Long-run Returns to Impact Investing in Emerging Market and Developing Economies

Abstract: Impact investors argue, controversially, that imperfect capital market integration presents an opportunity to invest to achieve social goals while also obtaining attractive financial returns. This proposition is put to the test using detailed cash flow data on every equity investment made by one impact investor across 130 emerging market and developing economies over six decades. We find private equity returns in these economies are comparable to the S&P 500, at least until 2010. Outperformance declines as banking systems deepen and countries relax capital controls. These results are consistent with a core thesis of impact investing that some eligible markets do not receive sufficient investment capital, and that impact investors' performance may not persist unless they create or identify new markets that lack access to capital.

their financial performance necessarily will not persist. Their ability to earn attractive returns may require repeatedly "investing" in new markets.

A principal concern when comparing investment performance across economies is that differences reflect differences in realized risk, rather than in expected risk-adjusted returns. The data allow us to address this concern more comprehensively than any other data available. First, since we observe the timing of cash flows, we are able to measure returns in terms of a public market equivalent (PME), which accounts for both the absolute level of return and the correlation of return with a global risk factor as in the capital asset pricing model (Kaplan and Schoar, 2005; Sorensen and Jagannathan, 2015; Kortweg and Nagel, 2016; Jeffers, Lyu, and Posenau 2022). Second, since the IFC invests across many sectors, including those considered especially conducive to economic development such as financial institutions (Levine, 2005) and infrastructure (Aschauer, 1989; Roller and Waverman, 2001), we are able to compare returns across countries within production technologies that may vary in their level of non-diversifiable risk. Third, the length of the time series, the longest in existence of which we are aware, provides assurance that differences in average returns across countries are not driven by the realization of non-diversifiable country risk in a few particular years. We are also able to characterize tail risk of investments through quantile regressions that measure associations between market characteristics and extreme values of the distribution of PME across individual investments.

Our work makes contributions to three long-standing questions in international finance. First, to what extent can country conditions predict future returns, particularly in private investments? We find that returns fall within economies as they relax capital controls and deepen their banking sectors. These results are inconsistent with the hypothesis of a perfectly integrated international capital market, under which expected financial returns are equalized across economies, and suggest that the greatest returns are available in economies that are transitioning from closed to open. One potential approach a development finance institution could take would be to offer subsidies in lesser developed markets. The finding that the IFC obtains higher returns when financial systems are less developed is not consistent with this approach and suggests the IFC may hold to its mandate to offer investments on commercial terms.

Second, our results provide the first and perhaps only evidence of the long-run viability of an impact investing strategy. There is broad divergence in priors over whether an impact investing approach can achieve market-level returns. Benchmarking the IFC's equity investment portfolio to the S&P 500 index (the index available for our entire sample period of six decades), we calculate that the total portfolio has obtained a PME of 1.15,

indicating that the portfolio has returned 15 percent more over its life than an equivalently timed investment in the public index would have. Alternative benchmarks yield estimates such as a PME of 1.30 when using the MSCI EM index (after 1988, when the index becomes available), and outperformance also obtains using the generalized public market equivalent (GPME), which relaxes some assumptions behind the PME. Returns have been lower for investments in the most recent decade, with a PME of 0.70 when using the S&P 500 and a PME of 0.98 when using the MSCI EM (the IFC's internal target to beat). Though only 26 percent of these most recent investments have been realized (and longer holding periods are in these data associated with higher returns) this decline in portfolio performance is consistent with there being fewer opportunities for financial profit as financial markets have become more developed and open. These results also contribute to the longstanding investigation on constraints to access of capital in emerging markets, which has often focused on smaller firms (e.g., Banerjee and Duflo, 2014). We do not find very high returns in a data set whose average transaction size in the most recent decade was $19.5 million.

Third, we provide evidence on the relative importance of macroeconomic conditions, relative to country characteristics, in driving emerging market returns. Macroeconomic conditions have material effects, with a 1 percent increase in cumulative annualized real GDP growth over the life of the average investment—8 years—associated with an additional 6.62 percentage points of return on that investment. On the other hand, local currency depreciation worsens the performance, while local inflation (controlling for the depreciation) is associated with higher returns. There is some evidence that improvement in sovereign risk during the investment period improves returns. These results confirm intuition that strong macroeconomic fundamentals are important for countries that seek to attract capital investment, though this effect could diminish over time as incomes converge (Kremer, Willis, and You, 2021; Patel, Sandefur, and Subramanian, 2021). However, quantitatively, a less integrated market appears to be more important for returns than economic growth, with a one standard deviation decrease in financial openness or banking system depth being associated with an increase in return that is substantially more than is associated with a 1 percent increase in cumulative annualized real GDP growth over the life of the average investment.

Given that our data include the portfolio of a single investor we do not claim that this performance is representative of the universe of EMDE private equity investments. Nor is it obvious that any other asset owner could replicate the IFC's strategy and returns. Nonetheless, given it is the only international investor with a portfolio spanning such a large and diverse set of countries and because it co-invests with a number of funds, the portfolio provides a unique view of the return to private investment in EMDEs. IFC's direct investments

preform similarly to its investments in collective investment vehicles including private equity fund managers (532 of 2,509 investments) all of which also took investment from private (non-governmental) investors.

Our paper ties together three strands of literature from development economics, international macroeconomics, and finance. First, the portfolio provides the most comprehensive microeconomic evidence ever on the long-standing macroeconomic question of whether international credit frictions exist and their quantitative implications for economic development (Feldstein and Horioka, 1980; Lucas, 1990; Alfaro, Kalemli-Özcan and Volosovych, 2008; Gourinchas and Jeanne, 2013). The equality of the return to capital across countries is a very difficult assumption to test given the absence of firm-level returns data that are comparable across countries. Previous studies, which conclude that markets appear integrated, have resorted to measuring the covariance of public equity indices (Campbell and Hamao, 1992; Harvey, 1995) or testing for common marginal product of capital implied by the cross section of national accounts (Caselli and Feyrer, 2007). More recently, Chari and Rhee (2020) use Worldscope data to study a sample of publicly-traded companies in 44 emerging stock markets between 1997 and 2004 and find variation across economies in returns measured by EBITDA over the previous year's market value of assets, but no variation across economies in a measure of return that accounts for investment, depreciation, and changes in the market value of assets. Our paper differs from and complements these studies in four ways. First, we analyze the largest data set of firm-level financial returns available, spanning the years 1961 to 2020 and 130 economies. Second, we study financial returns to equity investment in firms operating in private capital markets. Capital constraints should be more binding for unlisted firms, allowing a more demanding test of the market integration hypothesis. Third, unlike studies of differences in returns based on changes in the market value of public equities, our data include dividend payments to the investor so that differences in dividend policies across firms and economies do not bias our measure of financial return. Fourth, given the large sample of economies, we are able to test for associations between returns and a much richer set of factors than national income.

Second, we add to an empirical literature on macroeconomic risk through the analysis of the relationship between key macroeconomic variables and private equity returns. This literature has typically studied public equities in the absence of data on private equity investments.[4] Given that equity investments represent real assets, economic theory suggests that equity investments may be used as a hedging instrument against

[4]See Rapach and Zhou (2013) for a survey of the voluminous and controversial literature on forecasting stock returns. Such exercises typically compare returns to public stocks in the time series to variables related to a public index (e.g., the dividend yield, the ratio of book to market value, treasury rates, volatility). In contrast, we relate private equity returns to macroeconomic variables in the largest available cross section of economies.

unexpected inflation, and we should therefore expect a positive correlation between performance and inflation. Exchange rate movements are also expected to impact equity returns such as in the case of exporting firms whose competitiveness increases when the home currency depreciates. However in the empirical literature there is some evidence of a negative correlation between equity returns and depreciation (Hau and Rey, 2006). Sovereign risk ratings, which approximate a set of macroeconomic risk factors, have shown to be negatively correlated with equity returns as shown for a set of countries by Brooks et al. (2004) and in the case of Argentina by Hébert and Schreger (2017).

Third, we add to the understanding of the financial return to private equity investments in general, and impact investing in particular. While the U.S. private equity industry has been well studied (see Kaplan and Sensoy, 2015, for a comprehensive review) there is very little rigorous evidence available on returns in EMDEs. Lerner, Sorensen, and Stromberg (2009) provide an important exception: they use data from Capital IQ to construct a database of private equity investments around the world starting in about 1990. The authors find that emerging markets comprise a small fraction of total private equity investment, and that country characteristics have some influence on whether funds pursue strategies of financial engineering, governance engineering, and/or operational engineering. While they are unable to measure returns, they examine exits, and find a lower likelihood of success in wealthier countries, and that deals that are undertaken in "hot" markets are more likely to fail. Our paper contributes to this literature by a) providing a history of time series over twice as long, and b) providing the first systematic evidence of returns relative to a benchmark (PME) free of survivorship bias within the sample.

A smaller and more recent literature (summarized further in the next Section) examines the performance of impact investing strategies. Impact investors distinguish themselves from socially responsible investors (SRI) who seek exclude (e.g., gambling, coal) or include (e.g., clean energy, affordable housing) certain investments from their portfolio, but do not necessarily aspire to "impact" the world by doing so (Renneboog, Ter Horst, and Zhang 2008; Hartzmark and Sussman 2019) The literature has defined impact investing strategies in one of two ways. Geczy, Jeffers, Musto, and Tucker (2021) define them as those that target social-benefit outcomes alongside financial return. While consistent with how impact investors define their approach in practice, this definition is silent about whether and how they actually impact social-benefit outcomes. Barber, Morse, and Yasuda (2020) resolve this problem by defining impact investing strategies as those that "pay" for externalities by accepting a below-market return.[5] This definition however is inconsis-

[5]These authors obtain data from PreQin on 159 impact funds between 1995 and 2014, and, comparing them to a

tent with investors' own claims that they can earn a profit. We offer the first estimate of the long-run return to an impact investing strategy seeking to provide capital to eligible projects that would not have otherwise received sufficient funding due to imperfectly integrated financial markets. By emphasizing this third definition, we contribute to the literature a coherent definition of "doing well by doing good" that is consistent both with impact investors' own statements and with economic theory. Jeffers, Lyu, and Posenau (2022) assess the return and risk of venture capital impact investment funds, finding that while impact investment funds underperform the market, they also have lower risk than traditional venture capital funds. We complement their work on risk by demonstrating how the top and bottom tails of returns vary across many international markets, a proxy for the risk in those markets.

2. Conceptual Framework and Background

2.1 What is Impact Investing?

In practice, impact investors distinguish themselves from traditional investors through verifiable effort towards both financial profit and social-benefit objectives.[6] The IFC was created in order to advance economic development, was one of the first to measure social outcomes associated with its investments, and also identifies as an impact investor.[7] Though the origin of the term "impact investing" is dated around 2007 the concept is much older: Around the year 200 CE Rabbi Shimon ben Lakish is reported to have said, with regards to helping a needy person, that "a loan is greater than a donation, and a business partnership is greater

similar set of non-impact funds, find that impact funds on average achieve a 4.7 percentage point lower IRR. Their paper focuses on impact investing strategies in general, rather than seeking to distinguish between funds that seek to obtain market (commercial) returns and funds that explicitly promise investors lower (concessional) returns. A finding that the average return for both types of these funds—that is, when pooled together—is below market does not necessarily indicate that funds seeking market returns obtain below market returns.

[6] Geczy, Jeffers, Musto, and Tucker (2021) describe how a sample of private impact investment funds contract with employees and portfolio companies. The Operating Principles for Impact Management (see https://www.impactprinciples.org/) require adherence to an investment process that provides asset owners with (verifiable) information on the conduct of fiduciaries in pursuit of social-benefit objectives. Signatories to these Principles include asset managers specialized in "purposeful investing" such as MicroVest Capital Management LLC ($287 million in assets under management in accordance with the Principles), legacy private wealth managers such as Credit Suisse AG ($4.2 billion), and government-owned development finance institutions such as the European Bank for Reconstruction and Development ($51.7 billion).

[7] See the foreword by CEO Philippe Le Houérou to IFC (2019a). All of the IFC's investments may be considered impact investments because they were made with the intent to promote economic development alongside financial profit, as in the Charter. Defining an impact investor by their objective, rather than their allocation to any particular sector, is how impact investing is defined by the industry itself (see, e.g., the Operating Principles for Impact Management, GIIN).

than all of them" (Levine, 2010, p.291).

The investor's intent to create a social benefit does not imply the investor creates one. Brest, Gilson and Wolfson (2018) argue that an impact investor can make a difference in the world only if they invest in projects that would not have been financed otherwise (there is term of art for this —"additionality"). If impact investors compete with traditional investors for the same deals, it will be impossible to find such projects. One way to overcome this critique has been to define the impact investor as an asset owner willing to "pay" for potential positive externalities by taking below-market returns (Barber, Morse, and Yasuda, 2020). However, many impact investors still argue that they can address social or environmental problems while still earning a competitive financial return; says one "there's no trade off at all" (Noonan, 2018).

The IFC's charter proposes a resolution to this inconsistency by offering an alternative definition of the impact investor: one that provides capital to eligible projects that would not have otherwise received sufficient funding due to imperfectly integrated financial markets. An impact investor's process can make a difference while earning a private financial return only if capital markets are not perfectly integrated, so profit opportunities still exist in certain markets. The existence of international capital market imperfections was a principle on which the World Bank was originally founded (Clemens and Kremer, 2016).

To be precise, in a perfectly integrated international capital market, geography has no systematic effect on the returns investors receive in exchange for their capital. If long-run private returns are available in a particular market, investors will divert their capital there until returns are no longer available (see, e.g., Lucas 1990), either due to competition that bids up entry multiples, or a decline in the marginal product of capital. An empirical test of this model is available in the regression

$$r_i = r_0 + X'_{c(i)}\beta + \varepsilon_i \tag{1}$$

where r_i is the (risk-adjusted) return on asset i, and r_0 is average return on all assets. The vector $X'_{c(i)}$ includes various characteristics of country c, where the investment is located. The term ε_i is an unrestricted error term. The coefficient β is not interpreted as a causal effect, but rather as an estimate of the average differences in return observed across groups of countries defined by $X'_{c(i)}$. Observed differences in returns confirm that capital markets are imperfectly integrated, because the law of one price does not hold. If $\beta \neq 0$

markets are said to be segmented, since the price differs across capital markets.[8] Conversely, if all countries participate in a perfectly integrated capital market $\beta = 0$, and country characteristics would have no effect on the average financial performance of an investment since all investors receive the same price for their capital. In one leading test of this hypothesis, Caselli and Feyrer (2007) calculate the marginal product of capital implied by the national accounts (which is equal to its price in equilibrium) and find that it does not vary substantially across countries, or that $\beta = 0$. They conclude that "there is no prima facie support for the view that international credit frictions play a major role in preventing capital flows from rich to poor countries." Chari and Rhee (2020) show financial returns in publicly traded firms are equalized across countries and draw a similar conclusion.

Contrary to this evidence, and similarly to the claims of other impact investors, the charter of the IFC posits that in some developing countries, commercially-viable projects fail to receive financing on "*reasonable*" terms. One could say this thesis is valid if and only if $\beta \neq 0$. When $\beta = 0$, the price of capital is the same everywhere and so capital must be available in every market on reasonable terms. When $\beta \neq 0$ the equilibrium price of capital is higher in certain markets. If the marginal product of capital diminishes with scale, moving capital from the market in which the price is lower to the one in which it is higher will increase welfare. This could be called impact, or making a difference. Estimation of Equation (1) therefore offers a method to test whether it is possible for an investor to have impact in the way described in IFC's original charter. Further, the IFC's portfolio allows one to test this hypothesis among firms operating in private markets, which could yield different results than previous analyses of national accounts and publicly traded firms.

2.2 Background on the International Finance Corporation

Through its investments the IFC seeks to contribute to improvement in social and environmental outcomes aligned with the United Nations' Sustainable Development Goals (IFC, 2019b). Historically, before the elaboration of these goals, it sought to provide capital in economies where it was scarce. 185 member countries own and govern the institution, determine its policy, and provide equity capital. The balance sheet size stands at approximately $99 billion, of which $43 billion are development-related investments and the rest are liquid securities (IFC, 2019c). The carrying value of the equity investment portfolio comprises 30% of development-related investments. Figure 1 charts the institution's financial history in three ratios:

[8] For a case of international product market segmentation, see Goldberg and Verboven (2001)

return on equity (net income/total capital), leverage (total assets/total capital) and administrative expense (non-interest expense/total assets).[9]

The IFC made its first loan in 1957, providing $2 million to Siemens' Brazilian affiliate (IFC, 2018). In 1961, the charter was amended to allow holding equity, leading to a surge in equity investment during 1963-64 to about 50% of total investment (Kapur et al., 1997). Since the 1960s, this share has fluctuated between 15-35%. Equity investment in private markets has been the basis for growth in the capital base through retained earnings, with realized gains from these investments leading to high points in return on equity seen in Panel A in 1989 (RoE = 12.4%) and in 2005 (20.5%).

The IFC raises funds for its operations at international capital markets. As shown in Panel B in Figure 1, the IFC's leverage ratio was 3.6 as at 2019. The extent of borrowing varies substantially across institutions owned by governments that seek to promote economic development through investment in private firms.[10]

A small literature examines the role of the IFC as an investor and development institution. Dreher, Lang, and Richer (2019) investigate the link between IFC loan allocation and Board membership in the institution, and find a positive relationship between political influence and lending decisions. Taussig and Delios (2015) use data from the IFC's investment in private equity funds to examine the role of local expertise and performance, finding that local expertise improved performance more in countries with weak contract enforcement institutions. Kenny, Kalow, and Ramchandaran (2018) analyze the countries targeted by IFC investment between 2001 and 2016, noting a shift in allocation from low income countries towards middle-income countries. None of these papers reports on the returns obtained by the IFC. Desai, Kharas and Amin (2017) study the relationship between IFC project returns and ESG risk factors, though in the period since 2005.

[9] Values used in calculating these ratios are reported in Table A1.

[10] For instance, the United Kingdom's CDC Group (2019) has a leverage ratio of 1.0, indicating it does not borrow at all, while the European Investment Bank (2020) has a leverage ratio of 5.8, and the China Development Bank (2017) has a leverage ratio of 12.9, indicating these banks borrow substantially more relative to their capital base compared to the IFC today. The CDC Group and the European Investment Bank are signatories to the Operating Principles for Impact Management, an affirmation that they identify as impact investors. The leverage ratio reported here is total assets divided by total equity using values from annual reports. For the European Investment Bank, total equity is the sum of accruals and deferred income, provisions, subscribed capital, reserves, and profit for the financial year.

2.2.1 External Validity

The IFC's long history and broad geographical diversification allow us to paint an unusually rich picture of emerging market private equity investment. However, it is worth noting several caveats. First, the IFC is a single investor. Nonetheless, the institution almost always co-invests with private sector investors, rarely taking more than 25% of the value of a project. Moreover, in the past three decades the IFC has increasingly invested indirectly through private equity funds, which are also marketed to institutional investors. We therefore view the portfolio as potentially informative about the returns available to private investors in the markets in which it operates. Consistent with this view, when regressing the PME of an IFC investment on vintage year fixed effects and a dummy for whether the investment is in a collective investment vehicles such as a private equity fund, the dummy is positive though statistically insignificant (a point estimate of 0.14, s.e. = 0.08). IFC's direct investments preform on average similarly to its investments in funds with private institutional investors as limited partners.

Second, while the IFC's charter prohibits it from taking government guarantees, the IFC's affiliation with the World Bank Group provides additional protection from expropriation. Realized returns subject to this immunity may not be representative of what is available to independent investors. However, given that many investors in emerging markets coinvest with the IFC, and that the Multilateral Investment Guarantee Agency sells expropriation insurance, this protection to a certain extent is also available to the private market.

Third, Panel C in Figure 1 shows the IFC's operating expenses at around 2% of assets during 1964-1988, though they have subsequently declined, and are today approximately 1.4% of assets. These costs include public policy work, and technical assistance for investments, among other things, and also investment costs associated with the debt portfolio, which may be lower than for the equity portfolio alone. Since it is not possible to accurately apportion fixed costs to each investment, and because the IFC engages in significant non-investment activity such as research, we analyze portfolio and individual investment performance on a gross basis, without subtracting off operating expenses. To account for investments in collective investment vehicles—in which case measured returns are net of fees paid to fund managers—we report portfolio returns inclusive and exclusive of these investments (note 17), and also include in regressions sector fixed effects including a dummy for collective investment vehicles, which controls for differences in performance between these investments and others.

3. Data and Measurement

3.1 Financial Performance

The main data used in this study are the complete set of cash flows to and from all 2,509 equity investments (in companies or funds) beginning at the founding of the IFC in 1956 until June 30th, 2019.[11] The IFC's equity investments are primarily made through the direct purchase of a minority stake in a company, or participation in a fund as a limited partner. The dataset includes the month of each cash flow, the exact value in US dollars, and the most recent mark-to-market valuation of investments that are still held in the portfolio. Each investment's "vintage year" is defined as the year of first cash flow to the company. Each company is categorized by the "country-of-risk", or the country in which the company generates most of its revenue, as well as by one of 23 sectors (e.g., collective investment vehicles, electric power, food and beverage). Included among these investments are the IFC's interests in individual companies acquired through its participation as a limited partner in funds managed by the IFC Asset Management Corporation (AMC).[12]

3.1.1 The Public Market Equivalent (PME).

The cash-flows are used to calculate the financial performance of the entire portfolio as well as of the investment into each company (or fund). To do this, the cash-flow stream is divided into its positive and negative parts, called distributions ($dist\,(t)$) and contributions ($cont\,(t)$). Distributions are the cash flows returned to the IFC either through dividend payments or through the sale of the company's shares. For investments that are still held in the portfolio, we treat the net asset value on June 30, 2019 as a positive distribution, as if the investment is liquidated on that date at its fair value. Contributions are the IFC's investments into the company, including the payment of management fees in cases when the company is a fund.

Our measure of financial return is the Kaplan and Schoar (2005) public market equivalent, defined by

$$PME = \frac{\sum_t \frac{dist(t)}{1+R(t)}}{\sum_t \frac{cont(t)}{1+R(t)}}$$

where $R(t)$ is the realized total return of the market index from the year of first cash flow $(t = 0)$ to the time of the distribution or contribution (t). Sorensen and Jagannathan (2015) motivate the PME as a method to

[11] We focus on cash flows exclusively related to equity investments, and therefore do not include investments that include both equity and debt components (e.g., convertible loans). We leave analysis of the IFC's debt investments to future research.

[12] Cash flows between portfolio companies of third-party funds in which the IFC is a limited partner are not observed.

evaluate returns for a CAPM investor whose wealth is held in the index; if the ratio is greater than one, the investor prefers the portfolio to the index. We use the S&P 500 index as a market reference for comparability to the literature on private equity performance.[13]

Given this choice, a natural question is whether we should instead use an alternative benchmark that better matches the risk characteristics of the portfolio, for instance an index of emerging market public equity, or an index of private equity. There are several reasons why we do not. First, the S&P 500 is the only index for which the time series is complete back to our first cash flow in 1961. In some results, we do use the MSCI World index and the MSCI Emerging Markets index as alternatives, though these start later in 1970 and 1988 respectively and are much less diversified than the IFC portfolio. Second, while consultancies such as Cambridge Associates do produce international private equity indices for the most recent period after 2000, the returns in these indices do not reflect the same country and sector allocations as the IFC, and also include only funds whose investors select to report their performance to the consultancy. Our purpose in using the PME is not to test whether the IFC portfolio outperforms an investor trying to replicate the same strategy, since given available data it would be impossible to measure this counterfactual. Rather, we use the PME to correct for the time value of money and compare performance to a public benchmark that is broadly agreed to have provided a reasonable absolute return over the long run, in a way that accounts for the irregular timing of payoffs in private equity transactions.

3.1.2 Alternative Performance Measures

For comparison, we report returns measured in two other ways. First, we report a measure of financial return that does not correct for the time value of money, total value to paid-in capital (TVPI), or the sum of all distributions divided by the sum of all contributions, which is also known as the investment multiple, or multiple of money. Recall that if the investment has not been fully realized, its fair value on the final date of our data set is treated as a distribution. It is on this basis that the sum of distributions are called "total value." Second, we report the generalized public market equivalent (GPME) proposed by Kortweg and Nagel (2016). These authors observe that the PME can be affected by the performance of the market during the sample period. For instance, using the vocabulary of the CAPM framework, the PME will be greater than one if alpha is zero, but the portfolio has beta greater than one and the PME is observed at a time when the market is performing well. The GPME adjusts for the risk-free rates and returns of public equity markets during the sample period, so that the GPME will indicate less outperformance than the PME for high beta

[13] Index values are as reported by Bloomberg.

investments if the public market is doing well during the sample period.[14] Conversely, the GPME will report more outperformance than the PME for low beta investments if the public market is doing well during the sample period. This issue is of particular concern in the literature because many papers have used data on private equity returns from the 1990s, when the public market was doing very well. This issue is less of a concern in the present paper because our sample period is 1961 to 2019.

3.1.3 Potential Selection Bias

Our dataset allows us to avoid two forms of selection bias that typically hamper analyses of the performance of an asset class. A first source of selection bias is survivorship bias, such as when successful investments are more likely to appear in a dataset than failures (Carhart, Carpenter, Lynch and Mutso (2002) discuss this in the context of the mutual fund industry). Since our dataset includes all of the IFC's investments—even the write-offs—comparisons of investments within the portfolio will not be affected by such bias. Another version of survivorship bias would occur if the probability of the IFC disclosing its returns at all is affected by its performance. However, the IFC has had a longstanding policy of disclosing performance through annual reports.

A second source of selection bias is infrequent valuation, such as when an investor values investments only upon a successful initial public offering (IPO) or after the company completes a successive round of fundraising (Cochrane (2005) discusses this in the context of venture capital). Because valuations are positively correlated with these events, ignoring investments that have not gone public or raised further funds could also lead to an upward bias in average performance. Our estimates are not subject to such bias, first because the majority have already exited, and second because we include the mark-to-market net asset values of all unrealized investments on the same date (Gompers and Lerner 1997). Since mark-to-market valuations are known to have issues (Jenkinson, Sousa, and Stucke 2013; Brown, Gredil, and Kaplan 2015), in some specifications we restrict the sample to only mature investments by excluding the 5 most recent vintage years, to check that our results are not driven by mark-to-market valuations that are more difficult to determine given the youth of the investment.

3.2 Macroeconomic Covariates

We relate the PME to a variety of economy-level covariates such as market size, openness, sovereign risk, and financial development. Two measures of market size, population and GDP per capita, are taken from the

[14] For the risk free return we use the 1 month US treasury rate reported by CRSP, for the market return, as with the PME, we use the SP500 total return series as reported by Bloomberg.

World Development Indicators (World Bank, 2019a). Our main measure of financial openness is the index of Chinn and Ito (2006, 2008), which is the first principal component of dummy variables codifying capital controls reported in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*. We complement this index with indicators from Fernández et. al. (2015) who codify the IMF's more detailed records, available after 1995, indicating whether foreigners specifically have the right to purchase or sell local equity shares. Our measure of financial development is the ratio of private sector credit by deposit money banks to GDP, reported in the Global Financial Development Database (World Bank, 2019b). Finally, we relate returns to several macroeconomic variables in the World Development Indicators: (i) real GDP growth, (ii) inflation, and (iii) local currency deprecation; (iv) central government debt as a share of GDP as reported by the IMF; and (v) a sovereign debt rating index produced by Oxford Economics based on an average of ratings by Moody's, S&P and Fitch.

4. Private Equity Investment Allocation and Performance

4.1 Allocation

To first describe the unique geographic allocation of the equity portfolio, we compare the IFC's portfolio cash deployed (i.e., contributions, as defined above) to FDI inflows reported by the United Nations Conference on Trade and Development (UNCTAD). FDI inflows are defined as the acquisition of an equity capital stake of 10 percent or more by investors resident in a country different than the one in which the enterprise is located, and hence include most cross-border private equity investment, either by funds or through mergers and acquisitions by firms.

Table 1 reports the country allocation of IFC investment and FDI in constant dollars broken down by whether countries were classified as "advanced economies" or "emerging market and developing economies" (EMDEs) by the IMF in 2019. All values are in real terms. Overall, IFC equity investment accounts for 0.09 percent of total FDI. Unlike FDI however the IFC has been entirely focused on EMDEs, with 97.7 percent of its cash deployed in current EMDEs and 2.3 percent in countries that have since transitioned to advanced economy status such as the Republic of Korea, Greece, and the Czech Republic. In contrast, 61.3 percent of FDI has gone to advanced economies where the IFC has never deployed cash, such as the United States (which has received 18 percent of total FDI), the United Kingdom (6.9 percent) and Hong Kong SAR, China (4.3 percent). The IFC also has not deployed equity investment in certain jurisdictions through which some FDI

into EMDEs is indirectly channeled (Coppola, Maggiori, Neiman and Schreger, 2020), namely the British Virgin Islands (2.2 percent of total FDI), the Cayman Islands (1.5 percent), and the United Arab Emirates (0.4 percent). When examining geographic diversification within EMDEs, the IFC's portfolio is also more diversified compared to FDI and public equity investment references.[15]

Figures A1 and A2 respectively compare trends in FDI inflows to IFC inflows over time, and as a share of GDP in countries of different income levels. IFC investment has grown with FDI, and has been less volatile during certain downturns. Relative to their GDP, the IFC is also substantially underweight in high-income and upper-middle income economies compared to FDI. In Table A2, we investigate how IFC equity investment is timed, relative to FDI and World Bank lending to national governments, using a panel vector autoregression model. There is no evidence that lagged World Bank investment predicts IFC investment, consistent with limited coordination between activities of the sister institutions in the past, at least as regards equity investment.[16] Table A3 shows the frequencies of investments by decade, geographic region, and sector.

4.2 Portfolio Performance

Table 2 reports the performance of the entire IFC private equity portfolio, where all cash flows from all investments have been pooled together. Columns of the table report the PME calculated on subsets of investments grouped by earliest vintage year beginning with all investments since the first in 1961, then all investments since 1970, since 1980, and so forth, in order to document the evolution of portfolio returns over time. In addition to PME, TVPI is reported. The two bottom rows of the table report the number of investments in each vintage year group, as well as the share of investments in that group that have been realized (i.e., have a current net asset value equal to zero).

[15] As of June 2020, more than 75 percent of holdings in the MSCI Emerging Market stock index were located in just five economies: China, Taiwan (China), Korea, India, and Brazil. East Asia and the Pacific together with Latin America and the Caribbean (defined using World Bank regional classifications) attracted 54.0 percent of FDI in EMDEs in which the IFC has invested, whereas only 41.4 percent of the IFC's investment has gone to these regions. While 11.3 percent of the IFC's investment has gone to Sub-Saharan Africa, the continent received only 5.3 percent of FDI among countries in which the IFC has invested. Looking at the largest FDI destinations in each region, the IFC is underweight in China (9.3 percent vs. 19.5 percent of FDI in EMDEs in which the IFC has invested), Brazil (6.5 percent vs. 9.0 percent), Nigeria (1.0 percent vs. 1.1 percent), and Saudi Arabia (0.2 percent vs. 2.3 percent), while it is overweight in India (9.6 percent vs. 4.3 percent) and the Russian Federation (5.4 percent vs. 4.6 percent).

[16] The IFC's most recent strategy, promulgated in 2016, does emphasize increased coordination with the World Bank going forward.

Looking first at the PME relative to the S&P 500, the entire portfolio has achieved a PME = 1.15 since 1961. Over the long run, the portfolio has delivered 15 percent more than a counterfactual investment into the US public equity market. This performance is roughly comparable to the median performance of advanced economy leveraged buyout funds (PME = 1.16) and venture capital funds (PME = 1.02) during the 1980s-2000s, as reported by Harris, Jenkinson, and Kaplan (2014); it is also better than the sample of 170 impact investments made between 2000-2014 studied by Gray et. al. (2016), which achieved a PME = 1.00 relative to the S&P 500.[17] Looking at indices available only in later decades, the PME relative to the MSCI EM and World indices is systematically higher, consistent with the superior average performance of the S&P 500 over the long duration of time studied.[18] For instance, looking at all projects with vintage years after 1990—shortly after the initiation of the MSCI EM index—IFC achieved a PME = 1.30 relative to MSCI EM, a PME = 1.23 relative to MSCI World, and a PME = 1.14 relative to the S&P 500. These ex-post PMEs do not necessarily imply that the IFC's ex-ante expected return was as high as that demanded by a well-diversified private investor, who for instance could have a different market benchmark to capture systematic risk.

When restricting the portfolio to only investments with vintage years including 2010 and after, the PME has dipped below parity with all three public indices though it still achieved returns comparable to MSCI EM with a PME = 0.98 relative to that index. Relative to the S&P 500, the most recent decade of investments delivered a PME = 0.70. Several factors could explain the decline in returns. First, far fewer investments in the recent decade have been realized—25.8 percent compared to 69.2 percent of realized investments since 1961. Newer investments may be held with the expectation that their market valuations will increase. Second, the significant rally in US equities since the global financial crisis could explain under-performance relative to the S&P 500. Third, the IFC scaled up investment in the recent decade primarily in more developed middle-income markets, as described by Kenny, Kalow and Ramachandran (2018). Figure 1A showed global FDI plateaued in this decade, whereas IFC investment expanded sharply, suggesting perhaps that there could have been fewer profitable investment opportunities available at that time. Consistent with this view, emerging markets have also underperformed advanced economies in the most recent decade in other portfolios, for instance in the MSCI index[19], and the Cambridge Associates' index[20] of private equity and venture capital

[17]The PMEs reported in the literature are typically net of management fees paid to fund managers, while the IFC PME accounts for management fees only in the subset of investments managed indirectly though funds in which the IFC is a limited partner. The long-run PME on collective investment vehicles including private equity fund managers (532 of 2,509 investments) is 0.97. The portfolio return excluding these vehicles is 1.18.

[18]The MSCI EM outperformed the S&P 500 only during the 2000s, whereas the S&P 500 has outperformed MSCI EM in both the 1990s and 2010s.

[19]See https://www.msci.com/documents/10199/c0db0a48-01f2-4ba9-ad01-226fd5678111

[20]See https://www.cambridgeassociates.com/wp-content/uploads/2020/07/WEB-2020-Q1-ExUS-Dev-EM-Selected-Book.

performance.

Looking at alternative measures of performance, returns are positive according to the TVPI, as expected, though they are lower for investments made after 2010. Outperformance also obtains according to the GPME proposed by Kortweg and Nagel (2016). The GPME is scaled so that equivalent performance to the market equals zero instead of one, so a GPME above zero indicates outperformance. By this measure, outperformance for investments made prior to 2010 appears even greater than when measured by the PME, which could indicate that this portfolio has a relatively low beta (see discussion in Jeffers, Lyu, and Posenau 2022).[21] Unlike the PME, the GPME is measured with statistical error, since it relies on an estimate of a stochastic discount factor (we use code from Kortweg and Nagel 2016 to estimate this). P-values are reported for a test of whether the GPME =0 and these are not statistically significant at standard levels. Kortweg and Nagel (2022) observe that statistical precision is a drawback of the GPME measure. Despite this, the GPME above zero indicates that in this sample outperformance measured by the PME is not only due to high beta investments being made in times of high market performance.

A last question is how portfolio performance is affected by specific countries. Since the IFC's investment strategy is by design diversified, long-term outperformance of the S&P 500 is not driven by any one country. Excluding China, the largest recipient of FDI in EMDEs, yields a PME since inception equal to 1.11, compared to 1.15 for the complete portfolio. Excluding Brazil yields a PME equal to 1.17. Excluding all economies that are classified today by the IMF as advanced, and on this basis could be classified as success stories of economic development, yields a PME equal to 1.14.[22]

4.3 Individual Investment Performance

We now summarize the performance of individual investments, which are the basis for the regression analysis in the next section. Figure 2 plots the density of realized PME (Panel A) and TVPI (Panel B) for all IFC investments (with and without correction for market risk), by decade of initial investment.[23] For the graph,

pdf

[21] Like Jeffers, Lyu, and Posenau (2022) we do not estimate beta directly, given that our data include net asset values of open investments at one point in time, and we do not observe changes in these values that could be correlated with the market return over time (see Gompers and Lerner 1997). Nonetheless, we investigate how risk varies across different markets in Section 5 with quantile regressions that explore differences in PME distribution across countries.

[22] These economies are the Czech Republic, Estonia, Greece, the Republic of Korea, Latvia, Lithuania, Singapore, the Solvak Republic, Slovenia, and Taiwan (China).

[23] Table B1 reports average and median values of these return measures by decade.

values above 3 were recorded as 3. Decade refers to the vintage year, so even though an investment is classified under the decade in which it originated its return may be based on an exit in a different decade, or the current net asset value.

One way to assess the relative risk and reward of each decade is to compare mass to the right of the center under each distribution. By this measure, the greatest mass of high return projects (measured by PME) was found in 1961-1969, followed by 2000-2009, followed by 1990-1999. The variance of the distribution appears smallest (not accounting for outliers) when considering the most recent decade 2010-2019. This is expected given the large share of unrealized investments valued at close to their cost. Notably, the worst performance (measured by PME) was for investments that originated in 1980-1989; the density function for that decade is skewed further to the left than investments made in 2010-2019.

4.3.1 Individual Investment Performance and Investment Size

In Table 3, we report the size distribution of IFC investments, and also the performance of portfolios constructed by grouping together all investments of the same size. Specifically, we classify each company into investment size quartiles by decade, defining size as the nominal value of total cash deployed in the investment. Panel A reports the cutoffs for each quartile in each decade. Prior to 1990, size quartiles were relatively stable across decades, with the cutoff for the bottom quartile ranging from $0.33 million to $0.35 million, and the cutoff for the top quartile at about $2.00 million to $2.50 million. The average investment size rose considerably in subsequent decades, with the bottom quartile cutoff rising to $0.60 million in 1990-99, $2.04 million in 2000-09, and $4.00 million in 2010-19. This growth in average investment size is much more than could be explained by inflation. The share of large investments also increased substantially, with the top quartile cutoff rising to $6.09 million in 1990-99, $15.45 million in 2000-2009, and $21.76 million in 2010-19. The IFC's portfolio therefore reflects a combination of different investment sizes, with some on the scale of those executed by large private equity funds, and others more on the scale of venture capital investments.

Panel B of Table 3 reports the returns to portfolios constructed by pooling cash flows from all investments in the same size quartile together—where quartiles are defined by the cutoffs in Panel A. This ensures that whether an investment is classified as "small" or "large" is defined relative to the time period. Here we see that there is a relationship between investment size and performance, but it is not monotonic. Relative to the S&P 500, the portfolio of the smallest (1st quartile) investments has a PME = 1.48, higher than for the

overall portfolio. The second quartile portfolio by size has PME = 1.16, also slightly higher than the overall portfolio. The largest (4th quartile) investments perform slightly better, with PME = 1.18, and the lowest returns are in the third quartile portfolio by size, which has PME = 1.02. These results contrast somewhat with the findings of Harris, Jenkinson and Kaplan (2014) who find that, in advanced economies, leveraged buyout funds—which typically do larger deals—have higher average returns than venture capital funds—which do smaller deals. However, Harris et al. do not report information that would allow us to evaluate differences in sector composition between our and their samples.

4.3.2 Individual Investment Performance and Holding Duration

In Table 4, we use regressions to examine the association between investment financial performance and holding duration, where duration is measured as the number of years between the first and last cash flow. In this portfolio the 25th percentile of holding duration is 4 years, the 50th percentile is 7 years and the 75th percentile is 11 years. Column (1) reports that an additional year of duration increases PME by 0.04, and this result is statistically significant at one percent. Column (2) estimates this relationship using a spline function, which allows the slope between PME and duration to differ between three intervals: less than 5 years, between 5 and less than 10 years, and 10 years or more. Here, the slope remains positive and statistically significant at standard levels in all three intervals, though the slope becomes less steep after 10 years. In Columns (3) and (4) these specifications are replicated restricting the sample only to realized investments, with no significant change in the estimated coefficients. A potential explanation for the outperformance of private equity investments relative to public markets is that outperformance reflects a liquidity premium—higher returns in exchange for a longer holding duration. These results are consistent with the existence of such a premium. They are also consistent with the idea of private returns to 'patient' capital, a theme among impact investors.

5. International Capital Market Segmentation

We now evaluate the sources of potential segmentation of international capital markets through estimation of Equation (1). To account for the long time series of investments, and potential differences in ex-ante systematic and sectoral risk across investments, we modify this equation into the following:

$$PME_{it} = \tau_t + \alpha_{s(i)} + X'_{c(i)}\beta + \varepsilon_{it} \tag{2}$$

where i indexes the investment, and t indexes the vintage year. The term τ_t is a fixed effect for each vintage year. Our returns measure $r_{it} = PME_{it}$ corrects for systemic risk and some time variation in the cost of capital, so the time fixed effects therefore capture residual variation in the price of capital not explained by the reference index, in this case the S&P 500, and also control for the overall performance of the index after different vintage years. The term $\alpha_{s(i)}$ is a fixed effect for each sector s, included as a control to capture potential differences in ex-ante risk across technologies, which may affect ex-post returns measured by the PME. The vector $X'_{c(i)}$ includes various characteristics of country c, and the term ε_{it} summarizes residual risk. In estimation we report standard errors clustered at the country level, given potential correlation of residual risk over time within countries. Another potential source of residual correlation is between investments occurring at the same time period, which means the index for the PME will be similar. The vintage year fixed effects control for this.

There are several challenges in implementing the test for market integration with β, however we are able to address these challenges because of the unique qualities of this portfolio. First, investors care about risk-adjusted returns rather than just mean returns, and risk could vary across countries. The cash flow data allowed us to account for some risk using the PME measure. To investigate whether residual risk varies with country characteristics, we will estimate Equation (1) as a quantile regression, to examine whether the tails of the returns distribution (e.g., 10th percentile, 90th percentile) vary with country characteristics. Second, the IFC could select different sectors with different levels of ex-ante risk in different countries. To account for this issue, we include in our empirical specification sector fixed effects, so that cross-country comparisons are within narrow production technologies (e.g., collective investment vehicles, health care, electric power). Third, differences in average returns across countries may be driven by non-diversifiable country risk in a few particular years. However, the length of the time series allows us to to observe individual countries over a longer time period than in any other dataset available. Fourth, the different densities of returns illustrated in Figure 2 raises the possibility of a selection issue. An investor might overweigh markets with a larger density of high returns in order to equalize returns across markets within the portfolio. In this case, we would fail to reject that markets are perfectly integrated, despite the mean returns in the population of investments in each country being actually different. In the case of the IFC, this challenge is less relevant due to an investment policy that explicitly limits country exposure based on the principle that all IFC member countries have access to the IFC's funding, and a desire to manage the concentration of financial risk.[24]

[24]Current policy limits the maximum economic capital exposure to 10% of the IFC's net worth in any country with gross national income greater than $1.5 trillion, and which is classified as low risk. Smaller and higher risk economies have smaller exposure limits.

5.1 Market Size

First, we consider segmentation of returns by market size, including in the regression (log) population and (log) GDP per capita, the latter to account for the population's purchasing power. This regression allows us to test the joint hypothesis of imperfect capital market integration combined with either the hypothesis from the neoclassical growth model that returns are higher in lower income economies (Lucas, 1990), or the hypothesis that there are non-constant returns to scale in investment. Table 5 reports the results of this regression, with Column (1) reporting the OLS estimates of Equation (1) and Columns (2)-(6) reporting estimates of a quantile regression, at the 10th, 25th, 50th, 75th and 90th percentiles. Panel A reports a specification with only vintage year fixed effects and Panel B reports a specification with vintage year and sector fixed effects. Panel C reports the same specification as in Panel B, retaining only mature projects by dropping projects with vintage year of 2015 or later.

Looking first at the OLS regression in Column (1) the coefficients on (log) population and (log) GDP per capita are positive but statistically insignificant in Panel A. They increase in magnitude in Panel B such that the coefficient on (log) population becomes statistically significant at the 10 percent level, though not income. The difference between Panels A and B suggests that some lower observed returns in larger markets can be explained by the composition of sectors, reinforcing the value of sector fixed effects as a control for technological risk and that Panel B is the preferred specification. The results in Panels A and B do not appear to be driven by issues with valuation of the most recent investments, given that the coefficients in Panel C are well within standard confidence intervals of the coefficients in Panels A and B. Turning to the quantile regressions in Columns (2)-(6), the statistical significance of the effects is much greater, and the coefficient on (log) GDP per capita now obtains statistical significance at standard levels, consistent with the idea that outliers in the returns distribution make it harder to obtain statistical significance using OLS. Downside risk does not appear different across markets, as the coefficients for the 10th percentile regression in column (2) are quite small and insignificant; higher returns in larger economies appear to be driven by the right of the distribution, at the 50th, 75th and 90th percentiles, in columns (4)-(6). This suggests larger markets are not inherently risker, and have more 'home run' investments.

Overall this table provides some evidence international capital markets are not perfectly integrated. Higher median returns appear to be available in more populous and higher income economies. Interestingly, the results are also the opposite of what would be expected from a diminishing marginal product of capital or

diseconomies of scale in investment. Viewed in light of the model in Equation (1) these results suggest that larger markets within our sample of EMDEs are constrained for capital (relative to the perfect integration benchmark) because they have higher average returns that are not bid away by competition.

5.2 Financial Openness and Development

A more direct test of this hypothesis includes in the regression measures of financial openness and development that capture more directly an economy's access to capital. Table 6 reports these results. Explanatory variables are normalized as Z-scores by subtracting off the sample mean and dividing by the standard deviation so that effect sizes may be interpreted relative to the distribution of these measures. Column (1) includes only the financial openness index of Chinn and Ito (2006). Column (2) adds private sector credit to GDP. In Column (3), we include dummies for the specific right of foreigners to buy and sell equity shares, a component of the Chinn and Ito (2006) index that we expect to be especially relevant for the IFC portfolio, though for which separate variables are only available after 1995. Their effects are not statistically significant. In Column (4), we include dummies for whether a country has British or socialist legal origins, using the classification of La Porta et al. (1999). Lerner and Schoar (2005) find that private equity returns and valuations are higher in economies with British legal origins and lower in those with socialist legal origins, though their sample is much smaller than ours in terms of the number of countries included. We do not find a statistically significant association between legal origins and financial performance in our sample.The omitted category is French or German legal origins (only one country in the sample, the Republic of Korea, is classified as having German legal origins). In Column (5), where we drop the 5 most recent years of investments, and the coefficients do not differ significantly. Taken together these negative coefficients are consistent with the hypothesis that returns are lower in less open or developed financial markets, though significance is difficult to obtain due to residual risk in returns.

This issue is addressed in subsequent columns by including country fixed effects, which control for country-specific risk and isolate the effect of changes in financial openness and development within countries over time. Overall, some, but not a great deal of variation is explained by country-specific risk; in Column (1) without country fixed effects the $R^2 = 0.134$ and in Column (6) it increases to 0.199. An additional benefit of the country fixed effect specification is that it allows us to study how the persistence of returns within economies is associated with financial openness and development.

After accounting for country fixed effects, the quantitative magnitude of the coefficients on financial openness and banking system development increases, along with their statistical significance. Using the specification in Column (6) a one standard deviation increase in financial openness reduces PME by 0.254, or, for an 8 year investment ($1.254^{(\frac{1}{8})} - 1$) x $100 = 2.86$ percentage points *per year*. As a benchmark, in our dataset, between 2000-2001 as Poland prepared to enter the European Union, its value of the Chinn-Ito openness index increased by approximately 1 standard deviation. In Column (7), a one standard deviation increase in banking sector development reduces PME by 0.201, or for an 8 year investment, ($1.201^{(\frac{1}{8})} - 1$) x 100 $= 2.31$ percentage points *per year*. A one standard deviation increase in private sector credit to GDP is 39 percentage points, approximately the amount of growth experienced by Brazil from 1990 to 2020, or double the growth experienced by Kenya during the same 30 year period. Our interpretation of these results is that capital controls and limited banking system depth have prevented capital from flowing to viable projects in less financially open and developed economies.[25] Were this not the case, we would not observe a change in returns as economies open and develop. That associations become stronger when including country fixed indicates the largest differences in returns across economies occur *within* economies that transition from closed to open. Such differences are obscured somewhat when looking only at the cross section.

Table 7 reports quantile regressions of the PME on the measure of capital market openness and banking system depth, to evaluate how these variables are associated with the risk of investments. These regressions show that the decline in return associated with more openness and banking system depth is concentrated in the right of the distribution, and is largest at the 90th percentile, whereas there is no difference in returns at the 10th percentile. This suggests that downside risk does not change with openness and banking system depth, rather the highest return "home run" projects are eliminated from the distribution. When risk is measured by the difference between the 90th and 10th percentiles of returns, closed economies do not appear to be riskier.

The results in this section provide the first available evidence on the relationship between financial markets and private equity returns in a large cross section of countries, and are consistent with the hypothesis that

[25] Table B2 explores the association between financial performance and five factors that some investors use to gauge country risk or investability, when measured the year before the first cash flow, which could also be associated with capital market integration. A challenge with these data is that the time series and country coverage are often incomplete, reducing the size of the sample. Of these variables, the only one for which we find a significant association is Economic Freedom, more of which is associated with negative returns. This is consistent with the hypothesis that firms in "freer" countries are less capital constrained. The non-significance of the political risk, corruption perceptions, and ease of doing business indices suggests that these measures are less relevant for investment analysis than may be assumed, perhaps because even if they are correlated with productivity (e.g., national income) they need not be correlated with the extent of capital market integration, which determines the level of returns.

some economies have been constrained in access to capital. It is worth relating these findings to what is known about the flows of private equity investments across countries. Lerner et al. (2009) study 76,398 private equity investments made in 1984-2008 that span 123 countries, and, though they do not measure returns, they find associations between country characteristics and investment volume as a share of GDP, using similar regressions as in Table A2. These authors report that private equity investment flows more to countries with higher GDP per capita and less corruption, though not to markets with less private sector credit to GDP. While their paper studies a different sample of investors, with potentially different preferences than the IFC, one way to reconcile these results with our own is that the greatest volume of investment need not necessarily go to the markets with highest returns; indeed, returns could be highest in markets with less private sector credit to GDP precisely because there is less investment in those markets.

6. Private Investment Performance and The Macroeconomy

We now consider how returns vary with the macroeconomic variables that typically appear in a small open-economy macro model used for country risk analysis, namely real GDP growth, inflation, and local currency depreciation. We also consider central government debt to GDP and the sovereign risk rating as proxies for the country risk premium. These results are useful for benchmarking the magnitudes of the previous results.

In Table 8, we consider how these variables relate to performance when evaluated ex-ante, in the year before first cash flow. This specification tests whether performance can be predicted using the raw macroeconomic variables available at time of investment. The regression here is identical to Equation (2). In Table 9, we consider how annualized changes in these variables between the year of first cash flow and the last cash flow are associated with returns. This is a different specification, which does not investigate market segmentation, but rather associations of ex-post macroeconomic outcomes with returns. This specification is included to help benchmark the magnitudes of the other results to GDP growth, but they can also be used to understand how returns can be predicted if accurate forecasts of macroeconomic variables in emerging market and developing economies are available.[26]

Overall, Table 8 shows that macroeconomic variables measured in the year before investment have a less significant association with performance. The only significant coefficient (at 10 percent) is on real GDP growth in Column (6). Notably, the effects of central government debt as a share of GDP and the sovereign

[26] We set aside the question of how to forecast macroeconomic variables accurately.

rating are estimated as precise zeros. Our interpretation of these results is that macroeconomic variables at time of investment do not have great predictive power over which capital markets are integrated with the international market.

Table 9 shows the effects of changes in macroeconomic variables over the life of the investment. Such macro dynamics have significant predictive power for investment performance. In Column (1), one additional percentage point of GDP growth in each year of the investment is associated with an increase in PME of 0.066, or an additional 6.6 percentage points in return over the life of the investment. This is natural as GDP growth reflects broad-based productivity growth or increase in the labor supply, including for IFC investees. In Column (2), we see that investment performance declines significantly if the local currency depreciates over the course of the investment. Recall that financial returns are all measured in US dollars, and so depreciation of the currency implies a lower valuation of the firm's cash flow. In contrast, in Column (3), we see that faster growth of domestic prices (measured by the local currency GDP deflator) reduces performance, but this effect is not statistically significant. In Column (4), which includes together all three of the variables in the previous three columns, we see that the associations with currency depreciation and local currency inflation almost completely cancel each other out on average, consistent with what would be expected with a freely floating exchange rate. Real GDP growth remains a significant predictor of returns (at 10 percent significance), though its magnitude is reduced somewhat to 4.3 additional percentage points of return for an additional 1 percent of cumulative annualized GDP growth over the course of the investment. In Column (5), we see a negative association of investment performance and growth in the stock of government debt relative to GDP and in Column (6) we see a negative association between returns and deterioration in the sovereign debt rating. However, when these variables are combined with GDP growth, inflation, and local currency depreciation in Columns (7) and (8) these variables all lose statistical significance, though these specifications also have a smaller number of observations. As ratings are largely determined by a small number of country risk factors such as GDP growth and inflation (Cantor and Packer, 1996) this is not surprising.

Taken together these results confirm that a macroeconomic framework facilitating growth is likely an important pre-condition for the financial performance of private equity. Quantitatively, a less integrated market appears to be more important for returns than economic growth, with a 1 standard deviation decrease in financial openness or banking system depth within a country being associated with an increase in return that is substantially more than is associated with a 1 per-cent increase in cumulative annualized real GDP growth

over the life of the average investment. This finding suggests that the extent of capital market integration is the main driver of differences in returns across economies, rather than differences in underlying economic performance, consistent with the model elaborated in Section 2.

7. Conclusions

Our analysis of the IFC portfolio provides insight for any international investor who contemplates investing in emerging market and developing economies to realize an above market return on equity. Imperfect integration of international capital markets appears to have left available especially attractive opportunities in countries with less developed banking systems and capital controls, creating scope for both financial profit and a social impact. The combination of results on openness and macroeconomic variables suggests that the highest returns should be available in economies that are both growing rapidly and transitioning from closed to open. These results also provide a potential explanation for IFC's declining performance in the last decade, and the underperformance of EMDEs in other datasets. Economies rarely close after opening, private sector credit as a share of GDP grows with development, leaving fewer and fewer opportunities to go where other investors do not. It is an open question whether alternative impact strategies, which might, for example, focus on a specific sector or social or environmental outcomes (e.g., affordable housing, climate change mitigation), could expect similar returns. Impact investors' performance may not persist unless they create or identify new markets that lack access to capital.

Our analysis also has implications for policy makers seeking to attract investment to their countries. In the neoclassical model described by Lucas (1990) that we verify here, as capital markets become more integrated, more capital will flow but expected returns will fall. This implies it could be even harder for economies to attract additional capital, since the 'home-run' opportunities will no longer be available. GDP growth is an important factor in determining the financial performance of investment. However, as expected returns fall due to increased capital market integration, it will be even more important for economies to provide solid economic growth if they wish to attract more investors. Finally, our results on depreciation point to one practical public policy that could contribute to the integration of international capital markets in a world with a dominant currency. Given the substantial effects of ex-post currency depreciation observed on US dollar returns, there could be a benefit from policies that enhance exchange rate stability, and initiatives that provide external convertibility of local currencies through products such as swaps and forward contracts, especially when those currencies are not widely traded.

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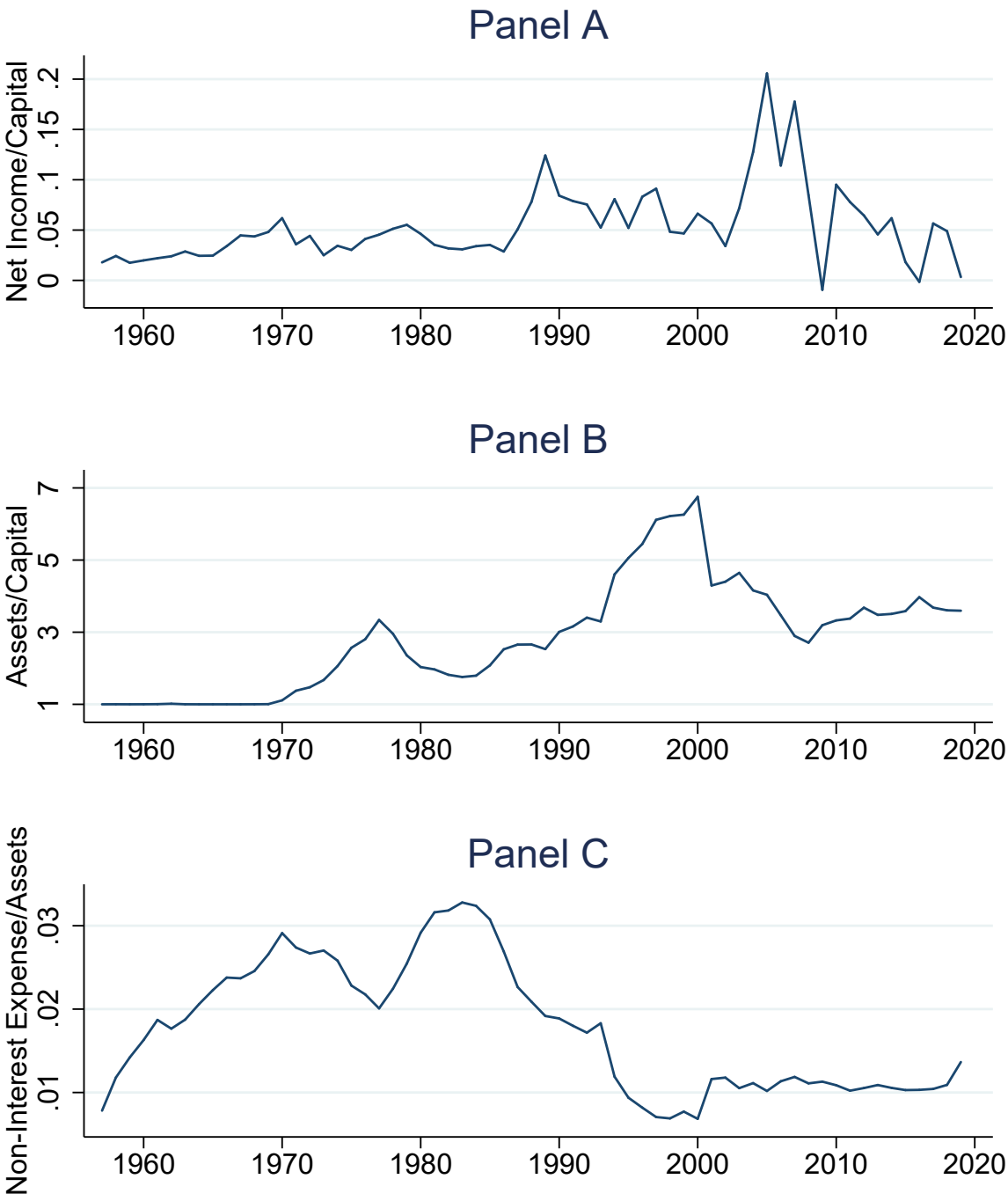
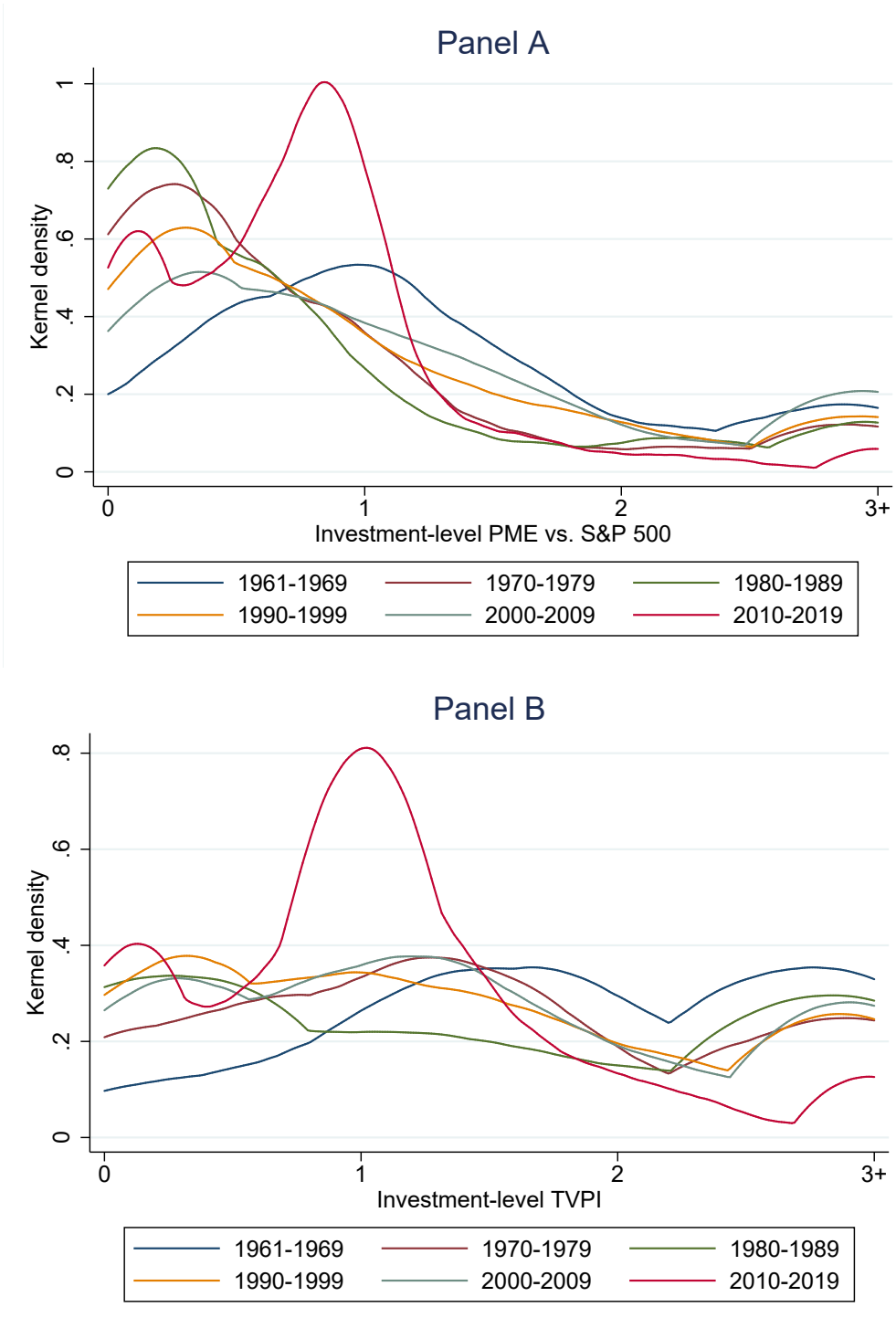
Figure 1: Key financial ratios of the International Finance Corporation. Values of assets prior to 2001 are not directly comparable with those after due to a change in accounting standards requiring derivatives to be held at fair rather than book value (FAS No. 133).



Source: The IFC annual reports

Figure 2: Individual equity investment performance by decade



Source: IFC equity cash flows

Note: For the graph, values above 3 were recorded as 3.

TABLE 1: Geographic distribution of IFC equity investment compared to foreign direct investment. This table presents IFC equity investment and global FDI flows by region. Advanced economies are as classified by the IMF as of 2019. Advanced economies with IFC equity investments are, in descending order of real cash deployed: the Republic of Korea, Greece, Czech Republic, Slovak Republic, Latvia, Singapore, Estonia, Slovenia, Lithuania and Taiwan (China). Brazil; China, Russian Federation, Nigeria, India and Saudi Arabia are the largest FDI destinations in their regions. The United States; United Kingdom; and Hong Kong SAR (China) are the world's three largest FDI destinations among advanced economies. The British Virgin Islands, Cayman Islands and United Arab Emirates are the three largest Emerging Market and Developing Economies FDI destinations without IFC cash deployed. World region IFC projects are grouped under Emerging Market and Developing Economies. Regional IFC projects are grouped under their region. FDI inflows from UNCTAD up to 2018. Values are 2018 dollars, converted from nominal dollars using the US GDP deflator.

	IFC equity investment since 1956		FDI inflows since 1970			
	Billions ($)	Share of SUB-TOTAL	Trillions ($)	Share of SUB-TOTAL	Share of TOTAL	IFC / FDI
A) Countries with IFC cash deployed						
Emerging Market and Developing Economies	33.77	97.7%	11.33	85.9%	29.1%	0.30%
Latin America and the Caribbean	8.01	23.2%	3.45	26.2%	8.9%	0.23%
Brazil	2.23	6.50%	1.19	9.00%	3.10%	0.19%
East Asia and the Pacific	6.28	18.20%	3.67	27.80%	9.40%	0.17%
China	3.22	9.30%	2.57	19.50%	6.60%	0.13%
Europe and Central Asia	6.37	18.40%	2.02	15.30%	5.20%	0.32%
Russian Federation	1.85	5.40%	0.61	4.60%	1.60%	0.30%
Sub-Saharan Africa	3.9	11.30%	0.7	5.30%	1.80%	0.56%
Nigeria	0.35	1.00%	0.15	1.10%	0.40%	0.24%
South Asia	4.45	12.90%	0.67	5.10%	1.70%	0.66%
India	3.31	9.60%	0.56	4.30%	1.40%	0.59%
Middle East and North Africa	3.22	9.30%	0.81	6.10%	2.10%	0.40%
Saudi Arabia	0.08	0.2%	0.31	2.3%	0.8%	0.03%
World Region	1.54	4.5%	-	-	-	-
Advanced Economies	0.78	2.3%	1.87	14.1%	4.8%	0.04%
Korea, Rep.	0.30	0.9%	0.29	2.2%	2.2%	0.10%
Greece	0.20	0.6%	0.08	0.6%	0.6%	0.25%
Czech Republic	0.18	0.5%	0.17	1.3%	1.3%	0.11%
SUB-TOTAL	34.56	100.0%	13.19	100.0%	33.9%	0.26%
B) Countries without IFC cash deployed						
Emerging Market and Developing Economies			1.89		4.9%	
British Virgin Islands			0.84		2.2%	
Cayman Islands			0.59		1.5%	
United Arab Emirates			0.17		0.4%	
Advanced Economies			23.86		61.3%	
United States			7.02		18.0%	
United Kingdom			2.68		6.9%	
Hong Kong SAR (China)			1.68		4.3%	
TOTAL			38.95		100.0%	0.09%

TABLE 2: Financial performance of the IFC private equity portfolio as of June 30, 2019. The public market equivalent (PME) is measured following Kaplan and Schoar (2005) as the ratio of cash in (disbursements) to cash out (client capital calls), where each series is discounted according to a public market index. The discount rate is given by the total return of the index, including dividends and price appreciation. TVPI is total value to paid-in. GPME is measured following Kortweg and Nagel (2016), where cash flows are discounted according to a stochastic discount factor $M_{t+1} = \exp(a - br_{m,t+1})$ and $r_{m,t+1}$ is the log market return at time t+1. For the full sample of investments since 1961, the terms are estimated as $a = 0.015$ (s.e. = 0.005) and $b = 3.478$ (0.697). The estimated terms are statistically identical when estimated in the subsamples of investments with different vintage years. All cash flows and market index values are observed on the last date of each month. For investments with non-zero holding valuation, the fair value is treated as a positive cash flow in June 30, 2019, as if the investment is sold on that date. An investment is considered fully realized if it has zero holding valuation.

	Index Start Date	Financial performance of the portfolio of all equity investments with vintage years including and since...					
		1961	1970	1980	1990	2000	2010
PME vs. MSCI Emerging Markets	1988				1.3	1.18	0.98
PME vs. MSCI World	1970		1.21	1.26	1.23	1.12	0.78
PME vs. S&P 500	1957	1.15	1.13	1.16	1.14	1.07	0.7
TVPI		1.71	1.70	1.69	1.61	1.47	1.15
GPME vs. S&P 500	1957	2.08	2.17	2.23	2.21	2.71	-0.11
p-value		[0.17]	[0.18]	[0.18]	[0.20]	[0.32]	[0.74]
Number of investments		2,509	2,429	2,304	2,053	1,433	803
Share of investments fully realized		69.20%	68.20%	66.40%	62.50%	47.50%	25.80%

TABLE 3: Investment financial performance and investment size. Total cash deployed across 2,509 companies is classifed into investment size quartiles by decade. Panel A reports the cut offs for each quartile. Panel B reports the returns to a synthetic portfolio made up of only the investments in each quartile. For the PME vs. MSCI Emerging Markets, projects are included in the calculation if they have vintage years after 1988, when the index began. For the PME vs. MSCI World, projects are included if they have vintage years on or after 1970. For the PME vs. S&P 500, all projects are included.

Panel A) Investment size cutoffs by decade (nominal $ millions)

Time Period	Bottom Quartile	Median	Top Quartile	Mean
1959-69	0.33	0.72	2.02	1.32
1970-79	0.35	0.88	2.00	1.85
1980-89	0.30	0.84	2.50	3.01
1990-99	0.60	2.22	6.09	5.28
2000-09	2.04	6.00	15.45	13.17
2010-19	4.00	10.00	21.76	19.49

Panel B) Portfolio performance by size quartile

Investment size	TVPI	PME vs. S&P 500	PME vs. MSCI World	PME vs. MSCI Emerging Markets
1st quartile (smallest)	2.18	1.48	1.44	1.85
2nd quartile	1.83	1.16	1.2	1.26
3rd quartile	1.68	1.02	1.11	1.21
4th quartile (largest)	1.69	1.18	1.24	1.36

TABLE 4: Investment financial performance and holding duration Duration is measured as the number of years between the first and last cash flow. Columns 3 and 4 include only investments that have been realized, and have a current holding valuation equal to zero. Standard errors are clustered at the country-year. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)
	PME	PME	PME	PME
Duration	0.040***		0.045***	
	(0.009)		(0.011)	
Duration X 1(Duration < 5)		0.090**		0.092**
		(0.038)		(0.037)
Duration X 1(5 ≤ Duration < 10)		0.089***		0.091***
		(0.020)		(0.022)
Duration X 1(10 ≤ Duration)		0.046***		0.050***
		(0.010)		(0.011)
R-squared	0.120	0.124	0.124	0.127
Observations	2,509	2,509	1,736	1,736
Sample	Full	Full	Realized	Realized
Vintage year fixed effects	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes

TABLE 5: Investment financial performance and market size. The dependent variable is the PME vs. S&P500, winsorized at the 99th percentile. Independent variables are the population and GDP per capita of the country, on the year of the first cash flow associated with the investment. Panel A reports a linear regression with the constant not reported. Panel B reports the same regression, but with fixed effects for 22 subsectors that partition IFC's four sectoral departments: Manufacturing, Agriculture and Services; Financial Institutions; Infrastructure; and Collective Investment Vehicles (funds). Panel C reports the same regression, excluding the five most recent vintage years, whose performance is disproportionately determined by mark to market valuations. Standard errors are clustered at the country-year. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)
		Quantile Regressions				
	OLS	0.1	0.25	0.5	0.75	0.9
	PME	PME	PME	PME	PME	PME
Panel A) Baseline specification						
Ln(Population)	0.028	0.003	0.010	0.019**	0.023*	0.025
	(0.021)	(0.005)	(0.008)	(0.009)	(0.014)	(0.026)
Ln(GDP per capita)	0.025	0.003	0.033**	0.050**	0.041	-0.068
	(0.044)	(0.010)	(0.013)	(0.020)	(0.029)	(0.048)
R-squared (pseudo)	0.096	0.035	0.060	0.072	0.096	0.164
Observations	2,069	2,069	2,069	2,069	2,069	2,069
Sample	Full	Full	Full	Full	Full	Full
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	No	No	No	No	No	No
Panel B) Baseline specification with sector fixed effects						
Ln(Population)	0.038*	0.004	0.010	0.016*	0.022	0.050**
	(0.021)	(0.005)	(0.007)	(0.009)	(0.016)	(0.024)
Ln(GDP per capita)	0.033	0.004	0.019	0.055***	0.053	0.045
	(0.044)	(0.009)	(0.012)	(0.020)	(0.037)	(0.060)
R-squared (pseudo)	0.131	0.047	0.085	0.091	0.117	0.202
Observations	2,069	2,069	2,069	2,069	2,069	2,069
Sample	Full	Full	Full	Full	Full	Full
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel C) Baseline specification with sector fixed effects, including only vintage years < 2015						
Ln(Population)	0.036	0.002	0.005	0.017	0.023	0.076**
	(0.024)	(0.006)	(0.007)	(0.011)	(0.018)	(0.039)
Ln(GDP per capita)	0.045	0.004	0.022	0.067***	0.068*	0.050
	(0.050)	(0.010)	(0.013)	(0.021)	(0.038)	(0.094)
R-squared (pseudo)	0.134	0.026	0.068	0.093	0.121	0.202
Observations	1,837	1,837	1,837	1,837	1,837	1,837
Sample	Pre-2015	Pre-2015	Pre-2015	Pre-2015	Pre-2015	Pre-2015
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 6: Investment financial performance and capital market development. The dependent variable is the PME vs. S&P 500, winsorized at the 99th percentile. The de jure financial openness index begins in 1970, and is the first principle component of dummy variables that codify the restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (Chinn and Ito, 2008). Specific equity transaction rights of nonresidents are reported in the AREAER after 1995, and are compiled by Fernández et. al. (2015). Private sector credit is domestic private credit to the real sector by deposit money banks. Explanatory variables are measured in the year of first cash flow. Financial openness and financial system depth have been normalized as Z-scores by subtracting off the sample mean and dividing by the sample standard deviation. Standard errors are clustered at the country-year. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	PME	PME	PME	PME	PME	PME	PME	PME	PME
De-jure financial openness index	-0.034	-0.043	-0.094		-0.041	-0.254***	-0.253***	-0.136	-0.253***
	(0.046)	(0.047)	(0.068)		(0.050)	(0.081)	(0.082)	(0.116)	(0.086)
Private sector credit by deposit money banks/GDP		-0.035			-0.039		-0.201*		
		(0.034)			(0.037)		(0.107)		
Non-residents can purchase local equity shares {0,1}			-0.038					0.300	
			(0.148)					(0.199)	
Non-residents can purchase local equity shares {0,1}			-0.101					0.148	
			(0.162)					(0.272)	
British legal origins				-0.034					
				(0.095)					
Socialist legal origins				0.126					
				(0.121)					
Observations	1,859	1,828	1,109	2,112	1,695	1,859	1,828	1,109	1,726
R-squared	0.134	0.135	0.143	0.132	0.138	0.199	0.201	0.206	0.205
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	No	Yes	Yes	Yes	Yes
Sample	Full	Full	Post-1995	Full	Pre-2015	Full	Full	Post-1995	Pre-2015

Table 7: Quantile regressions with capital market openness and development. The dependent variable is the PME vs. S&P 500, winsorized at the 99th percentile. The de jure financial openness index begins in 1970, and is the first principle component of dummy variables that codify the restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (Chinn and Ito, 2008). Private sector credit is domestic private credit to the real sector by deposit money banks from the Global Financial Development Database. Explanatory variables are all measured in the year of first cash flow. Financial openness and financial system depth have been normalized as Z-scores by subtracting off the sample mean and dividing by the sample standard deviation. Standard errors are clustered at the country-year. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Quantile Regressions									
	0.1	0.25	0.5	0.75	0.9	0.1	0.25	0.5	0.75	0.9
VARIABLES	PME	PME	PME	PME	PME	PME	PME	PME	PME	PME
De-jure financial	-0.007	-0.044*	-0.069*	-0.161**	-0.371					
openness index	(0.018)	(0.023)	(0.037)	(0.072)	(0.323)					
Private sector credit						0.001	0.014	0.012	-0.440**	-0.921**
by deposit money banks/GDP						(0.013)	(0.010)	(0.012)	(0.188)	(0.396)
Observations	1,859	1,859	1,859	1,859	1,859	2,058	2,058	2,058	2,058	2,058
Pseudo-R2	0.0503	0.0787	0.0712	0.0851	0.181	0.0525	0.0774	0.0660	0.0796	0.180
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full

TABLE 8: Investment financial performance and macroeconomic variables recorded in the year before the first cash flow. The dependent variable is the PME with respect to the S&P 500, winsorized at the 99th percentile. All independent variables are changes between the year of first cash flow and the previous year. Real GDP growth (in USD), inflation (change in LC GDP deflator) and currency depreciation (change in USD/LC) are from the WDI. Central government debt is from the International Financial Statistics. Sovereign rating is the (reverse) composite index provided by Oxford Economics based on the average of the sovereign ratings provided by Moody's, S&P and Fitch, ranging from 1 to 20, where 20 is the worst possible credit rating. Higher values indicate higher credit risk. Regression constant is not reported. Standard errors are clustered at the country-year.
*** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PME	PME	PME	PME	PME	PME	PME	PME
Real GDP growth rate	1.211					1.653*	1.966	0.444
	(0.969)					(0.991)	(1.203)	(1.323)
Inflation rate		0.140				0.017	0.021	0.745
		(0.126)				(0.483)	(0.583)	(0.618)
Currency depreciation rate			0.129			0.138	0.134	-0.749
			(0.128)			(0.494)	(0.602)	(0.636)
Central government debt (% GDP)				-0.001			-0.001	-0.001
				(0.001)			(0.001)	(0.003)
Sovereign rating index					-0.000			0.026
					(0.018)			(0.027)
R-squared	0.107	0.107	0.106	0.129	0.094	0.126	0.158	0.146
Observations	2,065	2,066	2,105	1,668	1,336	2,062	1,641	1,073
Sample	Full	Full	Full	Full	Full	Full	Full	Full
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 9: Investment financial performance and macroeconomics over the life of the investment. The dependent variable is the PME with respect to the S&P 500, winsorized at the 99th percentile. Explanatory variables are measured as annualized changes from the year of first cash flow to the date of the last cash flow. Real GDP growth (in USD), inflation (change in LC GDP deflator) and currency depreciation (change in USD/LC) are from the WDI. Central government debt is from the International Financial Statistics. Sovereign rating is the (reverse) composite index provided by Oxford Economics based on the average of the sovereign ratings provided by Moody's, S&P and Fitch, ranging from 1 to 20, where 20 is the worst possible credit rating. Higher values indicate higher credit risk. Regression constant is not reported. Standard errors are clustered at the country-year. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PME	PME	PME	PME	PME	PME	PME	PME
Real GDP growth	6.620***			4.306*			2.869	-3.580
	(2.435)			(2.491)			(2.636)	(4.503)
Currency depreciation		-0.355*		-3.945***			-3.670***	-4.103**
		(0.192)		(1.158)			(1.376)	(1.619)
Inflation			-0.202	3.713***			3.341**	3.503**
			(0.192)	(1.145)			(1.361)	(1.647)
Central government debt (% GDP)					-0.020*		-0.004	0.025
					(0.012)		(0.012)	(0.028)
Sovereign rating index						-0.378**		-0.430
						(0.166)		(0.349)
R-squared	0.149	0.143	0.145	0.155	0.181	0.122	0.188	0.192
Observations	1,393	1,417	1,392	1,391	1,109	1,310	1,095	623
Sample	Full	Full	Full	Full	Full	Full	Full	Full
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes