard errors. FE represents fixed-effects estimation. *N×T* represents the number of observations. Industry represents industry dummies. Cohort represents cohort dummies. F represents F-value. The reference category for firm age is the first accounting year (*AGE*1).

Table 12. Estimation results: trade credit ratio

| | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (ix) | (x) | (xi) | (xii) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Japan | | France | | Germany | | Italy | | Spain | | UK | |
| Variable | OLS | FE | OLS | FE | OLS | FE | OLS | FE | OLS | FE | OLS | FE |
| *FIX/TA* | -0.205*** | -0.174*** | -0.184*** | -0.149*** | -0.009*** | -0.008*** | 0.023*** | 0.017*** | -0.189*** | -0.155*** | -0.003 | -0.014*** |
| | (0.005) | (0.008) | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) | (0.004) | (0.001) | (0.002) | (0.002) | (0.003) |
| *AGE*2 | 0.003 | 0.003 | 0.003*** | 0.003*** | -0.001 | -0.001 | -0.103*** | -0.103*** | 0.037*** | 0.036*** | -0.003 | -0.003*** |
| | (0.004) | (0.003) | (0.001) | (0.000) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.003) | (0.002) |
| *AGE*3 | -0.005 | -0.006* | 0.006*** | 0.006*** | 0.003*** | 0.003*** | -0.123*** | -0.123*** | 0.065*** | 0.064*** | -0.005* | -0.005*** |
| | (0.004) | (0.003) | (0.001) | (0.000) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.003) | (0.002) |
| *AGE*4 | -0.004 | -0.005 | 0.013*** | 0.013*** | 0.006*** | 0.006*** | -0.124*** | -0.124*** | 0.059*** | 0.058*** | -0.004 | -0.004*** |
| | (0.004) | (0.003) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.003) | (0.002) |
| *AGE*5 | -0.004 | -0.005* | 0.017*** | 0.018*** | 0.008*** | 0.008*** | -0.112*** | -0.112*** | 0.053*** | 0.051*** | -0.008*** | -0.008*** |
| | (0.004) | (0.003) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) | (0.003) | (0.002) |
| Industry | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| Cohort | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| *N×T* | 20160 | 20160 | 476220 | 476220 | 42855 | 42855 | 214750 | 214750 | 205465 | 205465 | 12805 | 12805 |
| F | 177*** | | 5561*** | | 24*** | | 647*** | | 2612*** | | 15*** | |
| Wald χ² | | 519*** | | 13868*** | | 119*** | | 9015*** | | 7054*** | | 25** |

Notes: Figures in parentheses are robust standard errors. FE represents fixed-effects estimation. *N×T* represents the number of observations. Industry represents industry dummies. Cohort represents cohort dummies. F represents F-value. The reference category for firm age is the first accounting year (*AGE*1).

Table 13. Regression analysis for all the countries

| Variable | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (ix) |
|---|---|---|---|---|---|---|---|---|---|
| | Equity finance ratio ($E/TF$) | | | Debt finance ratio ($D/TF$) | | | Trade credit ratio ($TC/TF$) | | |
| | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE |
| $FIX/TA$ | -0.006*** | -0.017*** | -0.023*** | 0.378*** | 0.307*** | 0.237*** | -0.161*** | -0.121*** | -0.084*** |
| | (0.001) | (0.002) | (0.002) | (0.001) | (0.002) | (0.003) | (0.001) | (0.001) | (0.002) |
| $AGE2$ | -0.049*** | -0.049*** | -0.049*** | 0.023*** | 0.023*** | 0.024*** | 0.010*** | 0.010*** | 0.010*** |
| | (0.001) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) |
| $AGE3$ | -0.058*** | -0.058*** | -0.058*** | 0.027*** | 0.027*** | 0.027*** | 0.017*** | 0.017*** | 0.017*** |
| | (0.001) | (0.000) | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.000) |
| $AGE4$ | -0.056*** | -0.056*** | -0.056*** | 0.021*** | 0.021*** | 0.021*** | 0.018*** | 0.018*** | 0.018*** |
| | (0.001) | (0.000) | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.000) |
| $AGE5$ | -0.050*** | -0.050*** | -0.050*** | 0.010*** | 0.010*** | 0.010*** | 0.016*** | 0.017*** | 0.017*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.000) |
| $JPN$ | -0.043*** | -0.043*** | | 0.133*** | 0.135*** | | 0.146*** | 0.145*** | |
| | (0.002) | (0.004) | | (0.002) | (0.004) | | (0.001) | (0.003) | |
| $FRA$ | -0.105*** | -0.104*** | | -0.049*** | -0.043*** | | 0.166*** | 0.162*** | |
| | (0.001) | (0.003) | | (0.001) | (0.002) | | (0.001) | (0.001) | |
| $ITA$ | -0.057*** | -0.057*** | | -0.023*** | -0.023*** | | 0.201*** | 0.201*** | |
| | (0.001) | (0.003) | | (0.001) | (0.003) | | (0.001) | (0.001) | |
| $ESP$ | -0.085*** | -0.084*** | | -0.073*** | -0.072*** | | 0.149*** | 0.144*** | |
| | (0.001) | (0.003) | | (0.001) | (0.003) | | (0.001) | (0.001) | |
| $GBR$ | -0.111*** | -0.111*** | | -0.107*** | -0.104*** | | 0.032*** | 0.030*** | |
| | (0.003) | (0.006) | | (0.003) | (0.005) | | (0.001) | (0.002) | |
| Industry | Yes | Yes | No | Yes | Yes | No | Yes | Yes | No |
| Cohort | Yes | Yes | No | Yes | Yes | No | Yes | Yes | No |
| $N×T$ | 972255 | 972255 | 972255 | 972255 | 972255 | 972255 | 972255 | 972255 | 972255 |
| F | 1822*** | | | 7592*** | | | 8728*** | | |
| Wald $\chi^2$ | | 26600*** | 3362*** | | 45007*** | 1742*** | | 26600*** | 854*** |

Notes: Figures in parentheses are robust standard errors. RE represents random-effects estimation. FE represents fixed-effects estimation. $N×T$ represents the number of observations. Industry represents industry dummies. Cohort represents cohort dummies. F represents F-value. The reference category for firm age is the first accounting year ($AGE1$). The reference category for country is Germany ($GER$).
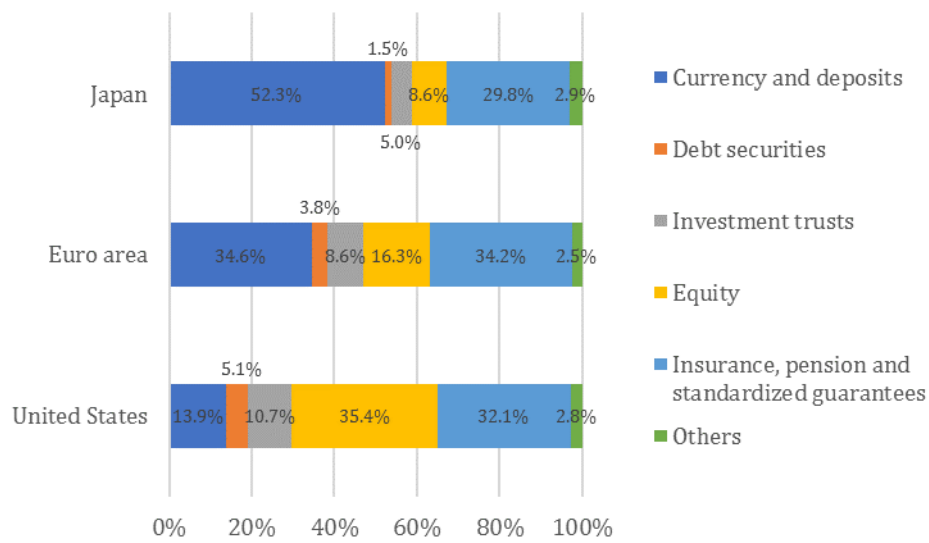
Figure 1. Financial assets held by households

Source: *Flow of Funds: Overview of Japan, the United States, and the Euro area*. Research and Statistics Department, Bank of Japan, December 22, 2016.

Notes: "Others" is the residual which is the remaining after deducting "Currency and deposits," "Debt securities," "Investment trusts," "Equity," and "Insurance, pension and standardized guarantees" from total financial assets. The total amounts of Japan, the Euro area, and the United States are 1,752 trillion yen, 22.3 trillion Euro, and 73.1 trillion US dollars, respectively.
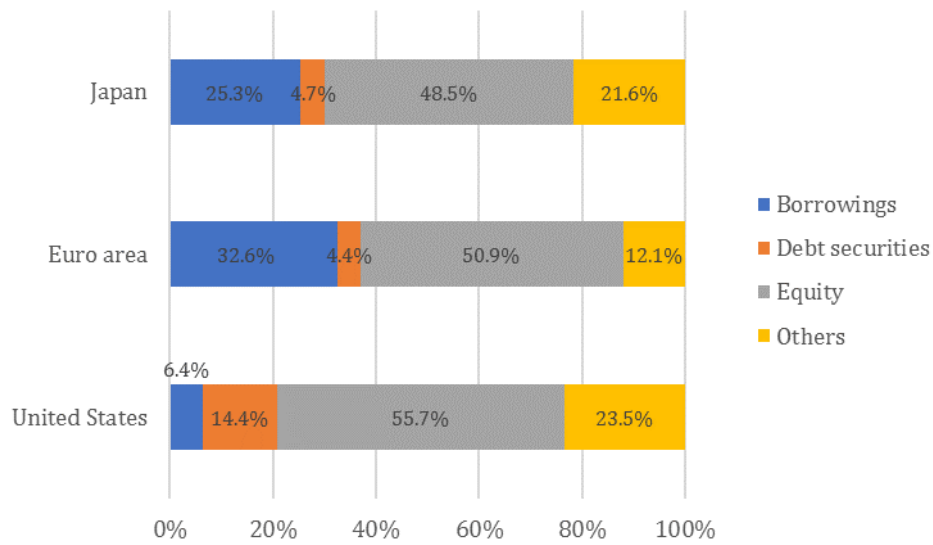
Figure 2. Financial liabilities and equity owed by nonfinancial corporations

Source: *Flow of Funds: Overview of Japan, the United States, and the Euro area*. Research and Statistics Department, Bank of Japan, December 22, 2016.

Notes: "Others" is the residual which is the remaining after deducting "Borrowings," "Debt securities," and "Equity" from total financial liabilities. Figures for the Euro area consist of both governmental and nongovernmental nonfinancial corporations. The total amounts of Japan, the Euro area, and the US are 1,407 trillion yen, 30.1 trillion Euro, and 40.6 trillion US dollars, respectively.
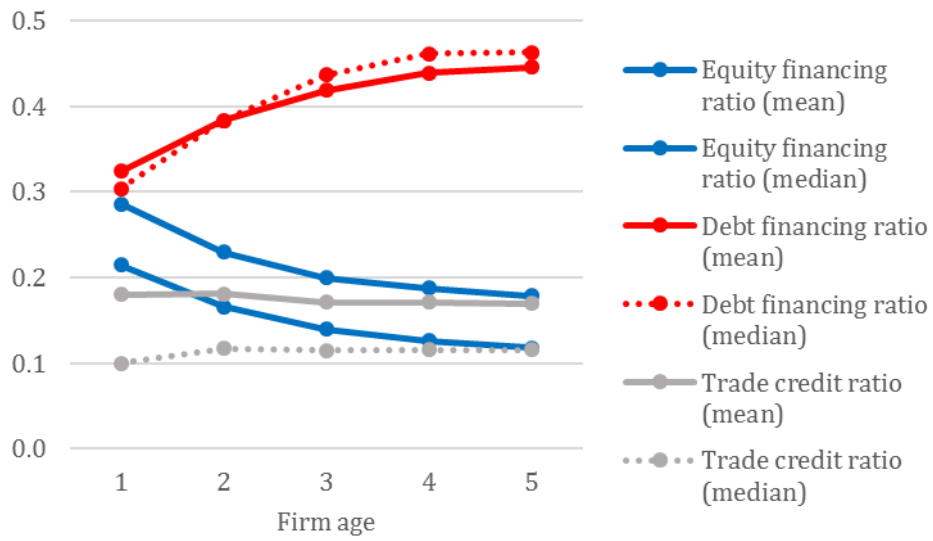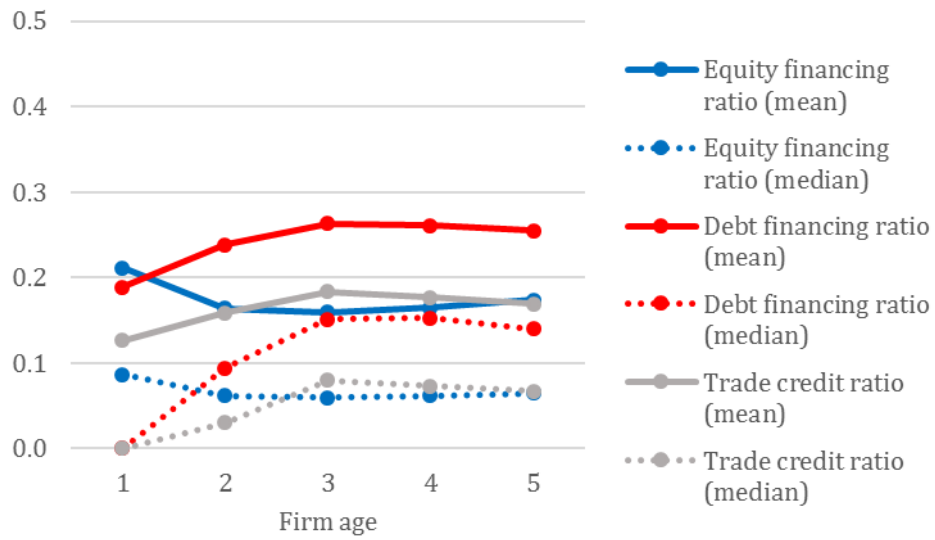
Figure 3. Mean and median ratios of equity and debt finance and trade credit: Japan

Note: The number of firms is 4032.
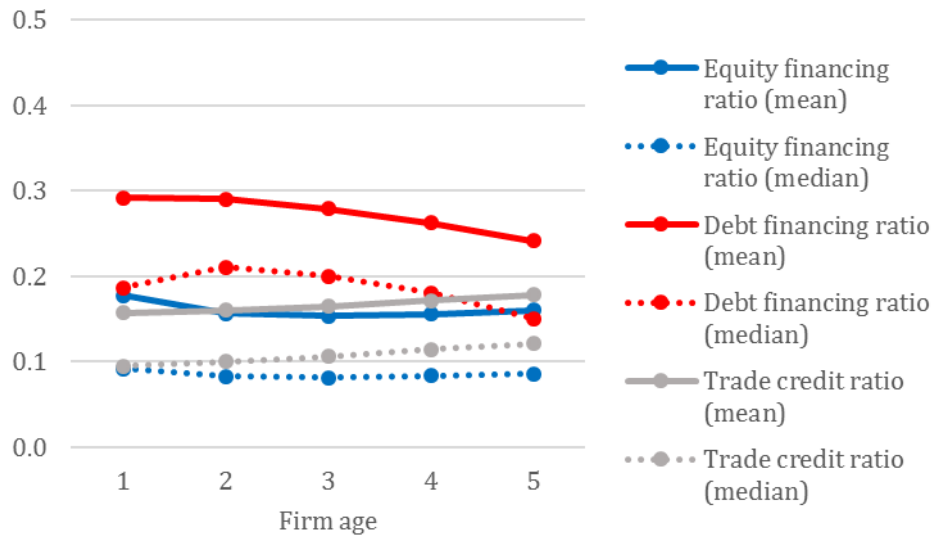
Figure 4. Mean and median ratios of equity and debt finance and trade credit: France
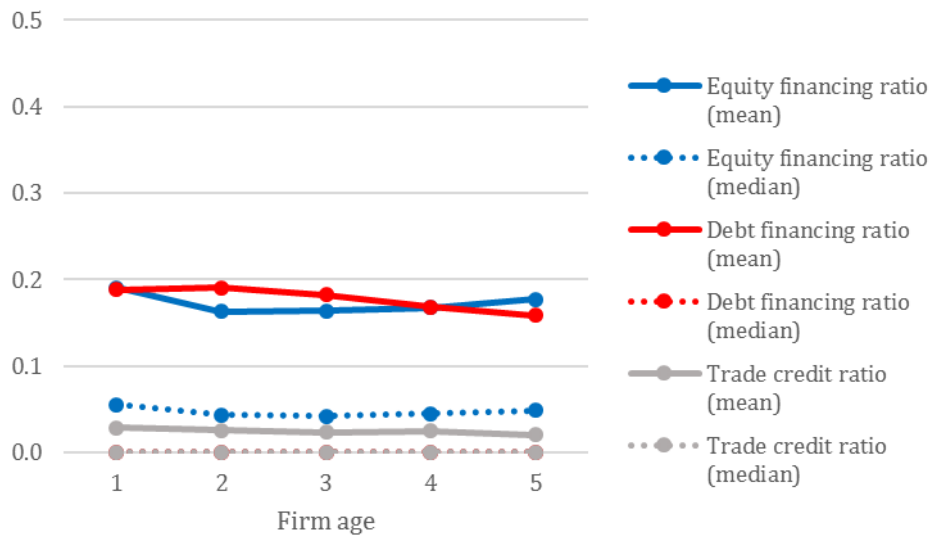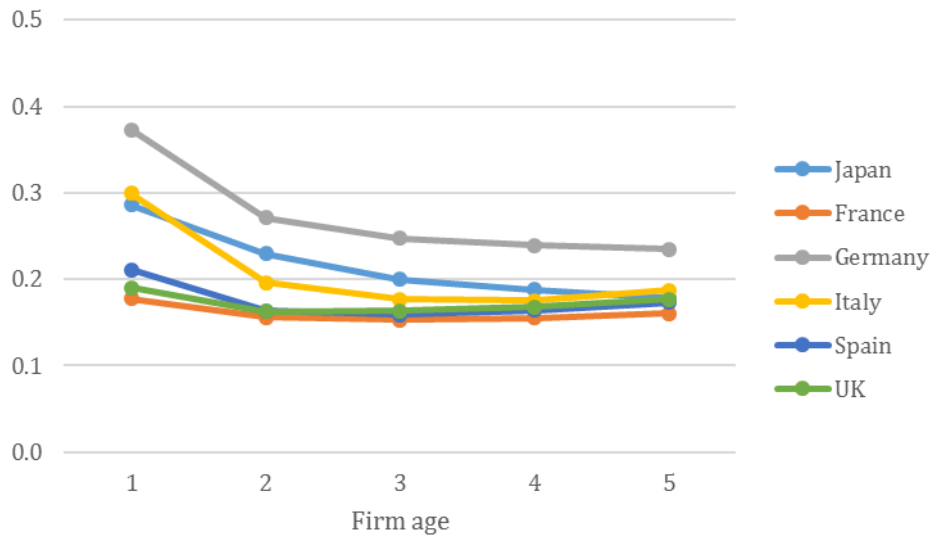
Note: The number of firms is 95244.
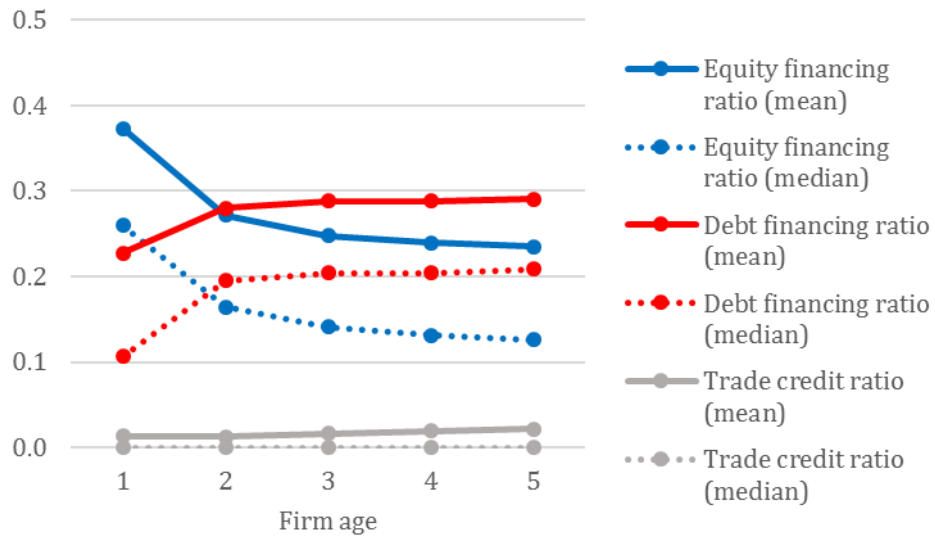
Figure 5. Mean and median ratios of equity and debt finance and trade credit: Germany

Note: The number of firms is 8571.
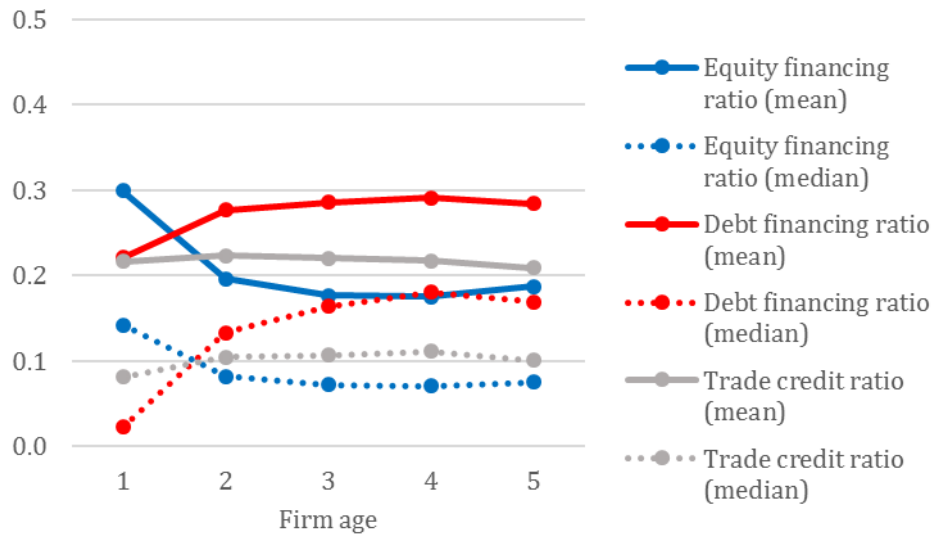
Figure 6. Mean and median ratios of equity and debt finance and trade credit: Italy

Note: The number of firms is 42950.

Figure 7. Mean and median ratios of debt and equity finance and trade credit: Spain

Note: The number of firms is 41093.

Figure 8. Mean and median ratios of debt and equity finance and trade credit: UK

Note: The number of firms is 2563.

Figure 9. Mean ratio of equity finance: all the countries

Note: The numbers of firms are 4032, 95244, 8571, 42950, 41093, and 2561 for Japan, France, Germany, Italy, Spain, and the UK, respectively.
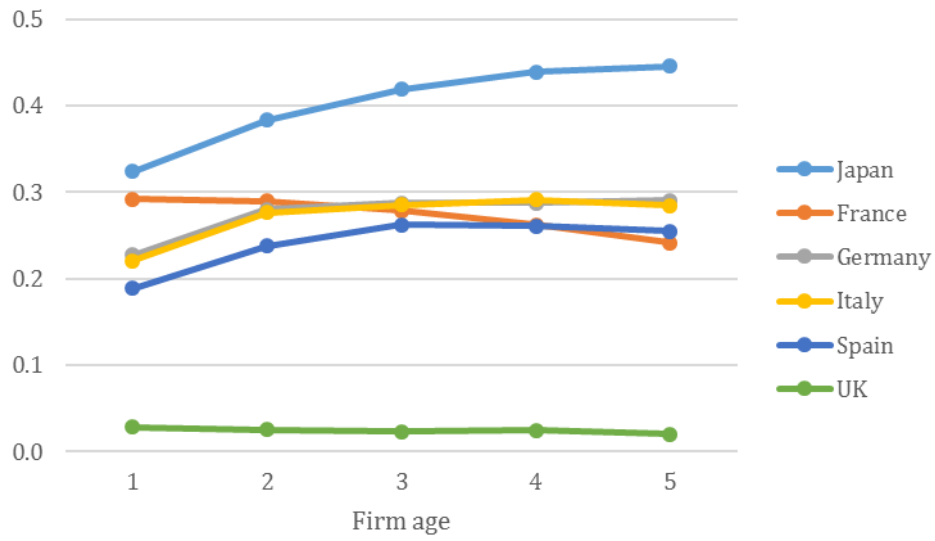
Figure 10. Mean ratio of debt finance: all the countries

Note: The numbers of firms are 4032, 95244, 8571, 42950, 41093, and 2561 for Japan, France, Germany, Italy, Spain, and the UK, respectively.
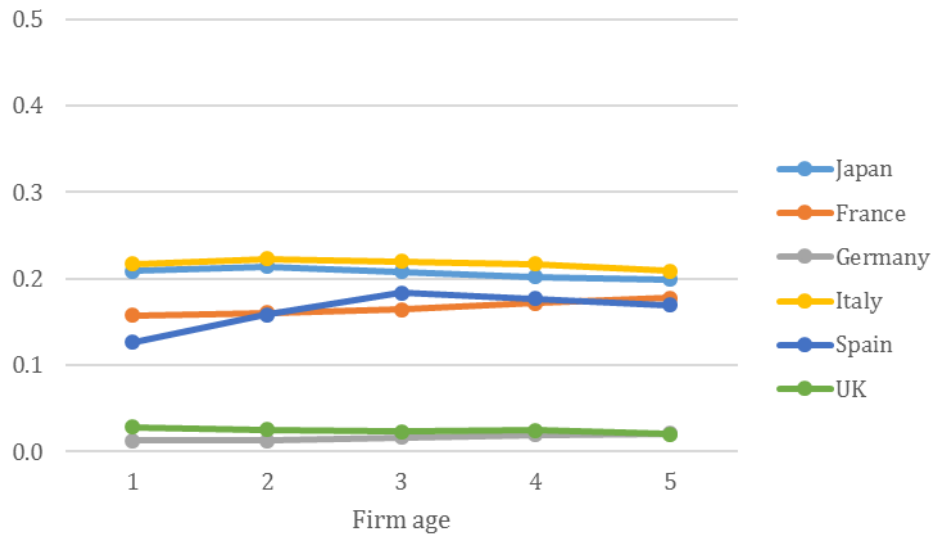
Figure 11. Mean ratio of trade credit: all the countries

Note: The numbers of firms are 4032, 95244, 8571, 42950, 41093, and 2561 for Japan, France, Germany, Italy, Spain, and the UK, respectively.