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Does Finance Promote New Firm Creation and Growth? Evidence from regional data in Japan*

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Abstract

This study examines how regional financial development influences new firm creation and growth in Japan. Using prefecture–year panel data from 2007 to 2023, we distinguish between regional equity and debt capital, proxied by the number of investment limited partnerships and bank branches, respectively. We find that regions with greater equity capital have more newly founded firms and initial public offerings, and provide suggestive evidence of stronger sales growth among young firms (firms within five years of establishment), whereas regional debt capital has no significant effect. Moreover, regional equity capital is associated with higher employment shares of medium- and large-sized young firms and lower shares of small ones, implying that regional equity capital promotes a compositional shift in new firm creation toward larger entrants. These findings are robust to potential endogeneity concerns and to alternative measures of financial development.

Keywords: firm growth; investment limited partnership; new firm; regional debt; regional equity
JEL classification: G24, G38, M13, R53

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1. Introduction

Regional financial development can influence local entrepreneurial dynamics by improving access to external capital, thereby increasing the likelihood that individuals start their own businesses and promoting firm growth (Guiso et al., 2004). While several studies emphasize the role of regional financial development in fostering entrepreneurship (Pan and Yang, 2019), others suggest that advances in information technology and financial markets have reduced the importance of geographical proximity between investors and firms, potentially weakening the relevance of regional financial development (Petersen and Rajan, 2002).[1] At the same time, empirical evidence on which specific dimensions of regional financial development are most critical for entrepreneurship remains limited. Whether and through which channels regional financial development leads to new firm creation and growth remains an open empirical question, and clarifying this relationship would provide valuable insights for policies aimed at regional revitalization. One way to clarify these channels is to distinguish between equity and credit markets, which differ fundamentally in their financing structures and incentive mechanisms.

The development of equity and credit markets, as well as financial institutions participating in these markets, has been identified as crucial for entrepreneurship in the literature. For example, some studies find that an increase in the supply of venture capital (VC) investment in a region positively affects firm creation and size (Popov, 2014; Samila and Sorenson, 2011). Their findings highlight the positive role of equity market development in fostering entrepreneurship. Similarly, credit market development may play a significant role in firm creation because bank loans are a vital source of financing for many start-ups (Berger and Udell, 1998; Robb and Robinson, 2014). Taken together, these studies suggest that both equity and

[1] Prior studies suggest that financial capital is not perfectly mobile across regions (Amos and Wingender, 1997; De Guevara and Maudos, 2009), implying that regional financial development may still play an important role in shaping entrepreneurial activity. However, we do not explicitly examine interregional capital mobility in this study, which remains an important topic for future research.

credit markets contribute to entrepreneurial activity, possibly through distinct channels associated with regional equity and credit markets.

However, the development of regional equity and credit markets may not always be conducive to entrepreneurship and can even have adverse effects. VC investment is highly concentrated in a few metropolitan areas and targets a narrow set of high-growth start-ups (Berger and Udell, 1998; Chen et al., 2010). Consequently, for most regional start-ups, debt remains the primary source of external finance (Robb and Robinson, 2014), thereby making the development of regional equity capital less directly relevant for these firms. The effects of credit market development are also ambiguous. While a larger number of banks and credit intermediaries and greater competition can stimulate firm entry (Black and Strahan, 2002; Cetorelli and Strahan, 2006; Kerr and Nanda, 2009), intensified competition may weaken lending relationships, thereby limiting start-ups' access to finance (Kerr and Nanda, 2011; Petersen and Rajan, 1995). Banks may also hesitate to lend to start-ups in order to protect existing clients, and debt service obligations can constrain firm growth in the presence of capital market imperfections. These considerations highlight the need to further examine whether and how regional equity and credit market development matters for entrepreneurship.

This study examines whether the development of regional equity and debt capital facilitates new firm creation and growth, using balanced prefecture–year panel data from 2007 to 2023 in Japan. Japan provides an ideal and unique setting for this analysis. The Japanese financial system is characterized by a long-standing dominance of debt capital over equity capital, with banks playing a central role in corporate financing. The development of VC and regional equity markets in Japan remains relatively limited. Moreover, Japanese banks are permitted to make equity investments either directly or through their VC subsidiaries, allowing them to participate in both credit and equity financing for start-ups.

To capture regional financial development, we focus on two key indicators: the number of investment limited partnerships (ILPs), normalized by the number of establishments, and the number of bank branches, normalized by population. ILPs are the typical legal entities used in Japan for syndicated equity investments in start-ups with growth potential. We measure entrepreneurial outcomes using three proxies: the number of

newly founded firms, the number of IPOs, and the average sales growth of young firms (i.e., firms established within the past five years). In addition, we examine whether regional financial development influences the employment share of young firms across different size categories (small, medium, and large).

Our main findings from the baseline estimation using a two-way fixed effects linear model are as follows. First, regional equity capital, measured by the number of ILPs, is positively associated with both the number of newly founded firms and IPOs. However, this positive association disappears when Tokyo Prefecture is excluded, suggesting that it is primarily driven by Tokyo Prefecture. Second, regional equity capital is positively, although not statistically significantly, associated with the average sales growth of young firms. Third, in contrast, regional debt capital, measured by the number of bank branches, is negatively, although also statistically insignificantly, associated with the number of newly founded firms and IPOs, as well as the average sales growth of young firms, suggesting that regional debt capital does not facilitate new firm creation and growth. Fourth, regional equity capital is linked to a higher employment share of medium- and large-sized young firms and a lower share of smaller ones, indicating a compositional shift in new firm creation toward larger entrants. Taken together, our findings suggest that regional equity capital is more closely associated with new firm creation and growth than regional debt capital, but that this association is highly concentrated in Tokyo Prefecture. This pattern indicates that debt capital alone is unlikely to stimulate new firm creation and growth, and highlights the challenges of fostering effective equity financing ecosystems in other regions.

While the baseline estimation results reveal associations—or a lack thereof—between regional financial development and entrepreneurship, drawing causal inferences requires addressing two key empirical concerns: endogeneity and measurement error in the explanatory variables. Endogeneity arises because financial development may itself respond to entrepreneurial activity, giving rise to potential reverse causality. Measurement error mainly stems from the fact that the number of ILPs and bank branches may not fully capture the underlying level of financial development.

To address endogeneity concerns, we employ a dynamic panel data model based on the generalized method of moments (GMM) proposed by Arellano and Bond (1991), which has been widely used in the

finance–growth literature (Beck and Levine, 2002). In addition, we use two historical instrumental variables (IVs): (i) the size of securities exchanges operating in each region before World War II, measured by their revenues from transaction fees, and (ii) the development of regional banks in the prewar period, proxied by the number of filatures per capita, which was closely linked to the textile industry, the leading sector at the time (Hoffmann and Okubo, 2022). These instruments exploit historical variation in equity and credit market development that is plausibly exogenous to current entrepreneurial activity. To further mitigate measurement error in our proxies, we follow Rossi and Scalise (2022) and apply principal component analysis (PCA) to derive three composite indicators—debt capital, overall financial market development, and equity capital—that capture broader aspects of regional financial development than the raw measures of ILPs and bank branches. The results from the GMM, IV, and PCA estimations broadly confirm the robustness of our main findings. In some specifications, regional equity capital shows a statistically significant positive effect on the average sales growth of young firms, whereas regional debt capital shows a statistically significant negative effect on the number of newly founded firms and IPOs.

Our results contribute to the literature in three ways. First, we extend the finance–growth literature by providing new evidence on new firm creation and growth using regional data. While numerous studies have examined the finance–entrepreneurship nexus at the country level (Dutta and Meierrieks, 2021; Gaies et al., 2023), only a few have analyzed it at the regional level (Guiso et al., 2004; Pan and Yang, 2019). These studies focus primarily on firm entry rates or start-up counts and do not address the growth of newly founded firms, leaving it unclear whether financial development contributes to their subsequent growth.[2] In contrast, we provide novel evidence by measuring IPOs and the average sales growth of newly founded firms at the prefecture level, thereby complementing existing studies. In other words, we examine not only the extensive margin of entrepreneurship (i.e., new firm creation) but also its intensive margin (i.e., post-entry growth).

[2] Guiso et al. (2004) examine the effect of financial development on the sales growth of firms located in a region. However, their analysis is not restricted to newly founded firms, as their primary focus is on regional growth.

Second, we add to a growing literature that distinguishes between the roles of equity and debt markets. For example, Zhu and Kim (2025) explicitly examine how equity and credit market development affects innovation, and Zhu (2023) analyzes its impact on product market competition. To the best of our knowledge, Pan and Yang (2019) is the only study that examines the impact of credit and equity market development on entrepreneurial activity using regional data from China. However, their analysis focuses solely on the number of newly listed firms on stock exchanges and does not adequately address the endogeneity of financial development.[3] In contrast, our study addresses the endogeneity problem by employing GMM and IV estimations, following Rossi and Scalise (2022). In doing so, we complement and extend this line of research.

Third, we examine how regional financial development affects young firms across different size categories. In this respect, the work closest to ours is Popov (2014), who investigates the role of VC in shaping firm size distributions in the United States. Our study provides complementary evidence from Japan and further investigates the role of credit market development. Taken together, these contributions highlight the importance of considering both the growth dimension of entrepreneurship and the heterogeneous roles of equity and debt capital when evaluating how regional financial development shapes entrepreneurial activity.

The remainder of this paper is organized as follows. The following section briefly reviews the related literature and outlines our contributions. Section 3 describes the study's data and methodology. Section 4 presents our estimation results. Finally, Section 5 concludes by summarizing the main findings.

2. Literature review

Entrepreneurship has been widely studied as a key driver of long-term economic growth (Acs and Szerb, 2007). In particular, prior research emphasizes that the emergence of start-ups with growth potential can

[3] Pan and Yang (2019) address endogeneity by using independent variables lagged by five and ten years. However, relying solely on lagged variables may not fully resolve endogeneity concerns.

contribute to regional economic development by fostering innovation and job creation (Baptista and Preto, 2011; Van Praag and Versloot, 2007). A central theme in the literature is access to finance, which plays a crucial role in shaping entrepreneurial activity by enabling potential entrepreneurs to transform business ideas into viable start-ups. Accordingly, financial development—such as improved access to credit—has been shown to enhance new firm creation and subsequent growth (Aghion et al., 2007).

The finance–growth nexus has been extensively examined in the literature (Beck et al., 2000; Levine, 1997, 2005; Popov, 2018). Much of this literature has primarily relied on cross-country data to examine how overall financial development influences aggregate economic growth (Shen and Lee, 2006). More recently, this line of research has been extended to focus on more specific drivers of economic growth, including entrepreneurship (Dutta and Meierrieks, 2021; Gaies et al., 2023). For instance, Klapper et al. (2006) examine the impact of financial development on new firm creation across European countries and find that entry regulations significantly hamper new firm creation.

In contrast, relatively few studies have examined the relationship between financial development and entrepreneurship at the regional level, despite substantial within-country heterogeneity in entrepreneurial activity, such as urban–rural differences. Notable exceptions include Guiso et al. (2004), who construct unique regional indicators of financial development using household survey data from Italy and show that regional financial development enhances the likelihood that individuals start their own businesses. More recent studies, such as Rossi and Scalise (2022) and Vega-Pascual et al. (2025), further investigate financial development and growth at the regional level. Taken together, these studies highlight the importance of examining financial development and entrepreneurial activity at the regional level, where results within a single country allow scholars to better control for institutional frameworks and stages of economic development than do cross-country studies (Popov, 2018).

Moreover, recent studies have begun to disaggregate financial development into several dimensions. For example, Dutta and Meierrieks (2021) investigate how different aspects of financial development—depth, access, efficiency, and stability—affect entrepreneurial activity, while Vega-Pascual et al. (2025) examine the impact of financial access on start-up growth in terms of assets and employment. Relatedly, a growing

body of research distinguishes between equity and credit market development as conceptually distinct components of financial systems (Zhu, 2023; Zhu and Kim, 2025).[4] This distinction is particularly important because equity and debt finance differ fundamentally in risk-sharing, monitoring incentives, and suitability, especially for financing young and innovative firms (Honjo, 2021). To the best of our knowledge, Pan and Yang (2019) remains the only study that explicitly distinguishes between equity and credit market development when examining their effects on entrepreneurial activity. It does not, however, fully address the endogeneity of financial development, which remains a central concern in the finance–growth literature.

Furthermore, several studies examine how regional financial development influences the size distribution of young firms. Using U.S. state–industry panel data, Popov (2014) finds that an increase in the supply of VC investment raises the relative shares of medium-sized and larger firms, suggesting that VC promotes an "elitization" of firm entry. We extend this line of research by analyzing not only the effects of equity capital development (VC) but also those of debt capital development (banks) on the size distribution of young firms. Examining the role of debt capital is particularly important because banks may hesitate to lend to or invest in start-ups to protect existing clients. If this is the case, the development of debt capital could increase the relative share of smaller young firms, which pose a less competitive threat to incumbent borrowers. This perspective further motivates distinguishing between equity and debt capital when examining regional entrepreneurship.

[4] Specifically, Zhu (2023) examines the effects of equity and credit market development on product market competition, while Zhu and Kim (2025) study their effects on innovation using cross-country data.

3. Data and methods

3.1. Data sources

We construct a prefecture–year panel data set using several data sources. First, we use the Statistics on Registration (*Tōki Tōkei*; RS hereafter) compiled by the Ministry of Justice.[5] As legal entities must be registered at the Legal Affairs Bureau, which is a regional organization of the Ministry of Justice, the RS comprehensively covers the registration of legal entities in Japan. We obtain annual data on the number of newly founded firms by prefecture. In addition, we obtain data on the number of ILPs by prefecture, which is used as a proxy for the development of regional equity capital. We focus on the location of ILPs, rather than that of VC firms, to capture regional equity capital. While VC firms may actively invest across regions, the establishment of an ILP in a given prefecture typically reflects a stronger local presence, as organizing an ILP involves legal, administrative, and informational costs that make purely nonlocal investment less likely. Although this assumption is necessarily imperfect, using the location of ILPs is expected to better reflect regionally grounded equity financing conditions than measures based solely on the headquarters of VC firms, and thus to provide a more locally relevant proxy for regional equity capital.

Second, we use the Almanac of Financial Institutions in Japan (*Nihon Kinyu Meikan*) provided by Japan Financial News Co., Ltd. (*Nihon Kinyu Tsushinsha*). This data source provides information on the addresses of bank branches in Japan as well as the basic characteristics of banks and their branches. We obtain data on the number of bank branches to capture the development of regional debt capital.

Third, we use data provided by Tokyo Shoko Research, Ltd. (TSR), a major business credit research company in Japan. The TSR database contains financial and employment information on both listed and unlisted firms, covering a broad range of firms across all prefectures. Using this database, we construct a proxy for the growth of young firms. Specifically, we measure the employment share of young firms,

[5] In practice, we obtain data on legal entities from the RS through the e-Stat (website), which is a portal site for Japanese Government Statistics provided by the Statistics Bureau of the Ministry of Internal Affairs and Communications. The e-Stat contains data on legal entities since 2006.

enabling us to examine how regional financial development influences the growth of young firms across different size categories.

Fourth, we use the White Paper on IPOs (*Kabushiki Kōkai Hakusho*) edited by Pronexus, Inc. to count the number of IPOs listed on Japanese stock exchanges, which serves as a proxy for the creation of high-growth firms. Stock exchanges include the Tokyo Stock Exchange, Nagoya Stock Exchange, and Fukuoka Stock Exchange, as well as junior (i.e., second-tier) stock exchanges, including those that had been closed by the time of this study (e.g., Osaka Stock Exchange, MOTHERS, and JASDAQ).

Finally, we use additional data sources to construct control variables and derive alternative indicators of regional financial development for the PCA. Specifically, we use the Prefectural Economic Accounts (*Kemmin Keizai Keisan*), compiled by the Cabinet Office; the Population Census (*Kokusei Chōsa*), the Employment Status Survey (*Shūgyō Kōzō Kihon Chōsa*), and the Economic Census for Business Frame (*Keizai Sensasu Kiso Chōsa*), compiled by the Statistics Bureau; the Economic Census for Business Activity (*Keizai Sensasu Katsudō Chōsa*), compiled by the Statistics Bureau and the Ministry of Economy, Trade and Industry; and the Land Price Survey by Prefectural Governments (*Todōfuken Chika Chōsa*), compiled by the Ministry of Land, Infrastructure, Transport and Tourism.

Using these data sources, we construct a yearly panel data set for the creation of start-up and high-growth firms across 47 prefectures. In May 2006, when the Companies Act was enacted in Japan, rules on legal entities were substantially changed; specifically, some regulations on a joint stock company (*kabushiki gaisha*; JSC), such as minimum capital requirements, were abolished, and the limited liability company (*gōdō gaisha*; LLC) was introduced as a new legal entity. As these regulatory changes likely influence individuals' incentives to start their own businesses, we set the starting year of our observation period to 2007, resulting in a panel data set with 799 observations (47 prefectures × 17 years) covering the period 2007–2023.

3.2. Empirical methods

3.2.1. Baseline model

Following Rossi and Scalise (2022), we employ a two-way fixed-effects linear model as our baseline. Let Y_{it} denote a regional outcome variable in region i in year t. We assume that this outcome depends linearly on region i's equity and debt capital, X_{it-1}. To capture the development of regional equity and debt capital over time, we use the number of ILPs and the number of bank branches in a prefecture, respectively.

To alleviate possible omitted variable bias, we include region (prefecture) and year fixed effects to control for unobserved time-invariant region characteristics and common time shocks affecting entrepreneurial outcomes. Furthermore, we lag the independent variables by one year to partially mitigate potential reverse causality. The regression equation for regional outcome Y_{it} is specified as follows:

$$Y_{it} = \beta_1 X_{it-1} + \beta_2 Z_{it-1} + u_i + v_t + \epsilon_{it}, \quad (1)$$

where Z_{it-1} represents time-varying prefectural control variables; u_i is a prefecture fixed effect; v_t is a year fixed effect; and ϵ_{it} is a disturbance term. β_1 and β_2 are parameters to be estimated. We use cluster-robust standard errors, clustered at the prefecture level, to account for within-prefecture correlation and to assess the statistical significance of the estimated coefficients. To account for time-varying factors affecting entrepreneurial outcomes, we include firm age dummies (AGE0_19, AGE20_39, and AGE60+, with AGE40_59 as the reference category), a higher-education dummy (UNIV), an entrepreneurial culture (CULT) following Glaeser and Kerr (2009), and land price (ln LAND) as control variables. The definitions of these variables are provided in Table 1.

Finally, a note on the interpretation of our measure of regional equity capital is warranted. While ILPs are not necessarily restricted to investing within the prefecture in which they are located, our empirical strategy relies on the implication that, if cross-prefectural investment were to dominate, one would expect little systematic relationship between regional equity capital and local entrepreneurial activity. This implication provides a basis for interpreting the estimated association between regional equity capital and entrepreneurial outcomes.

3.2.2. Endogeneity: Arellano-Bond difference GMM estimator and IV approach

The baseline model described above may still suffer from the endogeneity of regional equity and debt capital, particularly due to potential reverse causality between financial development and entrepreneurial activities. To address this issue, we conduct two additional estimations.

First, we employ the Arellano-Bond difference GMM estimator, which exploits the dynamic panel structure of the data. Specifically, we include one- and two-year lags of the dependent variable as additional regressors and treat regional equity and debt capital (X) as endogenous, using their one and two-year lags as instruments. To mitigate instrument proliferation, we restrict the lag depth of instruments to two years. The models are estimated using two-step difference GMM with robust standard errors clustered at the prefecture level.

Second, we conduct IV estimations using a control-function linear model. We rely on two historical variables that affected the development of regional equity and debt capital. For the IV of regional equity capital, we use the average revenue from transaction fees of securities exchanges in each prefecture from 1920 to 1924. This measure reflects the presence and intensity of organized securities trading in the prewar period, under the premise that prefectures with established exchanges or more active secondary-market trading historically developed stronger equity-financing environments, which are likely to be associated with more active equity investment in start-ups. During this period, there were eleven securities exchanges in Japan, and we aggregate their average revenues by prefecture to gauge the size of the regional equity capital market.[6] The data are taken from the Ministry of Commerce and Industry (*Shōkō-shō*), the Directory of Stock Exchanges, 1924 (*Taishō 13 Nen Torihikijo Ichiran*), Tokyo: Yūshōdō Shoten. As an IV for regional debt capital, we use the logarithm of the number of filatures per capita in each prefecture in 1895, which was constructed and employed as an instrument for regional banking integration or segmentation by

[6] The eleven securities exchanges were located in Tokyo, Kyoto, Osaka, Yokohama, Kobe, Nagasaki, Niigata, Nagaoka, Nagoya, Hiroshima, and Hakata. For prefectures without a securities exchange was located, we assign a value of zero.

Hoffmann and Okubo (2022).[7] They argue that the relative importance of regional versus nationwide banks in the late nineteenth century was shaped by the development of an export finance model for silk reeling, which was Japan's main export industry at that time. This banking model was particularly supported by small, local cooperative banks, and persisted for over a century. We expect both historical IVs to be positively associated with regional equity and debt capital (relevance condition) and not directly associated with entrepreneurial outcomes (exogeneity condition) during the sample period 2007–2023.

Since our instruments are historical variables measured at a single point in time, they vary only across prefectures and not over time. Including prefecture fixed effects in the second stage would therefore absorb all cross-sectional variation in the instruments and make the model unidentified. To address this issue, we adopt the control-function approach (Wooldridge, 2015). In the first stage, we regress the endogenous variables on the instruments and time-varying controls. In the second stage, we include the endogenous variables along with the first-stage residuals, the same set of controls, year dummies, and eight broadly defined regional dummies. This specification allows us to account for unobserved time effects while retaining identification from the cross-sectional variation in the historical instruments.

3.2.3. Measurement error: PCA

While the number of ILPs and bank branches serves as suitable proxies for regional equity and debt capital, they may be subject to measurement error for several reasons. First, they may not fully capture all aspects of financial development. Second, as discussed in Section 3.4, the number of active ILPs is not publicly available and must be estimated using Equation (1). Third, not all ILPs specialize in startup financing; while many operate as venture capital funds, others resemble private equity funds by investing in distressed firms.

To assess the robustness of our baseline results to potential measurement errors, we conduct a principal component analysis (PCA) to derive alternative indicators of regional financial development. PCA

[7] Since data on the number of silk filatures are not available for Okinawa Prefecture, we exclude it from the sample used in the IV regressions.

summarizes the common variation among a set of correlated variables into principal components. Specifically, in addition to EQUITY and DEBT, we include the number of bank headquarters per capita (HEAD), representing the agglomeration of banks in a prefecture, and the percentage share of value added generated by the financial sector (VA), representing the relative size of the financial sector. Using the extracted components, we then re-estimate the baseline models. The interpretation of each component, based on its factor loadings, as well as the estimation results, is presented in Section 4.3.

3.3. Dependent variables: Entrepreneurial outcomes

Table 1 reports the definitions of the variables used in Equation (1), and Table 2 presents the descriptive statistics. For the outcome variables, we measure new firm creation and growth using the number of newly founded firms (NEW), the number of IPOs (IPO), and the average sales growth of young firms (GROWTH) in the prefecture.[8] As shown in Table 2, the average number of newly founded firms is more than two thousand per year and prefecture. To construct NEW, we normalize the number of newly founded firms by the number of existing establishments in the prefecture. We also measure the creation of high-growth firms by counting the number of IPOs listed on junior and main stock exchanges, identified by the prefecture of each firm's headquarters.[9] As shown in Table 2, the average number of IPOs listed on the junior and main stock exchanges is approximately 1.6 per year and prefecture. The median number of IPOs is zero, indicating that many prefectures have no IPOs in most years. Again, we normalize the number of IPOs by the number of existing establishments to construct a variable for firm growth (IPO). Moreover, GROWTH is used to capture whether young firms—specifically firms established within the past five years—are more likely to

[8] We measure the number of newly founded firms as the total of JSCs, LLCs, limited partnership companies (*gōshi gaisha*; LPCs), and general partnership companies (*gōmei gaisha*; GPCs), which represent the four typical legal entities when establishing a company in Japan.

[9] In Japan, junior stock exchanges (markets) have been introduced to provide equity capital to young and innovative firms, and high-growth firms tend to subsequently graduate to main stock exchanges (Honjo and Kurihara, 2023). Indeed, most firms go public on junior stock markets, while a few firms directly go public on main stock exchanges.

achieve growth. This variable is constructed as the average sales growth of these firms within each prefecture.

In addition, we examine the employment share of young firms. While regional financial development may be crucial for new firm creation and growth, it remains unclear how different forms of finance—namely, equity and debt capital—affect the size distribution of young firms within a region. Previous studies have demonstrated that the development of regional venture capital is associated with an increase in the relative shares of medium- and large-sized firms (Popov, 2014). To further our understanding, we investigate not only the role of regional equity capital but also that of regional debt capital, which has received considerable attention in the literature. Following Popov (2014), we use three variables to measure firm-size shares: firms with less than 20 employees (EMP0_19), 20−99 employees (EMP20_99), and 100 or more employees (EMP100+). These variables are defined as the ratio of the number of firms in each category, divided by the total number of firms.

3.4. Key independent variables: Regional equity and debt capital

For the main variables, we measure regional equity capital using data on ILPs. We focus on the location of ILPs, rather than that of VC firms, to capture regional equity capital. While VC firms may invest across regions, the establishment of an ILP requires ongoing screening, due diligence, and monitoring of portfolio firms, as well as the acquisition of soft information, which are more efficiently conducted in prefectures where potential investee firms are concentrated. As a result, the geographical location of ILPs is likely to reflect regionally grounded equity financing conditions more accurately than measures based solely on the headquarters of VC firms.

Since the number of active ILPs is not reported in the RS, we estimate prefecture i's stock of ILPs in year t ($Equity_{it}$) using the information on the number of newly registered ILPs (ENT_ILP_{it}) and the total number of dissolutions, liquidations, and other registration amendments (EXT_ILP_{it}) reported in the RS:[10]

$$Equity_{it} = Equity_{it-1} + ENT\_ILP_{it} - EXT\_ILP_{it}. \quad (2)$$

The initial stock ($Equity_{i0}$) in 1998, when the Limited Partnership Act for Investment was enacted and enforced, can be obtained from the RS. The stock of ILPs calculated using Equation (2) averages approximately 55 per prefecture (Table 2). We normalize $Equity_{it}$ by the number of existing ILPs in the prefecture in the same year when constructing a variable for regional equity capital (EQUITY).

We measure regional debt capital using data on bank branches, specifically, the total number of branches of city banks, regional banks, second-tier regional banks, *shinkin* banks (credit associations), credit cooperatives, and trust banks in the prefecture. As shown in Table 2, the average number of bank branches is approximately 445 per prefecture, which is larger than that of ILPs. We normalize the number of bank branches by the number of inhabitants in the prefecture when constructing a variable for regional debt capital (DEBT).

As discussed in Section 3.2.3, because EQUITY and DEBT may suffer from measurement error, we derive alternative proxies of regional financial development using PCA.[11] Specifically, COMP1, COMP2, and COMP3 capture regional debt capital, overall regional financial development, and regional equity capital, respectively. For further details, see Section 4.3.

[10] We notice that EXT_ILP_{it} includes not only dissolutions and liquidations but also other registration amendments. However, we cannot distinguish dissolutions and liquidations from other registration amendments in the RS. Therefore, we effectively assume that other registration amendments are negligible in Equation (2). Moreover, although the number of transfers is available in the RS, transfers are also assumed to be negligible, as we cannot identify whether an ILP is transferred within or between prefectures.

[11] For robustness, we also use the total amount of bank lending in a prefecture, instead of the number of bank branches per capita, to construct DEBT. The corresponding estimation results, which are not reported for brevity, are qualitatively similar.

3.5. Descriptive statistics

Figure 1 (a) and (c) illustrate the cross-prefectural relationship between the number of newly founded firms (ENTRY) on the one hand, and regional equity and debt capital (EQUITY and DEBT) on the other, based on their averages over the period 2007–2023.[12] Among the 47 prefectures, Tokyo Prefecture is an outlier with exceptionally high ENTRY and EQUITY values, reflecting the strong geographic concentration of newly founded firms and ILPs in Tokyo Prefecture relative to other prefectures. As Figure 1 (b) and (d) show, excluding Tokyo Prefecture reveals a positive relationship between EQUITY and ENTRY and a negative relationship between DEBT and ENTRY. These findings suggest that start-ups are more likely to emerge in prefectures with higher levels of equity capital, while they are less likely to emerge in those with higher levels of debt capital. Because the cross-prefectural patterns shown in Figure 1 may be driven by other factors, we formally examine the relationships by estimating Equation (1) using a two-way fixed-effects model with additional controls. In addition, to verify whether the estimates are driven by Tokyo Prefecture, we estimate Equation (1) excluding Tokyo Prefecture from the sample.

4. Results

4.1. Baseline estimation results

Table 3 presents the estimation results using two-way fixed-effects linear models: the number of newly founded firms (NEW) in column (i); the number of IPOs (IPO) in column (ii); the sales growth of young firms (GROWTH) in column (iii); the employment shares of small-, medium-, and large-sized young firms (EMP0_19, EMP20_99, and EMP100+) in columns (iv), (v); and (vi), and employment size (ln EMP) in column (vii). All columns include regional equity capital (EQUITY), regional debt capital (DEBT), and control variables (AGE0_19, AGE20_39, AGE60+, UNIV, CULT, and ln LAND).

In column (i) of Table 3, the coefficient of regional equity (EQUITY) is positive and significant at the 1% level. This result indicates that the number of newly founded firms is higher in prefectures with higher

[12] Figure A1 in the Appendix presents the time series trends for NEW, IPO, EQUITY, and DEBT.

levels of equity capital. In column (ii), the coefficient of regional equity is also positive and significant at the 1% level, indicating that higher equity capital is more likely to be associated with a greater likelihood of firms eventually going public. In contrast, in column (iii), the relationship between regional equity capital and the average sales growth of young firms is positive but insignificant, suggesting that regional equity capital does not necessarily foster their growth. Conversely, the coefficients of regional debt (DEBT) are negative but insignificant across columns (i), (ii), and (iii). Overall, these results suggest that while equity capital facilitates firm entry and IPO activity, the development of regional debt capital neither promotes nor hinders new firm creation and growth.

Regarding the employment share, the effect of regional equity capital (EQUITY) on large-sized young firms (EMP100+) is positive and significant at the 5% level in column (vi), while that of regional debt capital (DEBT) is insignificant. In contrast, the effects of regional equity capital on small- and medium-sized young firms (EMP0_19 and EMP20_99) are insignificant in columns (iv) and (v). These results suggest that regional equity capital promotes a compositional shift in new firm creation toward larger entrants, whereas regional debt capital does not. Finally, column (vii) shows no evidence that either regional equity or debt capital influences the average employment size.

As an additional estimation, Table 4 presents the estimation results when Tokyo Prefecture is excluded from the sample. Unlike in Table 3, the effects of both regional equity (EQUITY) and debt capital (DEBT) on new firm creation and growth become insignificant, with the only significant result observed for IPOs: the coefficient of EQUITY turns negative and is significant at the 1% level. This suggests that the positive effects of regional equity capital found in Table 3 are largely driven by Tokyo Prefecture. Consistent with this, we also find no evidence that either regional equity or debt capital influences the employment composition of young firms once Tokyo Prefecture is excluded.

4.2. GMM and IV estimation results

Table 5 presents the estimation results using the GMM estimator. The specifications include two lagged dependent variables (Dep. var. (-1) and Dep. var. (-2)), while the dependent variables and other independent

variables are the same as in Table 3. The validity of the internal instruments—one- and two-year lags of regional equity and debt capital variables—is supported in most cases by the Arellano–Bond AR(1) and AR(2) tests for serial correlation in the error term (results not reported).

In columns (i) and (ii) of Table 5, the coefficients of regional equity (EQUITY) are positive and significant at the 1% level. In column (iii), the coefficient is positive and significant at the 5% level , whereas it is insignificant in the corresponding column of Table 3. Taken together, these results support a positive effect of regional equity capital on new firm creation and growth, suggesting that our findings are robust to the endogeneity of EQUITY and DEBT when using the GMM estimator.

Regarding the employment share, the effect of regional equity capital (EQUITY) on medium- and large-sized young firms (EMP20_99 and EMP100+) is positive and significant at the 1% level in columns (v) and (vi), while that of regional debt capital (DEBT) is insignificant. In contrast, the effect of regional equity capital on small-sized young firms (EMP0_19) is negative and significant at the 1% level in column (iv). These employment share results differ from those in the baseline model (Table 3), which show a positive effect of EQUITY only on EMP100+, and suggest that regional equity capital promotes a compositional shift in new firm creation toward larger entrants.

Table 6 presents the estimation results using the IV estimator. Columns (iii) and (iv) in Table 6 report the second-stage regression results for the number of newly founded firms (NEW) and the number of IPOs (IPO), while columns (i) and (ii) report the first-stage regression results for regional equity capital (EQUITY) and regional debt capital (DEBT). Additionally, columns (v) and (vi) provide the first-stage results for EQUITY and DEBT, with the second-stage regressions for the average sales growth of young firms (GROWTH), the employment shares of young firms (EMP0_19, EMP20_99, and EMP100+) and employment size (ln EMP) reported in columns (vii) to (xii)

In the first-stage regressions, the two historical instruments—TRADING FEES and ln FILATURES—are positively associated with EQUITY and DEBT, respectively. The corresponding F-statistics are

somewhat below the conventional threshold of 10 but not low enough to suggest a violation of the relevance condition.[13]

The second-stage IV regressions yield results that are qualitatively similar to those from the GMM estimations (Table 5). A notable exception is that the coefficient on regional debt (DEBT) for the number of newly founded firms (NEW) is negative and significant in column (iii), suggesting that regional debt capital may discourage new firm creation. However, the coefficients for the other dependent variables remain insignificant, consistent with the results in other estimation tables.

Overall, the results in Tables 5 and 6 sharpen the contrast between equity and debt capital observed in the baseline model (Table 3). Regional equity capital exhibits a stronger and more significant positive effect on new firm creation and growth and appears to shift the composition of new firm creation toward larger entrants, whereas regional debt capital shows no significant effect. Taken together, these findings reinforce the robustness of our baseline estimation results.

4.3. PCA results and estimation using PCA-based variables

We derive alternative indicators of regional financial development using PCA and re-estimate the baseline model. Table 7 presents the results of the principal component analysis. The factor loadings suggest that the first principal component (COMP1) is positively associated with regional debt capital (DEBT) and the number of banks per capita (HEAD), and negatively associated with regional equity capital (EQUITY) and the share of value added by financial industries (VA); therefore, COMP1 can be interpreted as an indicator of the agglomeration of regional debt capital. The second principal component (COMP2) is positively associated with regional equity (EQUITY), regional debt (DEBT), the number of banks (HEAD), and the value added by financial industries (VA); therefore, this component can be interpreted as an indicator of overall regional financial development. The third principal component (COMP3) is positively associated

[13] Specifically, the F-statistics for TRADING FEES are 5.24 and 5.37 in columns (i) and (v), respectively, while those for ln FILATURES are 9.77 and 9.98 in columns (ii) and (vi), respectively.

with regional equity capital (EQUITY) and negatively associated with financial industries' value added (VA), indicating that it reflects regional equity capital. The cumulative proportion of variance explained by these three principal components is approximately 93%, and we use them to capture different aspects of regional financial development.

Table 8 presents the estimation results using the PCA-based variables. The coefficients of the first principal component (COMP1), which represents the agglomeration of regional debt capital, are negative and significant at the 1% level in columns (i) and (ii), while those of the second component (COMP2), which represents overall regional financial development, are insignificant in all the columns. These results indicate that higher levels of regional debt capital do not promote the emergence of start-ups, including those that eventually go public. This suggests that the development of regional debt capital may hinder new firm creation and growth. In contrast, the coefficients of the third principal component (COMP3), which represents regional equity capital, are positive and significant at the 1% level in columns (i) and (ii). This indicates that start-up activity, including IPOs, is more likely to occur in prefectures with high levels of regional equity capital, underscoring the importance of equity financing for new firm creation and growth.

Regarding the employment share, most coefficients are insignificant across columns (iv), (v), and (vi). The only significant result is a positive coefficient of the third principal component (COMP3) for large-sized young firms (EMP100+) in column (vi), indicating that regional equity capital promotes a compositional shift in new firm creation toward larger entrants. Overall, these results are consistent with the baseline estimation results reported in Table 3.

5. Conclusions

This study investigates how regional financial development affects new firm creation and growth. Using balanced prefecture–year panel data from 2007 to 2023 in Japan, we examine whether the development of regional equity and debt capital promotes new firm creation and growth. To measure the development of regional equity and debt capital over time, we employ two proxies: the numbers of ILPs and bank branches

in a prefecture. Additionally, we examine whether regional financial development influences the employment share of young firms across different size categories.

The baseline estimation results are obtained from a two-way fixed-effects linear model, which controls for unobserved region-specific and time-specific factors. We find that regional equity capital is positively associated with the number of newly founded firms and IPOs, while regional debt capital has no significant effect. Moreover, higher regional equity capital is associated with a larger employment share for large-sized young firms. However, these relationships disappear when Tokyo Prefecture is excluded from the sample, suggesting that the positive effects of regional equity capital are primarily driven by Tokyo Prefecture. To address the potential endogeneity of regional equity and debt capital, we also estimate models using GMM and IV approaches. In addition, to mitigate potential measurement error in these variables, we apply PCA to derive alternative indicators of regional financial development. The results from these additional analyses are broadly consistent with the baseline estimation results.

A limitation of this study is that ILPs located in a given prefecture are not necessarily restricted to investing in firms within the same prefecture and may also provide funding to firms in other regions. Given the concentration of equity investment in Tokyo Prefecture, our findings may primarily reflect the role of equity financing in regions with well-developed equity ecosystems. Future research using firm-level investment data that link the location of ILPs to the geographic location of their portfolio firms would help to further clarify the implications of regional equity capital for entrepreneurship. Another limitation is that historical instruments may capture persistent regional characteristics that continue to affect current entrepreneurial activity, potentially violating the exclusion restriction. This concern, which is common in studies relying on historical IVs, calls for a cautious causal interpretation.

Appendix

Figure A1 shows the trends in the national averages of NEW, EQUITY, and DEBT from 2007 to 2023. As shown in the figure, both NEW and EQUITY increase steadily over time, whereas DEBT remains almost unchanged throughout the period.

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Table 1

Definitions of the variables

Variable	(Symbol)	Definition
(Outcome)		
New firm creation	NEW	Number of newly founded firms (total of JSCs, LLCs, LPCs, and GPCs), divided by the number of establishments in the prefecture.
IPO	IPO	Number of IPOs listed on junior stock markets (Tokyo Stock Exchange: Growth, MOTHERS, JASDAQ, NEO, Ambitious, Next, Centrex, Hercules, and Q-Board) and main stock markets (Tokyo Stock Exchange: Standard and Prime, and Nagoya Stock Exchange) headquartered, divided by the number of existing establishments in the prefecture.
Sales growth	GROWTH	Ratio of the sum of sales in the next fiscal year to the sum of sales in the current fiscal year minus one, calculated for firms established for five years or less in the prefecture.
Small-sized firm share	EMP0_19	Ratio of the number of firms with less than 20 employees to the total number of firms established for five years or less in the prefecture.
Middle-sized firm share	EMP20_99	Ratio of the number of firms with 20−99 employees to the total number of firms established for five years or less in the prefecture.
Large-sized firm share	EMP100+	Ratio of the number of firms with 100 employees or more to the total number of firms established for five years or less in the prefecture.
Employment size	ln EMP	Natural logarithm of the total number of employees for firms established for five years or less in the prefecture.
(Regional capital)		
Regional equity	EQUITY	Stock of ILPs (see Equation (1)), divided by the number of existing establishments in the prefecture.
Regional debt	DEBT	Sum of the number of branches of city banks, regional banks, second-tier regional banks, *shinkin* banks (credit associations), credit cooperatives, and trust banks, divided by the number of inhabitants in the prefecture.
(Controls)		
Age distribution	AGE0_19	Ratio of the population aged 0 to 19 to the total population of the prefecture.
	AGE20_39	Ratio of the population aged 20 to 39 to the total population of the prefecture.
	AGE60+	Ratio of the population aged 60 or older to the total population of the prefecture.
Education level	UNIV	Ratio of the population with a bachelor's degree or higher to the total population of the prefecture.

Entrepreneurial culture	CULT	Weighted average of industry-level establishment rates, where the weight for each industry is its employment share in the prefecture. Specifically, $\sum_{k=1,2,\ldots,I} \frac{EMP_{k,i}}{EMP_i} \cdot \frac{Entry\%_k}{Entry\%}$, where $\frac{EMP_{k,i}}{EMP_i}$ is the employment share of industry k in prefecture i and $\frac{Entry\%_k}{Entry\%}$ is the ratio of the establishment rate in industry k to that of all industries.
Land price	ln LAND	Natural logarithm of the commercial land price index of the prefecture.
(Variables used for the IV estimation)		
Stock exchange trading fees	TRADING FEES	Total amount of stock exchange trading fees in the prefecture, averaged over 1920–1924, with the original yen-denominated value divided by 10 million. The value is zero for prefectures without a stock exchange.
Filatures per capita	ln FILATURES	Natural logarithm of the number of silk filatures per capita in the prefecture in 1895, as reported in Hoffmann and Okubo (2022).
(Variables used for the PCA)		
Alternative regional debt	COMP1	First principal component from PCA, capturing the level of development in debt capital markets.
Overall financial development	COMP2	Second principal component from PCA, capturing the overall development of regional financial markets.
Alternative regional equity	COMP3	Third principal component from PCA, capturing the level of development in equity capital markets.
Headquarters	HEAD	Number of bank (city banks, regional banks, second-tier regional banks, *shinkin* banks, credit cooperatives, and trust banks) headquarters, divided by the number of inhabitants in the prefecture.
Value added	VA	Value-added by financial industries divided by the gross prefectural product in the prefecture.

Notes: This table shows the definitions of the variables used in the estimations reported in Tables 3–8.

Table 2

Descriptive statistics of variables

Variable	Mean	SD	25%	Median	75%
NEW	0.0139	0.0079	0.0091	0.0118	0.0161
IPO	5.33×10^{-6}	1.38×10^{-5}	0.0000	0.0000	5.34×10^{-6}
GROWTH	0.0980	0.0705	0.0550	0.0943	0.1348
EQUITY	0.0002	0.0004	0.0001	0.0001	0.0002
DEBT	0.0002	0.0000	0.0002	0.0002	0.0002
EMP0_19	0.9349	0.0228	0.9217	0.9377	0.9516
EMP20_99	0.0576	0.0197	0.0438	0.0554	0.0695
EMP100+	0.0074	0.0053	0.0038	0.0061	0.0098
ln EMP	2.0260	0.2415	1.8556	2.0014	2.1780
AGE0_19	0.1757	0.0146	0.1665	0.1752	0.1836
AGE20_39	0.2160	0.0293	0.1931	0.2134	0.2329
AGE60+	0.3420	0.0419	0.3131	0.3443	0.3733
UNIV	0.1784	0.0590	0.1375	0.1667	0.2066
CULT	1.3969	0.1454	1.2967	1.3977	1.5021
ln LAND	10.6019	0.6438	10.1659	10.3982	10.8609
# newly founded firms	2320.9	4975.3	488.0	862.0	1713.0
# IPOs	1.6	7.8	0.0	0.0	1.0
Stock of ILPs	54.9	281.0	4.0	7.0	17.0
# banks' branches	445.1	372.7	229.0	313.0	516.0

Notes: This table shows the summary statistics of the variables used in the estimations reported in Tables 3–8. The number of observations is 799. SD represents standard deviation.

Table 3

Estimation results for regional performance: Fixed-effects linear model

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Dep. Var.:	NEW	IPO	GROWTH	EMP0_19	EMP20_99	EMP100+	ln EMP
Estimation method:	FE	FE	FE	FE	FE	FE	FE
EQUITY	4.2908***	0.0227***	7.1371	-0.4277	-2.1259	2.5536**	79.6518
	(0.9771)	(0.0031)	(14.1941)	(4.9457)	(4.5796)	(1.2578)	(53.8591)
DEBT	-8.3062	-0.1011	-785.4711	152.7708	-158.0129	5.2423	-341.8572
	(14.8512)	(0.0707)	(482.0231)	(218.9708)	(171.0018)	(55.6602)	(2,423.0850)
AGE0_19	-0.0980**	-0.0003*	-0.6033	0.2564	-0.3818	0.1254	0.4138
	(0.0486)	(0.0002)	(1.0915)	(0.4134)	(0.3618)	(0.1160)	(5.3797)
AGE20_39	0.0070	0.0002**	-0.2440	-0.2810	0.2229	0.0581	3.9595
	(0.0262)	(0.0001)	(0.5917)	(0.2277)	(0.2010)	(0.0602)	(2.7930)
AGE60+	-0.0820**	-0.0002**	0.0230	0.0960	-0.0874	-0.0087	-0.7945
	(0.0403)	(0.0001)	(0.4332)	(0.1826)	(0.1677)	(0.0472)	(1.8474)
UNIV	0.0233	-0.0000	-0.2346	-0.1042	0.1246	-0.0204	-0.2877
	(0.0144)	(0.0001)	(0.4864)	(0.1483)	(0.1368)	(0.0417)	(2.0159)
CULT	-0.0051	0.0000	-0.2552	-0.1074*	0.0875	0.0199	1.1960**
	(0.0067)	(0.0000)	(0.2210)	(0.0628)	(0.0593)	(0.0131)	(0.4774)
ln LAND	0.0071	-0.0000	0.0151	-0.0284*	0.0288**	-0.0004	0.1692
	(0.0052)	(0.0000)	(0.0448)	(0.0144)	(0.0123)	(0.0032)	(0.1650)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# observations	799	799	799	799	799	799	799
# prefectures	47	47	47	47	47	47	47
F (Coef. = 0)	182.9***	26.86***	17.47***	30.04***	23.40***	18.61***	14.63***

Notes: This table presents the baseline estimation results based on a two-way fixed-effect linear model. Figures in parentheses are robust standard errors clustered at the prefecture level. F (Coef. = 0) indicates the test statistic for the null hypothesis that all coefficients are equal to zero. The null hypothesis that all fixed effects are equal to zero is rejected in all specifications. ***, **, * indicate 1%, 5%, and 10% significance levels, respectively.

Table 4

Estimation results for new firm creation in prefectures other than Tokyo Prefecture: Fixed-effects linear model

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Dep. Var.:	NEW	IPO	GROWTH	EMP0_19	EMP20_99	EMP100+	ln EMP
Estimation method:	FE	FE	FE	FE	FE	FE	FE
EQUITY	-0.4580	-0.0119***	-65.2961	-3.3200	3.2276	0.0924	63.2001
	(4.4200)	(0.0042)	(86.0316)	(30.6387)	(25.9751)	(6.2094)	(347.0671)
DEBT	-9.0300	-0.0968	-758.2629	178.3784	-181.9777	3.5994	-456.6498
	(14.1793)	(0.0711)	(481.5656)	(221.3466)	(173.0674)	(55.8950)	(2,447.9931)
AGE0_19	-0.1070**	-0.0003*	-0.4704	0.5199	-0.6197**	0.0998	-1.0128
	(0.0497)	(0.0001)	(1.1327)	(0.3507)	(0.2970)	(0.1212)	(5.5030)
AGE20_39	-0.0080	0.0001	-0.4930	-0.2111	0.1710	0.0401	3.2419
	(0.0244)	(0.0001)	(0.6435)	(0.2104)	(0.1911)	(0.0598)	(2.6714)
AGE60+	-0.0771*	-0.0002***	0.0984	0.1538	-0.1394	-0.0144	-1.1373
	(0.0401)	(0.0001)	(0.4438)	(0.1766)	(0.1615)	(0.0493)	(1.8939)
UNIV	0.0283*	0.0001	-0.2525	-0.1233	0.1405	-0.0172	-0.6205
	(0.0148)	(0.0000)	(0.5159)	(0.1547)	(0.1423)	(0.0442)	(2.1284)
CULT	-0.0081	0.0000	-0.2722	-0.0608	0.0475	0.0133	0.9390**
	(0.0075)	(0.0000)	(0.2355)	(0.0487)	(0.0495)	(0.0128)	(0.4446)
ln LAND	0.0076	0.0000	0.0229	-0.0259*	0.0263**	-0.0004	0.1618
	(0.0051)	(0.0000)	(0.0476)	(0.0145)	(0.0125)	(0.0030)	(0.1666)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# observations	782	782	782	782	782	782	782
# prefectures	46	46	46	46	46	46	46
F (Coef. = 0)	16.75***	31.68***	25.33***	16.48***	14.52***	16.75***	31.68***

Notes: This table presents the baseline estimation results based on a two-way fixed-effects linear model using a sample that excludes Tokyo Prefecture. Figures in parentheses are robust standard errors clustered at the prefecture level. F (Coef. = 0) indicates the test statistic for the null hypothesis that all coefficients are equal to zero. The null hypothesis that all fixed effects are equal to zero is rejected in all specifications. ***, **, * indicate 1%, 5%, and 10% significance levels, respectively.

Table 5

Estimation results for regional performance: Arellano-Bond difference GMM estimator

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Dep. Var.	NEW	IPO	GROWTH	EMP0_19	EMP20_99	EMP100+	ln EMP
Estimation method:	AB GMM	AB GMM	AB GMM	AB GMM	AB GMM	AB GMM	AB GMM
EQUITY	3.7174***	0.0312***	95.8804**	-20.8282***	17.4164***	6.2468***	139.6209***
	(1.0334)	(0.0025)	(46.0846)	(4.8069)	(4.5465)	(2.1934)	(49.4080)
DEBT	-16.4451	-0.3896	976.6290	271.8170	-413.1978	192.0582	-5,885.6524
	(54.2905)	(0.3299)	(4,544.3667)	(525.6626)	(615.0490)	(230.4658)	(7,547.9640)
Dep. var. (-1)	0.6561***	0.0618	-0.0920	0.5478***	0.5216***	0.4490***	0.3258***
	(0.0614)	(0.0637)	(0.0687)	(0.1398)	(0.0871)	(0.0771)	(0.1107)
Dep. var. (-2)	-0.0181	0.0547**	-0.2164***	0.1223**	0.0997	0.0500	0.1108*
	(0.0425)	(0.0276)	(0.0548)	(0.0580)	(0.0629)	(0.0683)	(0.0624)
AGE0_19	-0.1040***	-0.0002	5.6632***	0.3414	-0.1916	-0.1634***	-6.3506**
	(0.0195)	(0.0001)	(1.3810)	(0.2162)	(0.1547)	(0.0624)	(2.6692)
AGE20_39	-0.0816***	-0.0002**	-0.4062	-0.2453**	0.2244**	0.1124***	4.4345***
	(0.0086)	(0.0001)	(0.6014)	(0.1076)	(0.1086)	(0.0321)	(1.2898)
AGE60+	-0.0297***	-0.0001**	0.9014	-0.2908***	0.1668	0.0494*	0.9736
	(0.0084)	(0.0001)	(0.5661)	(0.1112)	(0.1228)	(0.0273)	(1.3703)
UNIV	0.0091	-0.0000	0.0568	0.2606***	-0.1804***	-0.0492***	-1.4538*
	(0.0057)	(0.0000)	(0.3927)	(0.0707)	(0.0663)	(0.0164)	(0.8440)
CULT	0.0068***	0.0000**	-0.1330*	0.0109	-0.0069	-0.0040	-0.1398
	(0.0010)	(0.0000)	(0.0730)	(0.0104)	(0.0083)	(0.0026)	(0.1028)
ln LAND	0.0029*	-0.0000	-0.2645**	-0.0652***	0.0314	0.0082	0.5253**
	(0.0015)	(0.0000)	(0.1099)	(0.0200)	(0.0229)	(0.0056)	(0.2097)
Constant	No	No	No	No	No	No	No
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of lags	2	2	2	2	2	2	2
# observations	705	705	658	658	658	658	658
# prefectures	47	47	47	47	47	47	47
Wald χ^2	2831***	964.2***	79.98***	218.1***	300.8***	482.9***	197.9***

Notes: This table presents the regression results using the Arellano-Bond difference GMM estimator. EQUITY and DEBT are treated as endogenous variables, and two lags of the dependent and endogenous variables are used as instruments. Figures in parentheses are robust standard errors clustered at the prefecture level. Wald χ^2 indicates the test statistic for the null hypothesis that all coefficients are jointly equal to zero. ***, **, * indicate 1%, 5%, and 10% significance levels, respectively.

Table 6

Estimation results for regional performance: Control-function linear model using instrumental variables

	(i)	(ii)	(iii)	(iv)
Dep. Var.:	EQUITY	DEBT	NEW	IPO
Estimation method:	CF linear (1st stage)	CF linear (1st stage)	CF linear (2nd stage)	CF linear (2nd stage)
EQUITY			9.5668***	0.0290***
			(3.0501)	(0.0043)
DEBT			-64.9576**	0.0033
			(26.7246)	(0.0527)
TRADING FEES	0.0048**			
	(0.0021)			
ln FILATURES		0.0000***		
		(0.0000)		
AGE0_19	-0.0085*	-0.0005	-0.0868	-0.0001
	(0.0046)	(0.0005)	(0.0550)	(0.0001)
AGE20_39	0.0001	0.0003	0.0301	-0.0001*
	(0.0028)	(0.0002)	(0.0371)	(0.0001)
AGE60+	-0.0038	0.0005**	-0.0305	-0.0001
	(0.0028)	(0.0002)	(0.0255)	(0.0001)
UNIV	0.0043**	-0.0003***	0.0033	-0.0000
	(0.0020)	(0.0001)	(0.0239)	(0.0000)
CULT	0.0003	0.0000	0.0042	0.0000
	(0.0002)	(0.0000)	(0.0053)	(0.0000)
ln LAND	-0.0004**	0.0000	0.0017	0.0000
	(0.0002)	(0.0000)	(0.0018)	(0.0000)
Constant	Yes	Yes	Yes	Yes
Region dummies	No	No	Yes	Yes
# observations	782	782	782	782
# prefectures	46	46	46	46
F (Coef. = 0)	12.47***	6.57***		
Wald χ^2 (Coef. = 0)			3443.29***	3088.17***

Notes: This table presents the instrumental variable regression results based on the control-function (CF) linear model. Columns (i) and (ii) report the first-stage regression results for EQUITY and DEBT, using TRADING FEES and ln FILATURES as instruments, respectively. Columns (iii) and (iv) report the second-stage regression results. Figures in parentheses are robust standard errors clustered at the prefecture level. F (Coef. = 0) and Wald χ^2 (Coef. = 0) indicate the test statistics for the null hypothesis that all coefficients are jointly equal to zero. ***, **, * indicate 1%, 5%, and 10% significance levels, respectively.

Table 6 (continued)

Estimation results for regional performance: Control-function linear model using instrumental variables

	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)
Dep. Var.:	EQUITY	DEBT	GROWTH	EMP0_19	EMP20_99	EMP100+	ln EMP
Estimation method:	CF linear (1st stage)	CF linear (1st stage)	CF linear (2nd stage)	CF linear (2nd stage)	CF linear (2nd stage)	CF linear (2nd stage)	CF linear (2nd stage)
EQUITY			28.1934*	-39.5341***	30.6979***	8.8363***	429.0376***
			(16.0150)	(7.6114)	(5.7130)	(2.5651)	(98.3079)
DEBT			42.4038	-113.3328	107.3854	5.9474	602.7853
			(247.9563)	(159.3873)	(143.7693)	(24.6657)	(1518.6273)
TRADING FEES	0.0046**						
	(0.0020)						
ln FILATURES		0.0000***					
		(0.0000)					
AGE0_19	-0.0087*	-0.0005	0.5776	-0.0114	-0.1166	0.1281*	5.0884
	(0.0046)	(0.0005)	(0.5508)	(0.4040)	(0.3625)	(0.0770)	(3.7835)
AGE20_39	0.0001	0.0002	0.0503	0.2933	-0.3094	0.0161	-1.2129
	(0.0027)	(0.0002)	(0.3481)	(0.2240)	(0.1898)	(0.0464)	(2.4037)
AGE60+	-0.0038	0.0005**	0.1009	0.1204	-0.1477	0.0273	0.0882
	(0.0027)	(0.0002)	(0.3811)	(0.2413)	(0.2149)	(0.0429)	(2.4381)
UNIV	0.0042**	-0.0004***	0.1519	0.1234	-0.1010	-0.0224	-2.2566**
	(0.0019)	(0.0001)	(0.1333)	(0.0909)	(0.0770)	(0.0201)	(1.0011)
CULT	0.0003	0.0000	-0.1017	0.0235	-0.0277	0.0041	0.1650
	(0.0002)	(0.0000)	(0.0624)	(0.0316)	(0.0289)	(0.0064)	(0.3157)
ln LAND	-0.0004**	0.0000	0.0098	-0.0133*	0.0114*	0.0019	0.1936**
	(0.0002)	(0.0000)	(0.0096)	(0.0076)	(0.0066)	(0.0016)	(0.0798)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	No	No	Yes	Yes	Yes	Yes	Yes
Region dummies	No	No	Yes	Yes	Yes	Yes	Yes
# observations	736	736	736	736	736	736	736
# prefectures	46	46	46	46	46	46	46
F (Coef. = 0)	11.16***	6.60***					
Wald χ^2 (Coef. = 0)			581.50***	672.03***	580.55***	559.35***	805.88***

Notes: This table presents the IV regression results based on the control-function (CF) linear model. Columns (v) and (vi) report the first-stage regression results for EQUITY and DEBT, using TRADING FEES and ln FILATURES as instruments, respectively. Columns (vii)–(xi) report the second-stage regression results. Figures in parentheses are robust standard errors clustered at the prefecture level. F (Coef. = 0) and Wald χ^2 (Coef. = 0) indicate the test statistics for the null hypothesis that all coefficients are jointly equal to zero. ***, **, * indicate 1%, 5%, and 10% significance levels, respectively.

Table 7

Principal components

Variable	COMP1	COMP2	COMP3	COMP4
EQUITY	-0.4372	0.5502	0.6947	0.1533
DEBT	0.5991	0.3687	-0.0711	0.7072
HEAD	0.5709	0.4179	0.1791	-0.6836
VA	-0.3521	0.6218	-0.693	-0.0955
Eigenvalue	1.8118	1.5093	0.3939	0.2850
Proportion	0.4530	0.3773	0.0985	0.0713
Mean	-0.0053	0.0045	-0.0263	
SD	1.3337	1.2202	0.6129	
25%	-0.6163	-0.6793	-0.3532	
Median	0.1008	-0.1903	0.0376	
75%	0.7772	0.4985	0.3522	

Notes: This table presents the results of principle component analysis. SD represents standard deviation.

Table 8

Estimation results for regional performance: Fixed-effects linear model with principal components

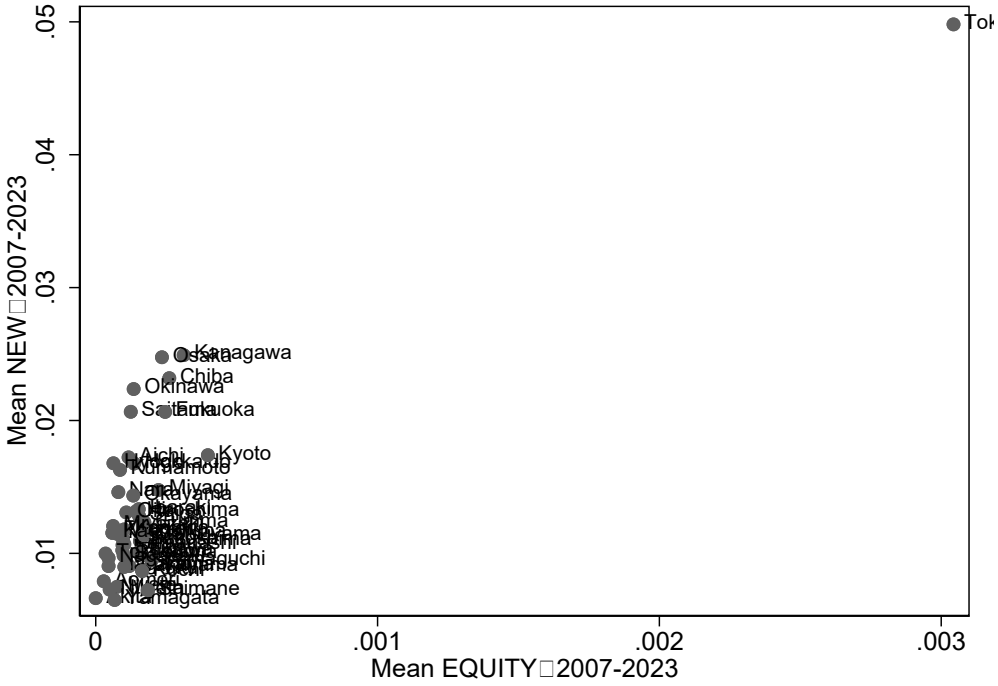
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Dep. Var.:	NEW	IPO	GROWTH	EMP0_19	EMP20_99	EMP100+	ln EMP
Estimation method	FE	FE	FE	FE	FE	FE	FE
COMP1	-0.0017***	-9.11×10^{-6}***	-0.0175	0.0066	-0.0059	-0.0007	-0.0585
	(0.0005)	(1.82×10^{-6})	(0.0171)	(0.0063)	(0.0056)	(0.0015)	(0.0694)
COMP2	0.0009	1.99×10^{-6}	-0.0195	0.0018	-0.0008	-0.0009	0.0048
	(0.0006)	(2.08×10^{-6})	(0.0234)	(0.0063)	(0.0054)	(0.0013)	(0.0680)
COMP3	0.0012***	7.00×10^{-6}***	0.0034	0.0015	-0.0027	0.0011**	0.0146
	(0.0004)	(1.09×10^{-6})	(0.0070)	(0.0019)	(0.0018)	(0.0005)	(0.0201)
AGE0_19	-0.1054**	-3.20×10^{-4}**	-0.2971	0.2227	-0.3329	0.1102	0.0763
	(0.0488)	(1.49×10^{-4})	(1.0072)	(0.3854)	(0.3320)	(0.1148)	(5.1500)
AGE20_39	0.0063	1.85×10^{-4}**	-0.2278	-0.2795	0.2188	0.0607	3.9669
	(0.0266)	(8.76×10^{-5})	(0.5633)	(0.2250)	(0.1961)	(0.0601)	(2.8021)
AGE60+	-0.0805**	-2.25×10^{-4}**	0.0067	0.0971	-0.0937	-0.0034	-0.7001
	(0.0396)	(9.70×10^{-5})	(0.4514)	(0.1838)	(0.1689)	(0.0470)	(1.8206)
UNIV	0.0234	-2.07×10^{-6}	-0.2686	-0.0984	0.1119	-0.0135	-0.1866
	(0.0147)	(7.54×10^{-5})	(0.4888)	(0.1470)	(0.1364)	(0.0427)	(2.0120)
CULT	-0.0052	8.47×10^{-6}	-0.2709	-0.1080	0.0908	0.0172	1.1806**
	(0.0065)	(1.67×10^{-5})	(0.2439)	(0.0656)	(0.0607)	(0.0133)	(0.5053)
ln LAND	0.0072	-1.49×10^{-6}	0.0119	-0.0280*	0.0280**	-0.0001	0.1753
	(0.0051)	(3.86×10^{-6})	(0.0461)	(0.0147)	(0.0125)	(0.0033)	(0.1690)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# observations	799	799	799	799	799	799	799
# prefectures	47	47	47	47	47	47	47
F (Coef. = 0)	150.80***	33.07***	18.08***	31.44***	24.81***	17.80	14.76***

Notes: This table presents the regression results based on a two-way fixed-effects linear model using PCA-based variables for regional financial development: COMP1, COMP2, and COMP3. Figures in parentheses are robust standard errors clustered at the prefecture level. FE represents a fixed-effects linear model. F (Coef. = 0) indicates the test statistic for the null hypothesis that all coefficients are equal to zero. The null hypothesis that all fixed effects are equal to zero is rejected in all specifications. ***, **, * indicate 1%, 5%, and 10% significance levels, respectively.

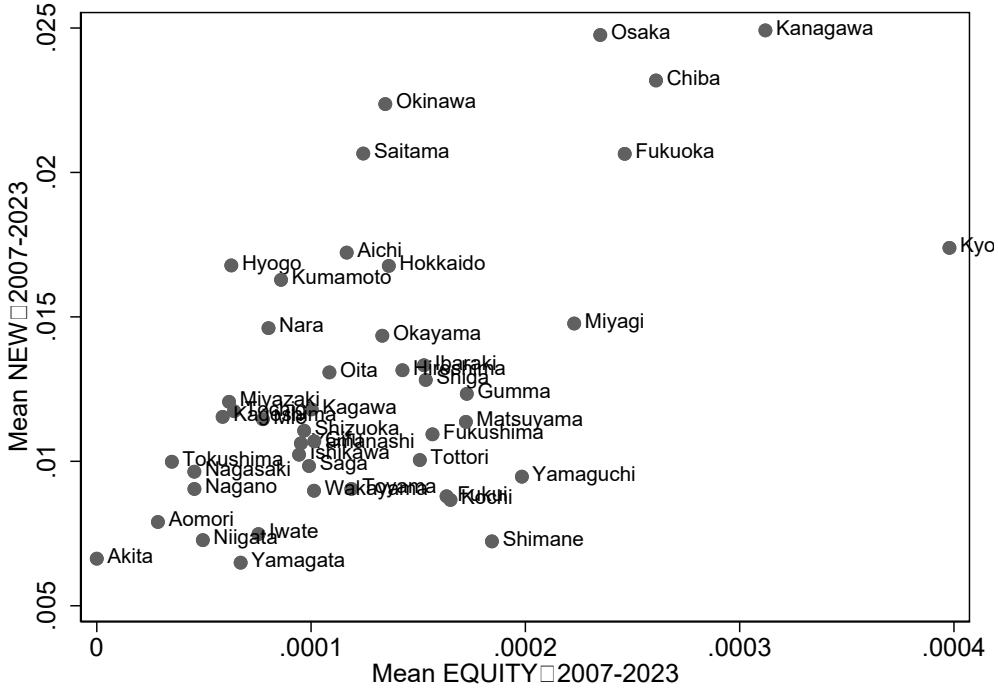
Figure 1

Scatter plots of NEW versus EQUITY and DEBT

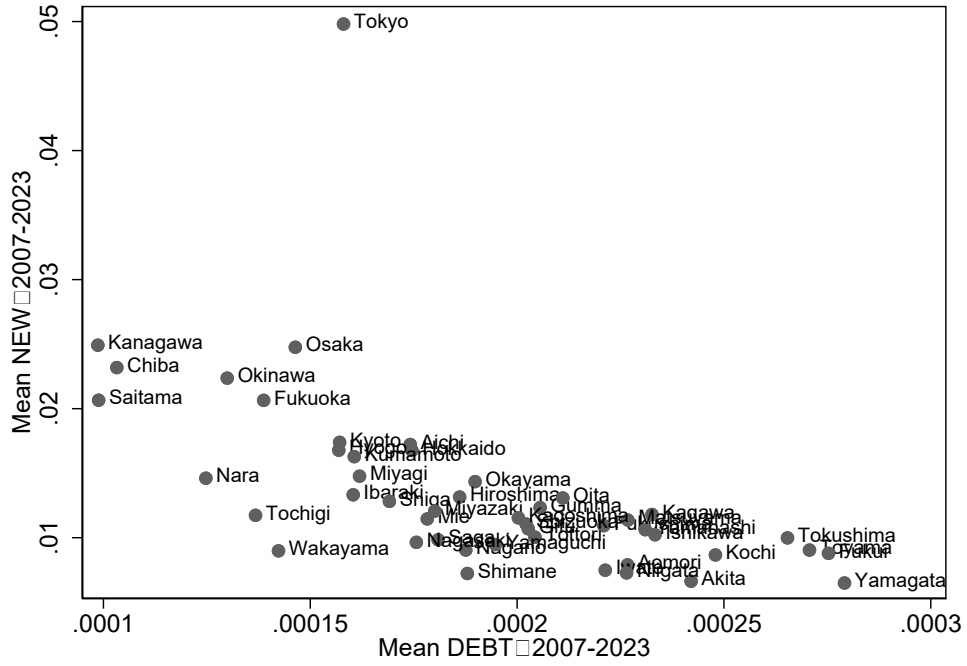
(a) NEW versus EQUITY: Full sample



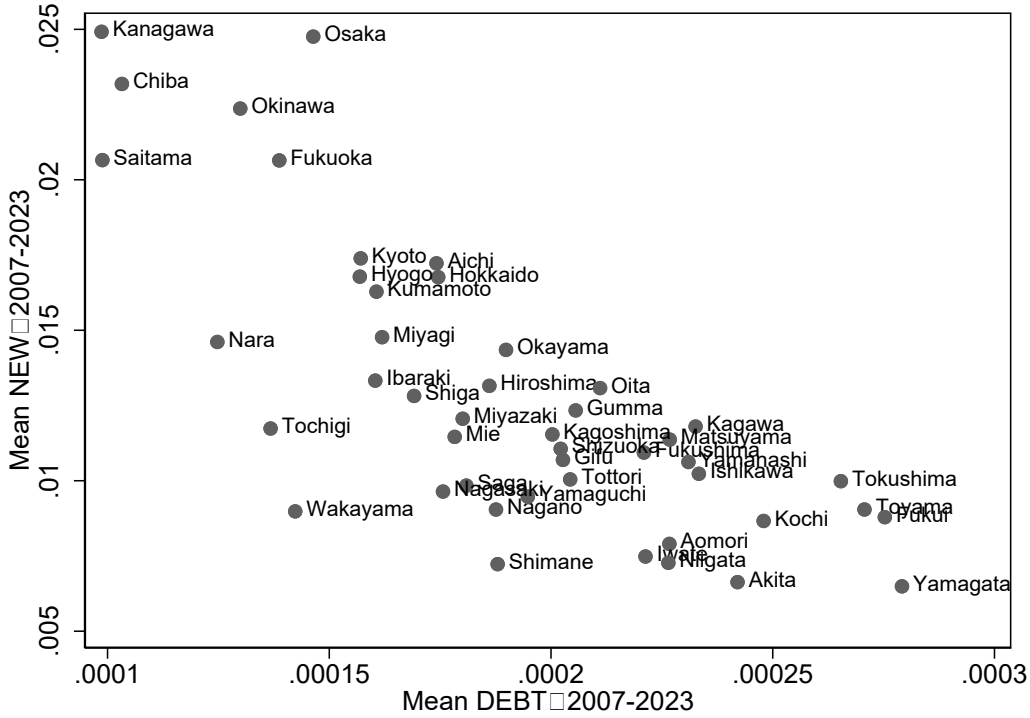
(b) NEW versus EQUITY: Sample excluding Tokyo Prefecture



(c) NEW versus DEBT: Full sample



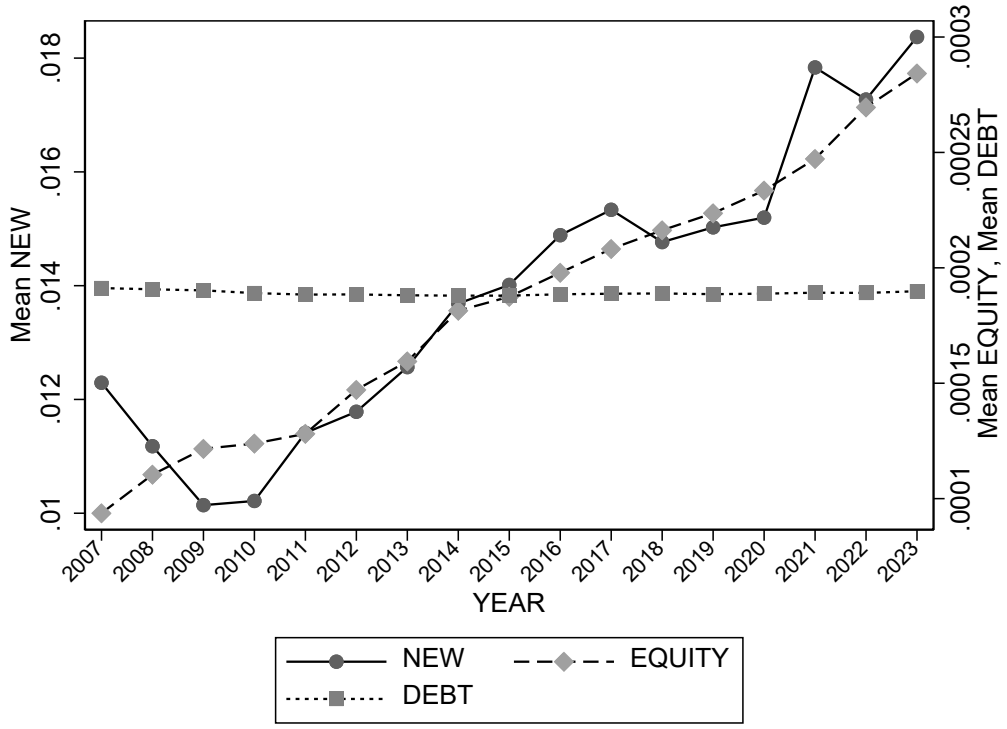
(d) NEW versus DEBT: Sample excluding Tokyo Prefecture



Notes: This figure shows scatter plots of NEW against EQUITY and DEBT for 47 prefectures, using averages over the period 2007–2023. Panels (a) and (c) include all prefectures, whereas Panels (b) and (d) exclude Tokyo Prefecture. The definitions of NEW, EQUITY, and DEBT are provided in Table 1.

Figure A1

NEW versus EQUITY and DEBT by Year



Notes: This figure illustrates the trends in the national averages of NEW, EQUITY, and DEBT from 2007 to 2023. The left vertical axis represents NEW, while the right vertical axis represents EQUITY and DEBT.