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THE FINANCIAL STABILITY IMPLICATIONS OF PRIVATE EQUITY FOR EMERGING MARKET ECONOMIES

Key points:

- *Private equity (PE) refers to capital investment made into companies with a goal of increasing their value before eventually selling at a profit. Despite the growing size of PE globally, studies on the impacts of PE on financial stability remain scant as compared to those on other non-bank financial intermediaries (NBFIs). This is particularly so for PE activities in emerging market economies (EMEs), whose share of global PE has grown over the years. To fill this gap, this study examines the financial stability implications of PE for EMEs, focusing on risks arising from the leverage of firms that PE is invested in ("invested firms") and the contagion risks among PE investors.*

- *Our dataset covers two dominant types of PE, namely venture & growth capital (VGC) and merger & acquisitions (M&A), and captures deals to firms in EMEs from 2003 to 2022. Based on the dataset, we identified three major findings.*

    i. *VGC is the dominant form of PE in EMEs firms, accounting for 68% of the total, while M&A shared around 32%. Leveraged buyout (LBOs), a special type of M&A that are funded largely by debt issuance and thus more prone to higher leverage of invested firms, accounted for a small share of 11% of the total.*

    ii. *Focusing on the dominant form of PE in firms in EMEs, only around 20% of VGC in our data sample involved debt issuance by the invested firms. However, the debt issuance is found to have a negative effect on their future financial performance. In particular, apart from higher leverage, these firms could also face a higher chance of delisting due to financial distress after their initial public offerings (IPOs), as compared to firms that received VGC without issuing debt.*

iii. *While PE investors from EMEs have non-negligible exposures to financially vulnerable firms (e.g. interest coverage ratio <1), their common exposures to these vulnerable firms appear to be limited, suggesting a relatively low contagion risk among PE investors.*

- *Overall, our findings suggest that systemic risks stemming from PE to EMEs as a whole may not be particularly high. However, there are some caveats to this study. First, our analysis does not dive into individual EMEs, so the level of risks to individual EMEs may differ significantly from our assessment. Second, unexplored areas remain due to data gaps, especially on the size of leverage employed by PE funds and their interconnections with other sectors in the financial systems that can also give rise to systemic issues. This precludes a fuller assessment of the financial stability impacts, and therefore warrants further efforts by regulators to close the data gaps.*

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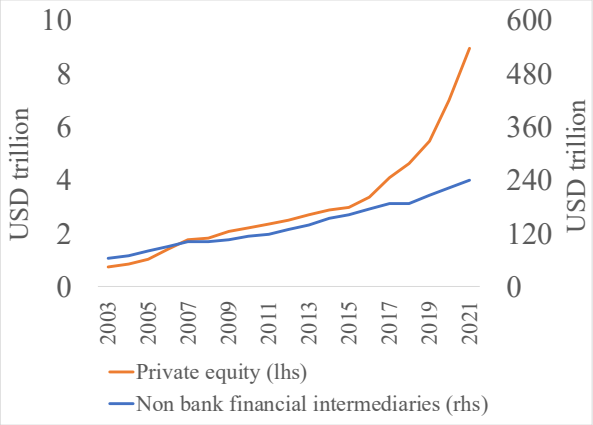
I. INTRODUCTION

The market of private equity (PE), which refers to capital investment made into companies with a goal of increasing their value before eventually selling at a profit, has grown rapidly since 2018, and particularly since the onset of COVID-19 pandemic in 2020 (Chart 1). Although it remains a small part of the global non-bank financial intermediaries (NBFIs), PE offers firms, from mature firms to start-ups, an important source of alternative financing outside the traditional channels. Apart from capitals, PE can also introduce knowledge and experience on firm development and governance, as well as business networks that may help improve firms' long-term prospect. In addition, by connecting firms to institutional investors, PE also opens long-term investment opportunities to these investors.

Chart 1: Size and trend of global PE market



Notes: (1) This chart depicts the size of global private equity market, represented by the total assets under management (AuM) of PE funds reported by source (orange line), and the size of global NBFIs that comprise mainly pension funds, insurance corporations and other financial intermediaries (blue line).
Source: S&P Capital IQ and Financial Stability Board

Notwithstanding the benefits that the PE industry brings to the economy, its rapid development has drawn attentions to the financial stability risks that the industry may pose, particular with respect to the leverage created by PE as well as financial system interconnectedness and the associated contagion risks arising from PE.[1] Importantly, probably because of its limited access by the public,[2] the PE industry is less regulated compared to other major entities in the financial system (Aramonte and Avalos, 2021). This together with large data gaps may preclude a comprehensive financial stability assessment of PE.

[1] Meanwhile, PE funds pose little liquidity transformation risk as most PE funds are close-ended funds.
[2] PE funds are usually only open to institutional investors and extremely wealthy individuals, but not the general public.

The landscape of the PE market has also evolved over time, with increasing investments made in emerging market economies (EMEs). The global share of PE funds with a focus on EMEs increased from 7% at the end of 2003 to 32% of total assets under management of PE funds at the end of 2022.[3] Nevertheless, studies on the financial stability impacts of PE on EMEs remain scant relative to those on other NBFIs.[4]

To fill this gap, this study examines the financial stability implications of PE for EMEs, focusing on risks arising from the debt and leverage of firms that PE invested in and the contagion risks among PE investors. Focusing on the two dominant types of PE, namely venture & growth capital (VGC) and merger & acquisitions (M&A),[5] this study presents our findings in response to the following questions:

1. What is the landscape of PE in EMEs? Which area(s) may warrant a deep dive to understand the implications for financial stability?

2. To what extent could the identified areas contribute to financial stability risks to EMEs?

This study is organised as follows. The next section gives an overview on the PE market and discusses the channels through which PE can affect the financial stability in EMEs. Section 3 describes the data used in the study and the major findings in response to the research questions, while the last section concludes.

[3] This is calculated as the share of assets under management (AuM) of PE funds with primary geographic focus on Africa, Central & South Americas, Asia or the Middle East & Israel to the total AuM of PE funds globally.
[4] Previous discussions on the financial stability impacts of PE mostly covered advanced economies (AEs), including Reserve Bank of Australia (2007), Gregory (2013), Johnston-Ross, Ma and Puri (2021) and Giuzio, Moldovan and Vassallo (2021).
[5] At end of June 2022, PE funds that focus on M&A or VGC accounted for 93% of the AuM of global PE funds (Mckinsey & Company, 2023).

II. PRIVATE EQUITY EXPLAINED

i. Overview of PE market

Chart 2: Schematic view of M&A and VGC activities in PE market

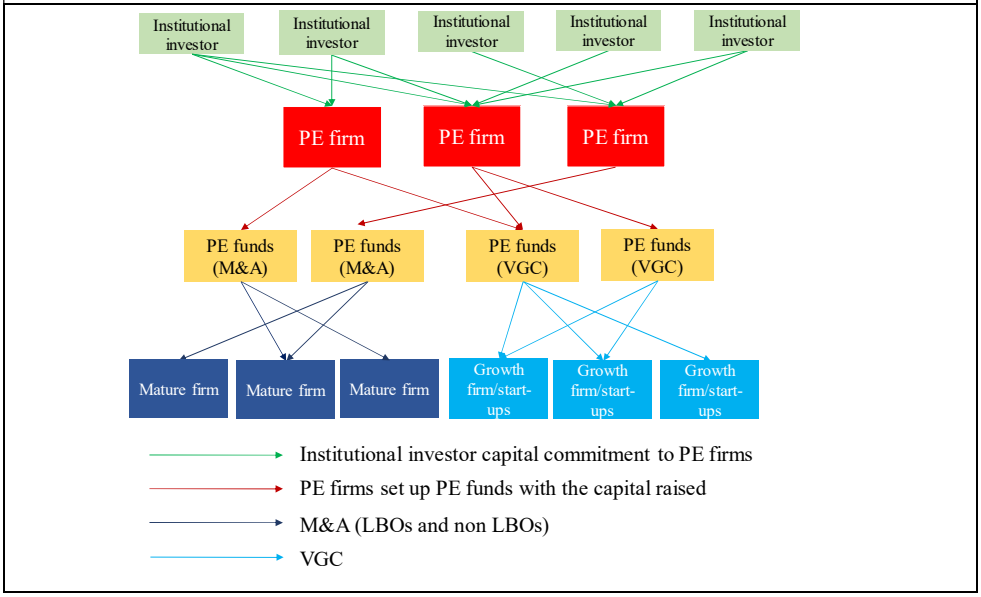


Chart 2 provides a simplified schematic view of M&A and VGC activities in PE, which involve three major parties. First, there are **PE firms** that pool capital from investors and invest in firms with the goal of selling at a profit afterwards. In practice, PE firms set-up PE funds, usually with a close-ended structure and a finite term (typically 5 to 10 years), with capital contributed by different investors. PE firms, as the "general partners" (GPs) of PE funds, are responsible for identifying investment targets and day-to-day fund operations.

The second group comprises **investors in PE funds** ("**PE investors**"), also referred to as limited partners (LPs) of PE funds. In contrast to GPs (PE firms), LPs (PE investors) are not involved in fund operations but instead provide the bulk (>99% in usual case) of the required capital for PE funds.[6] In return, PE investors receive payouts from the investment proceeds according to the agreed terms. PE investors are predominately institutional investors with long-term investment horizons, such as pension, sovereign wealth or endowment funds.

The last group covers the **firms that receive PE** ("**invested firms**"), which can be broadly divided into 1) mature firms and 2) growth firms and start-ups.

[6] LPs are required to provide committed capital (either in full or in parts) at the request of GPs ("capital calls") within a prescribed period.

1. **Mature firms:** firms targeted by PE firms that are usually underperforming and need new capital and/or restructuring to continue operations. The typical way for a PE fund to invest in a mature firm is to acquire a controlling stake through **merger & acquisitions (M&A)**. A PE firms would then restructure the firm with the aim of selling or listing/re-listing at a higher value in the future.
2. **Growth firms and start-ups:** these include either established or early-stage firms with high growth potential that need external capital to fulfil this potential. In such an investment (collectively referred to as **venture & growth capital, VGC**), a PE firm injects capital in exchange for a stake in a firm (usually less than 50%), hoping for attractive returns when the invested firm goes public or is acquired in the future.

ii. Possible financial stability impacts of PE

As discussed in earlier, PE firms contribute only a small part of the required capitals of the PE funds they manage, which limits their downside risks and potential loss.[7] At the same time, PE firms need to maximise returns of their PE investments to attract new capital from investors. Taken together, these factors might result in excessive risks taken by PE firms in their investments, which could in turn increase the vulnerabilities to invested firms and PE investors and lead to financial stability issues.[8]

Invested firms from EMEs

M&A and VGC could increase the vulnerabilities of invested firms from EMEs in different ways. For M&A, PE funds may finance a significant part (typically, 70% or more) of the transaction costs with external debts. Such "leveraged" M&As, commonly referred to as leveraged buyouts (LBOs), could leverage up the invested firms as the debt taken in LBOs usually ends up on their balance sheets.[9] This increases the default risk of invested firms, particularly if the PE firms have not succeeded in improving their performance. The effect of LBOs on invested firms' leverage has long been debated in the literature.[10]

[7] A PE fund may acquire invested firms through a special purpose vehicle (where the PE fund would bear limited liability) instead of directly by the fund itself. In this regard, even though PE firms as GPs bear the unlimited liability of PE funds, the actual liability that PE firms bear due to investments made could be limited through such indirect ownership.
[8] The issues covered in the study are subject to data availability and do not represent the exhaustive list of financial stability risks generated by PE. For example, the risks associated with leverage taken by PE funds are not assessed because information on the size and sources of borrowings by PE funds is generally not available.
[9] The acquired firms would issue new debts to pay off the debts raised by the acquiring party in LBOs, thus transferring the leverage taken to the acquired firms.
[10] See Hanque (2023) for a comprehensive review.

On the other hand, VGC may affect the financial vulnerabilities of invested firms through two possible channels. First, instead of equity shares only, firms may also issue debt to PE funds in exchange for VGC.[11] While this could allow faster access to new capital, [12] this adds to their debt burden and the risks of financial stress in the longer term.

Second, VGC could also increase the vulnerabilities of invested firms due to grandstanding behaviour displayed by young PE firms who, when compared to older PE firms, might take their invested firms to initial public offerings (IPOs) earlier in order to establish a good track record for future PE fund raising (Gompers, 1996). Such behaviour, however, could result in a lower chance of invested firms' survival after IPOs.[13]

PE Investors from EMEs

The major vulnerabilities facing PE investors from EMEs are the losses incurred by invested firms they invested in, which could be amplified and give rise to financial stability issues through the interconnections of PE investors. More specifically, PE investors may commit capital to common PE funds while different PE funds can invest in the same invested firms (Chart 2). These result in common exposures to invested firms and thus interconnections of PE investors. Such interconnections could then act as a contagion channel through which losses incurred by invested firms could spread across PE investors, potentially causing systemic issues.

[11] Apart from conventional loans and bonds, invested firms (in particular start-ups) could also issue a convertible note. A convertible note is originally structured as a debt investment but has provisions to allow the principal and accrued interest to convert into an equity investment at a later date, subject to satisfaction of pre-agreed conditions by issuing firms.
[12] Compared to equity issuance, debt issuance usually requires a lower legal fee and shorter turnaround time because of factors such as more standardised transaction terms and the absence of firm valuation needs.
[13] The invested firms that are subject to grandstanding behaviour of PE firms may go publicly pre-maturely and end-up performing poorly. The inexperience of young venture capital firms, and thus lower value-added support and quality of monitoring they can provide, may also contribute to the poor performance and stress of invested firms (Wang, Wang and Lu, 2002).

III. DATA AND FINDINGS

The primary data source of this study is S&P Capital IQ ("Capital IQ"). We first collect deal-level information on firm transactions. Then, we identified the firm transactions as being PE deals when there are one or more PE firms or funds as buyers, which in these cases are either M&A or VGC.[14] Accordingly, we extracted 37,431 PE deals on EME firms completed from 2003 to 2022, covering a total deal value of US$1,553 billion.

In addition to PE deals, we also extract the financial information of EME firms that is available and collected by Capital IQ. The information allows us to assess whether PE increases the vulnerabilities of the invested firms from EMEs. Furthermore, we also retrieved from Capital IQ the PE firms' ownerships of listed firms and the LPs (i.e. PE investors) of PE firms that it has collected. Such information facilitates the assessment of the susceptibility of PE investors to contagion risks.

Using the information collected, the next two parts present our findings to the two research questions.

i. Which area(s) may warrant a deep dive to understand the implications for financial stability?

Invested firms from EMEs

Chart 3 depicts the composition of new PE in EMEs firms annually from 2003 to 2022. It shows that VGC (the green area in the chart) is the major type of PE in EMEs firms, comprising 68% of the total completed deals during this period. The significance of VGC in EMEs is also reflected by its notable share to global VGC (Chart 4, green line).[15]

By contrast, PE funds do not actively engage in M&A, in particular LBOs which are considered riskier to invested firms, in EMEs. Not only do they take up a small part of overall PE in EME firms (11% in total from 2003 to 2022, the dark

[14] Based on the deal type of the firm transaction deals as reported by Capital IQ. Specifically, we identify a PE deal as M&A when its deal type is "M&A" and a deal as VGC when its deal type is "ROF" (rounds of funding, a term used to indicate the stage of the firm when it receives VGC).

[15] The importance of VGC to EMEs can also be demonstrated by the fact that about half of firms from EMEs that had IPOs from 2003 to 2022 have been backed by one or more PE firms compared with 37% for advanced economies (AEs).

brown area in Chart 3),[16] but LBOs in EMEs firms also only account for a small slice of PE-involved LBOs globally (Chart 4, the dark brown line).

Chart 3: PE in EME firms by investment type

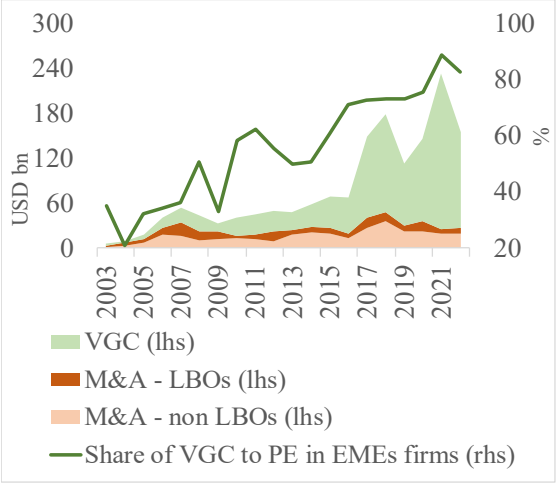
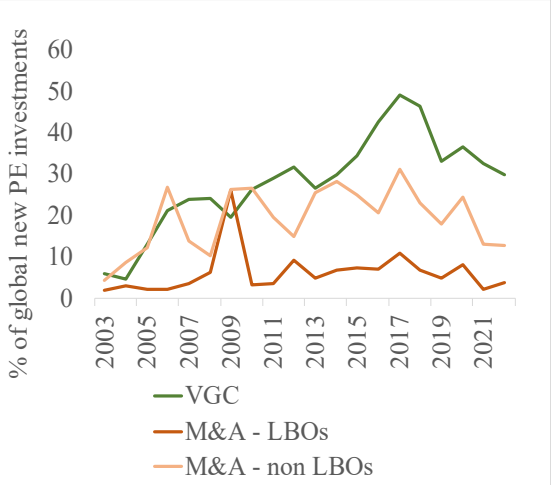


Chart 4: Share of PE in EME firms to global total by investment type



Notes: Chart 3 (left) depicts the composition of annual new PE on EMEs firms while Chart 4 (right) depicts the share of annual new PE on EMEs firms to global total, by PE type. Source: Authors' calculation based on S&P Capital IQ

With the dominance of VGC in EMEs, we shift our focus to look further into two aspects of VGC, as highlighted in *Section 2*, that may increase the vulnerabilities of invested firms.

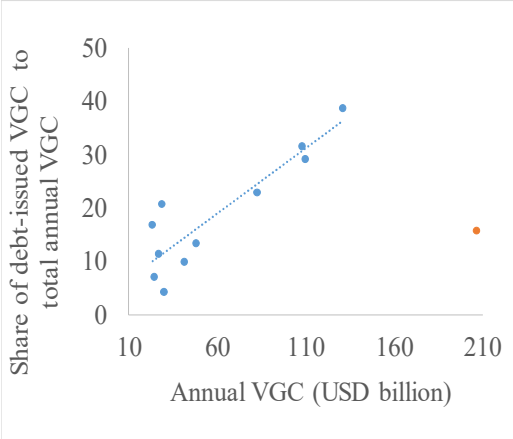
First, with regard to the types of VGC funding, we find that only 20% of VGC involve debt issued by invested firms, based on a sub-sample of VGC transactions for which information about funding type is available.[17] While the overall share of "debt-issued" VGC does not appear large, Chart 5 shows that it has increased with the overall level of VGC since 2010, suggesting that vulnerabilities associated with "debt-issued" VGC may build up more quickly in times of buoyant VGC activity.

Second, concerning the possible grandstanding behaviour in VGC, Chart 6 reveals that there are no noticeable differences in the age at IPOs between EME firms that are backed by younger or older VGC firms (left and middle box

[16] The share of LBOs to overall PE M&A activities in firms from EMEs (the share of dark brown area to the sum of dark and light brown area in Chart 4, 35%) is also much lower compared to that of firms from AEs (69%).
[17] We extract the funding type of VGC from the deal summary compiled by Capital IQ. Specifically, we classify a VGC as "debt-issued" when its deal summary mentions the issuance of debt instruments (such as loans, bonds, notes, convertible notes, and etc) and a VGC as "equity-only" when its deal summary indicates equity issuance only. It is worth noting not all VGC deals have disclosed the funding type information, and we only identify the funding type for about 20% of the VGC in our sample. Readers should therefore interpret the findings with caution.

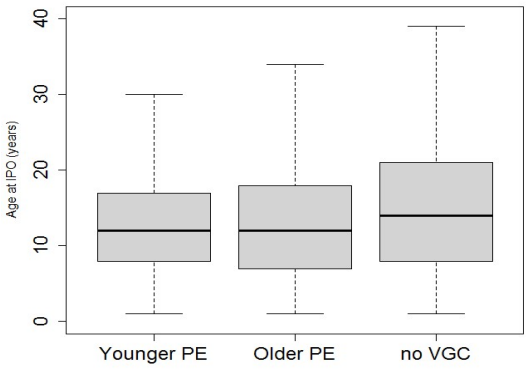
plots). This does not lend support to the material existence of grandstanding behaviour in VGC in invested firms from EMEs.[18]

Chart 5: Share of "debt-issued" VGC to annual VGC in EME invested firms



Notes: 1. The above chart depicts the scatter plot of the amount of annual VGC in EME invested firms and the annual share of "debt-issued" VGC to the sum of "debt-issued" and "equity-only" VGC, from 2010 to 2022. 2. The "debt-issued" and "equity-only" VGCs are identified using the funding type information as disclosed in the deal summary, whenever available. 3. The orange dot refers to year 2021 which is an outlier.
Source: Authors' calculation based on S&P Capital IQ

Chart 6: Age at IPOs of EME firms



Notes: 1. The chart depicts box plots of the age at IPOs for three groups of EME firms that had IPOs during the sample period; i) with VGC from younger PE firms ("Young PE"); ii) with VGC from older PE firms ("Older PE"); and iii) without VGC ("no VGC"). 2. Younger (older) PE firms refer to PE firms whose age (where available) at time of IPOs of respecitve firm is below (above) sample median. The age of the youngest PE firm is taken if there are muliple PE firms investing in a firm.
Source: Authors' calculation based on S&P Capital IQ

Overall, the above observations suggest that the potential financial stability impacts of VGC merit further investigation given that it is the dominant form of PE to EMEs. Among the potential vulnerabilities, the above analysis suggests that issues relating to "debt-issued" VGC may warrant a deeper dive, while the risk arising from grandstanding may be less of a concern.

PE investors from EMEs

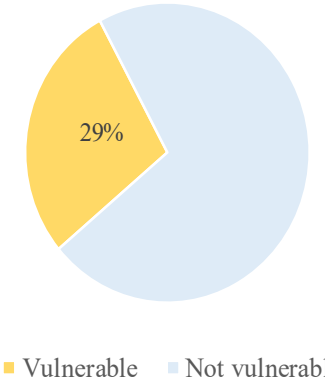
We assess the exposures of PE investors to invested firms that are financially vulnerable. Specifically, we first define vulnerable invested firms as the globally listed firms with non-zero ownership by PE firms and an interest coverage ratio smaller than one. Then, combining available information on the PE firms holding these vulnerable firms and the LPs (i.e. PE investors) of PE firms, we are

[18] The box plots in Annex A shows that there are no observable differences in the financial stress of EME firms that are backed by younger or older PE firms after their IPOs. This provides further support to the notion that grandstanding behaviour is unlikely a significant factor affecting VGC in invested firms from EMEs.

able to derive the linkages between PE investors from EMEs and the vulnerable invested firms.[19,20] By the same token, we also derive the links between PE investors from EMEs and the invested firms that are not financially vulnerable.

Chart 7 reveals that there are non-negligible exposures of PE investors to vulnerable invested firms, with the vulnerable invested firms accounting for 29% of the total links between PE investors and invested firms identified in our data sample. This justifies the need of performing a deep dive on whether there is a large common exposure to vulnerable invested firms, and to what extent the common exposure may contribute to contagion risks among PE investors.

Chart 7: Exposures of PE investors from EMEs to vulnerable invested firms



Notes: 1. This chart depicts the compsition of the links between PE investors from EMEs and invested firms globally through PE, by the financial vulnerability of the invested firms. 2. An invested firm is defined as (not) financially vulnerable if its interest coverage ratio in 2022 financial year is (larger than) smaller than one. Source: Authors' calculation based on S&P Capital IQ

ii. To what extent the identified areas could contribute to financial stability issues to EMEs?

Invested firms from EMEs

This part focuses on the impact of "debt-issued" VGC on invested firms as identified earlier. The left panel of Chart 8 depicts the time series box plot of the debt-to-assets ratio (a measure of financial leverage) before and after the IPO, where available, for those invested firms identified with "debt-issued" VGC. For comparison purposes, the same box plots are also presented for invested firms

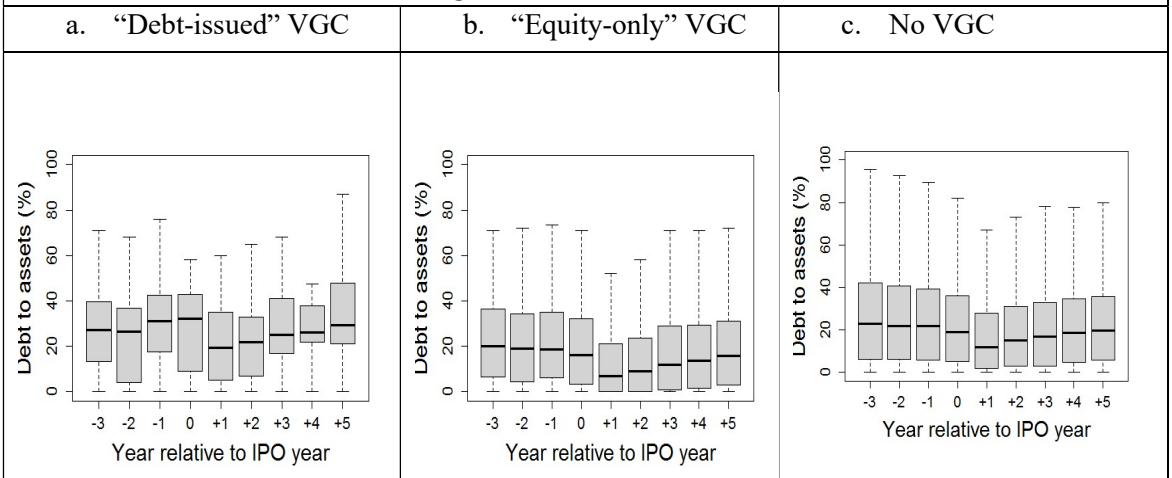
[19] This requires an assumption that LPs invest in all the listed firms that a PE firm has invested in.

[20] It is worth noting that our sample does not cover all the actual linkages between PE investors from EMEs and the vulnerable invested firms as the vulnerable firm holdings and the list of LPs for some PE firms is not available from source. Nevertheless, our data sample may still be useful in revealing the extent of the interconnections between EME investors through PE investments.

identified with "equity-only" VGC and firms that have not received VGC (see the middle and right panels respectively).

There are two main observations. First, the financial leverage of invested firms with "debt-issued" VGC tends to be higher and increase prior to IPOs (see the black median line in Panel A), compared to the other two groups (middle and right panels). Second, while the IPOs contribute to a lower leverage immediately due to the equity fundraising for all three groups of firms, those with "debt-issued" VGC display a much sharper pick-up in financial leverage afterwards. This suggests that "debt-issued" VGC may produce a long-term effect on the financial management of invested firms that tend to adopt a higher financial leverage.

Chart 8: Financial leverage of EME firms before and after their IPOs



Note: This charts depicts box plots of debt-to-assets ratios, before and after IPOs, for three groups of EMEs firms that have went IPOs during the sample period: i) with "debt-issued" VGC (Panel A); ii) with "equity-only' VGC (Panel B) and iii) without VGC (Panel C). 2. For i) and ii), the sample includes only firms that we can identify the funding type of VGC, which accounts for about 20% of the VGC-backed EME firms that went IPO during the sample period. Readers should interpret the figures with caution. Source: Authors' calculation based on S&P Capital IQ

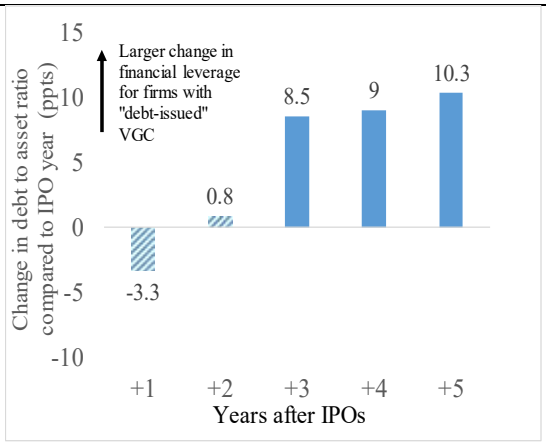
We further verify the long-term effects of "debt-issued" VGC using a regression model that controls for a firm's size, age, industry and year of IPO.[21] The estimation results are summarized in Chart 9. Specifically, Panel A depicts the estimated change in the debt-to-assets ratio for invested firms with "debt-issued" VGC up to 5 years following their IPOs, relative to comparable EME firms without VGC. A positive estimate indicates the financial leverage of firms with "debt-issued" VGC changes by more than the financial leverage of firms without VGC. By the same token, Panel B depicts the estimated change in debt-to-assets ratio for firms with "equity-only" VGC relative to those without VGC.

[21] Refer to Annex B for the details of the model.

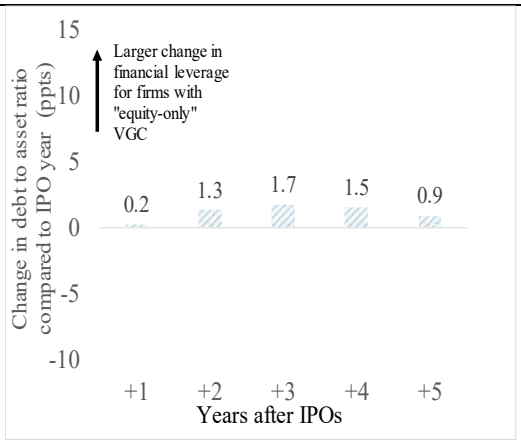
There are three major observations. First, Panel A indicates a significant and positive estimated change since the third year following a firm's IPOs, confirming empirically the effect of "debt-issued" VGC on firms' leverage over a longer time horizon. Second, the estimated change is more positive over time, indicating that the effect of "debt-issued" VGC may persist. And third, Panel B reveals an insignificant difference between EME firms with "equity-only" VGC and without VGC. This verifies that the significant estimated effect as depicted in Panel A relates to the debt issued by invested firms in getting VGC.

Chart 9: Estimated effect of "debt-issued" VGC on EME firm's leverage

a. Invested firms with "debt-issued" VGC



b. Invested firms with "equity-only" VGC



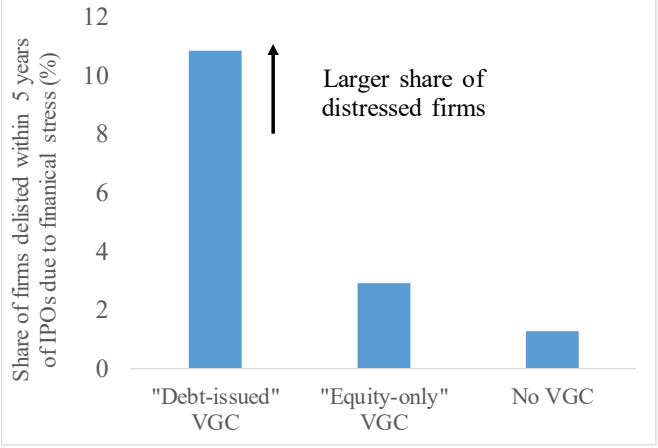
Notes: 1. Panel a (b) of the chart depicts estimated change in debt-to-assets ratio, where available, for sampled EME firms with "debt-issued" ("equity-only") VGC up to five years after respective IPOs, relative to comparable sampled EME firms without VGC, using a regression model that controls for firms' size, age, industry and IPOs year (Annex B). 2. Solid bar denotes the estimated change is statistically significant at 10% level. Source: Authors' estimates.

The major concern with the larger debt burden on invested firms is whether it leads to a higher risk of financial distress. To shed light on this, Chart 10 depicts the share of firms that have delisted within 5 years of their IPOs due to financial distress ("distressed firms"),[22] for EME firms that have 1) received "debt-issued" VGC, 2) received "equity-only" VGC and 3) not received VGC respectively. A larger share (11%) of distressed firms is observed among sampled EMEs firms with "debt-issued" VGC than among the other two groups. The finding points to the

[22] We define a firm as "distressed" when it satisfies one of the following conditions: 1) the firm is either liquidated or closed based on firm status or 2) either its interest coverage ratio is smaller than 1, its return on assets is negative or its debt-to-assets ratio is larger than 70% in the financial year before delisting.

potential negative impact of "debt-issued" VGC on invested firms' long term financial health.[23,24]

Chart 10: Share of distressed firms from EMEs



Notes: 1. This chart depicts the share of distressed firms in three groups of firms from EME that went IPOs during the sample period: i) with "debt-issued" VGC (left bar); ii) with "equity-only' VGC (middle bar); and iii) without VGC (right bar). 2. For i) and ii), the sample includes only firms that we can identify the funding type of VGC, which accounts for about 20% of the VGC-backed EME firms that went IPO during the sample period. Readers should interpret the figures with caution. Source: Authors' calculation based on S&P Capital IQ

PE investors from EMEs

This part examines the contagion risks among PE investors from EMEs due to their common exposure to invested firms that are financially vulnerable (Chart 7). If PE investors have a large common exposure to these vulnerable firms, the resulting interconnections may be one channel through which risks may propagate among PE investors from EMEs, in cases such as default of these vulnerable firms.

We first employ network analysis to examine the contagion risk. To simplify the analysis, we only focus on the top 20 vulnerable invested firms (based on the number of PE investors from EMEs that have invested in these firms), and plot the network of EMEs PE investors through their exposure to these 20 selected vulnerable invested firms in Panel A of Chart 11.

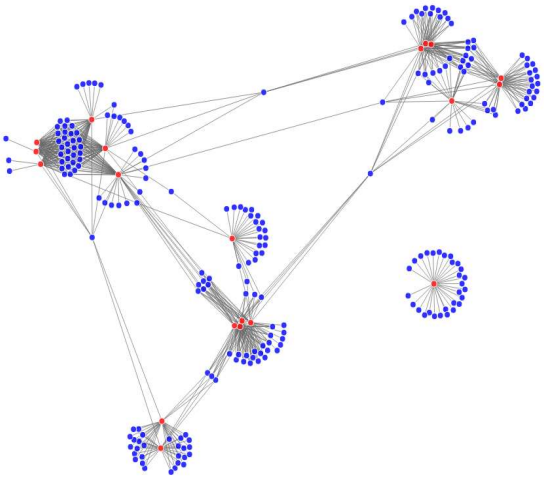
We next calculate the density of this network, by calculating the ratio of the number of identified links between PE investors and the 20 vulnerable firms

[23] The effect of "debt-issued" VGC is also found to be statistically significant using a logit regression model on the probability of delisting due to financial stress on the sampled EMEs firms.
[24] Apart from the effect of "debt-issued" VGC, the larger share of firms that have "not survived" among EMEs firms with "debt-issued" VGC observed in Chart 10 may also be due to the much smaller number of firms with "debt-issued" VGC in our sample (i.e. a low base effect). Readers should therefore interpret the figures with caution.

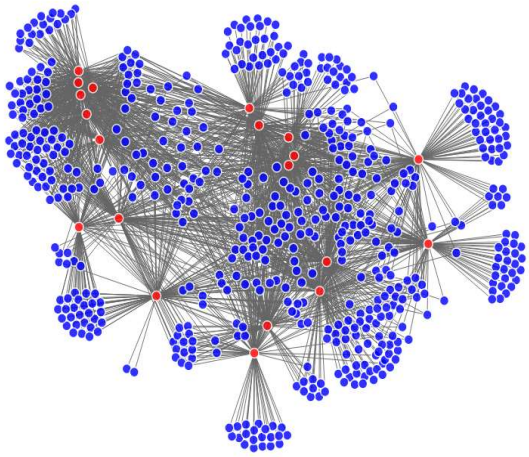
to the maximum number of links possible; and we obtain a density of 0.14. With the density measure ranging from 0 to 1, the relatively low density suggests that potential contagion risks arising from the common exposure of PE investors to vulnerable invested firms is likely limited. By creating the companion network for PE investors from AEs (Panel B, which gives a network density of 0.22), our network analysis shows further that PE investors from EMEs are also likely to be less prone to contagion risk compared to their AE peers.

Chart 11: PE investors network

a. PE investors from EME



b. PE investors from AE



Notes: 1. Panel A (B) depicts the network of PE investors from EME (AE) through the top 20 vulnerable invested firms with most number of PE investors from EMEs (AEs), using available information on the PE firms holding these vulnerable firms and the LPs (i.e. PE investors) of PE firms. 2. The red dots denote the vulnerable invested firms while the blue dots denote the PE investors that have invested in these firms through PE. Each edge denotes a link between a PE investor and a vulnerable invested firm through PE.
Source: Authors' calculation based on S&P Capital IQ

We wrap up the analysis by applying a statistical measure on the similarity of investors' investment portfolios for all sampled PE investors. We found that for any random pair of PE investors from EMEs, there is less than a 4% chance that they have common exposure to at least one vulnerable invested firms, suggesting a low degree of common exposure among PE investors from EMEs based on our data sample.[25] The result echoes the findings presented in Panel A of Chart 11.

[25] Specifically, we calculate the cosine similarity, which ranges from 0 (no common investments) to 1 (completely overlapped investments) of the invested firms' exposures for each pair of sampled PE investors from EMEs, with the results showing that less than 4% of the PE investor pairs have a non-zero cosine similarity (i.e. common exposures to at least one vulnerable invested firm).

IV. CONCLUSION

This study examines the financial stability implications of PE for EMEs, focusing on risks arising from leverage of invested firms and the contagion risks among PE investors. The findings are summarised below:

- On invested firms, we find that VGC is the dominant form of PE in firms from EMEs, with only around 20% of VGC in our data sample involved debt issuance by the invested firms. The debt issuance, however, is found to have a significant negative effect on the future financial performance of invested firms, particularly in the form of higher leverage and a higher chance of delisting due to financial distress after their IPOs, as compared to those firms that received VGC without issuing debt.

- On PE investors, while PE investors from EMEs are found to have non-negligible exposures to financially vulnerable firms through PE, their common exposures to these firms appear to be limited, suggesting a relatively low contagion risk among these investors due to common exposures PE invested firms.

Overall, our findings suggest that systemic risks stemming from PE to EMEs as a whole may not be particularly high. However, there are some caveats to this study. First, our analysis does not dive into individual EMEs, so the risks to individual EMEs may differ significantly from our assessments. Second, unexplored areas remain due to data gap issues, especially on the size of leverage employed by PE funds and their interconnections with other sectors in the financial systems that can also give rise to systemic issues. This precludes a fuller assessment of the financial stability impacts, and therefore warrants further efforts by regulators to close the data gaps.

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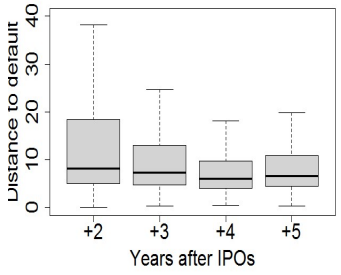
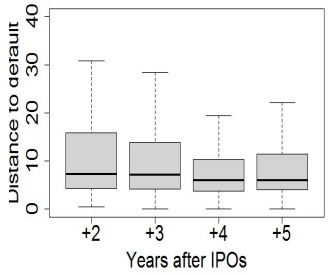
Annex A: Default risk of invested firms after IPOs by age of backing PE firms

Chart A.1: Financial leverage of EME firms before and after their IPOs

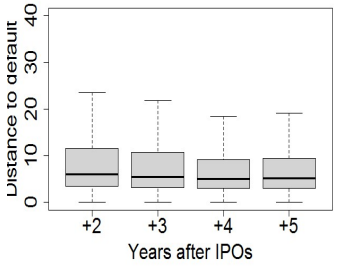
a. Younger PE



b. Older PE



c. No VGC



Notes: 1. This charts depicts the box plots of the distance to default (a market-based meausre of firm default risk, with a smaller value denoting larger default risk), 2 to 5 years after IPOs, for three groups of EMEs firms that have gone public listing during the sample period: i) with VGC from younger PE firms ("Young PE"); ii) with VGC from older PE firms ("Older PE"); and iii) without VGC ("no VGC"). 2. Younger (older) PE firms refer to PE firms whose age at time of IPOs of respecitve firm is below (above) sample median. The age of the youngest PE firm is taken when there are muliple PE firms that invest in a firm. 3. The distribution for firms' distance to default the first year after IPOs is not displayed because of much smaller number of observations available.
Source: Authors' calculation based on S&P Capital IQ.

Annex B: Empirical analysis of the effect of "debt-issued" VGC on firms' financial leverage

To study empirically the effect of "debt-issued" VGC on firms' financial leverage, we consider the following cross-section regression model:

$$\Delta dta_i^t = \beta_1 VGC_{i,debt} + \beta_2 VGC_{i,equity-onl} + \beta_3 Age_i + \beta_4 Size_i + Industry_i + IPOyear_i + \varepsilon_i \quad (1)$$

In the above model, Δdta_i^t refers to cumulative change in the debt-to-assets ratio of invested firm *i*, *t* years after its IPOs. VGC_{debt} ($VGC_{equity-onl}$) is a dummy variable that is equal to one when invested firm *i* has received "debt-issued" (equity-only) VGC before its IPOs. The model also controls for the age, size, industry and the year of IPO of invested firm *i*. We estimate the model on a matched sample of EMEs invested firms with and without VGC that that had IPOs, and whose balance sheet information is available, from 2003 to 2022.[26]

[26] In particular, for each sampled EMEs investing firm that received either "debt-issued" or "equity-only" VGC, we matched without replacement with a firm from the same industry but without VGC, with smallest differences in size, age and year of IPOs based on propensity score matching. Accordingly, EMEs investing firm that received either "debt-issued" or "equity-only" VGC but cannot be matched with a firm without VGC would be removed from the estimation sample.

Given the above set-ups, the estimated β_1 captures the average differences in the changes in leverage ratio of EMEs firms receiving "debt-issued' VGC relative to those without VGC , *t* years after their respective IPOs. A positive β_1 indicates that the leverage of firms with "debt-issued" VGC change by more than the leverage of firms without VGC after their IPOs. Similarly, estimated β_2 measures the estimated difference between firms with "equity-only' VGC and without VGC.

Table 1 reports the estimation results. As an illustration, we report results with *t* equals 3 years in the equation.[27] Specifically, the estimated β_1 is statistically significant at 8.5, implying that on average, the financial leverage of EME firms with "debt-issued' VGC have changed by 8.5 percentage points more than the matched EMEs firms that are without VGC 3 years after their IPOs. By contrast, the estimated β_2, which measures the impact of "equity-only" VGC, is statistically insignificant. This supports the notion that the significant and positive β_1 obtained can be attributed to the debt issued in the VGC rather than the VGC in general.

Table 1: Estimation result of Equation 1

	Δdta_{t+3}
VGC_{debt}	**8.5***
$VGC_{equity-only}$	1.7
Age	**-0.2*****
$Size$	0.1
Industry-fixed	Yes
IPO-year fixed	Yes
Observations	548

[27] The leverage of firms started to rise more notably in the third year following the IPOs (Chart 7).