

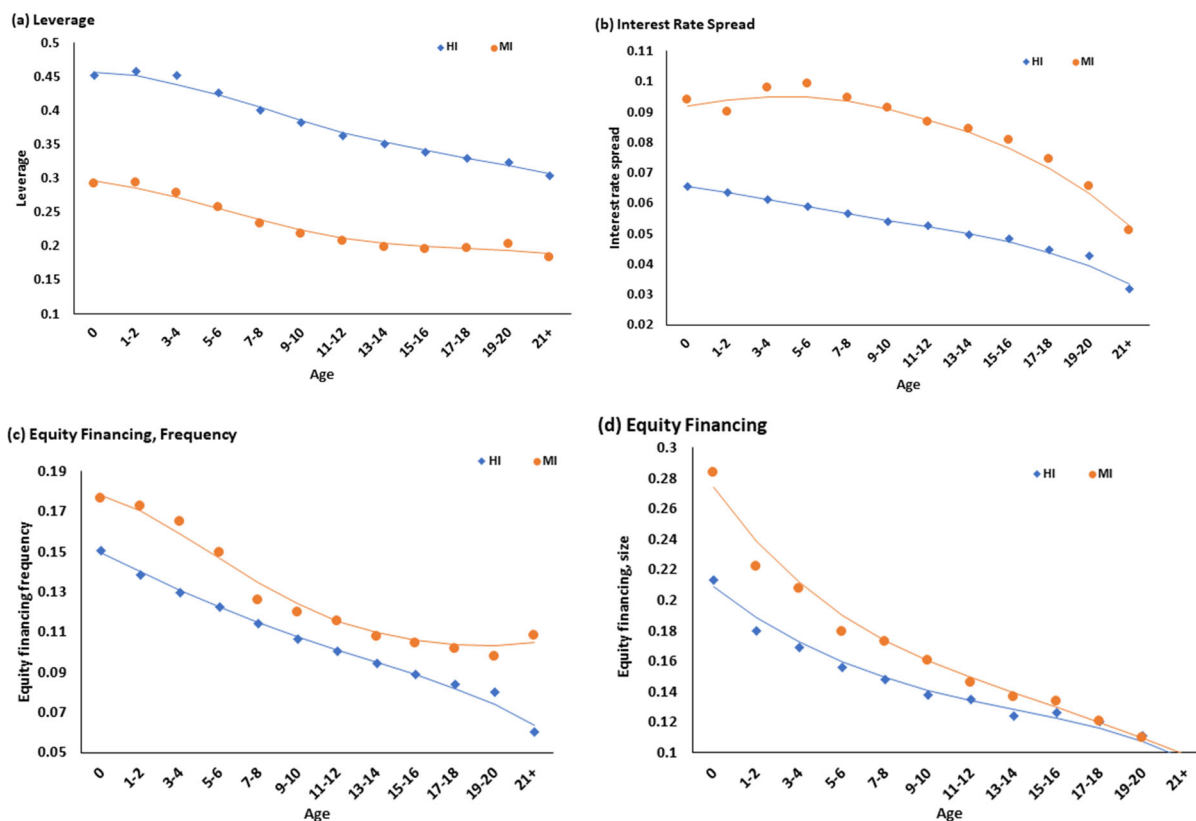
# Finance Over the Life Cycle of Firms: Evidence from High- and Middle-Income Countries

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A vast literature has studied the relation between the functioning of financial markets and economic growth. This line of research is motivated by the positive correlation between finance and income observed across countries. Less is known, however, about the nature of external financing over the life cycle of firms and whether these patterns vary for countries of different levels of development. To fill this gap, Boar, Kochen, and Midrigan (2021) use firm-level microdata, for a large sample of private firms in 11 high-income (HI) and 7 middle-income (MI) European countries, to present a comprehensive picture of how firms finance their operations at different points of their lifetimes.<sup>1</sup>

## Four Facts About Finance Over the Life Cycle of Firms

The figure below summarizes their findings. The authors regress different financial variables ( $y$ -axis) against 12 age categories ( $x$ -axis), controlling for sector, cohort, and time fixed effects. Additional interaction terms capture the difference between firms located in HI and MI countries.<sup>2</sup>



Source: Orbis, ECB Statistical Data Warehouse, and authors' calculations.

Note: HI and MI denote the results for high-income and middle-income countries, respectively. For presentation purposes, the numbers are scaled using the mean of the omitted group. Thus, the numbers should be interpreted as the average of each age-region group. The solid lines were computed using locally weighted smoothing over the point estimates. Leverage is measured as net

financial debt over capital. The spread is the average interest rate paid relative to the country risk-free rate, measured by the annual interest rate of country-specific, 10-year government bonds. Equity financing is measured using issued share capital. The frequency denotes the share of firms using equity financing each year. The size of equity is measured as the equity injection amount relative to the firm's capital.

The life cycle dynamics presented in this figure can be summarized as follows:

1. Young firms have higher leverage.
2. Young firms pay higher interest rate spreads on their debt.
3. Young firms are more likely to use external equity.
4. The size of equity financing, relative to firms' capital, is larger for younger firms.

All these results are consistent with the notion that younger firms rely more heavily on external financing. These patterns, however, are different for firms in HI and MI countries. Firms in HI countries tend to use more debt financing, while firms in MI countries use more external equity. For example, in HI countries, age 0 firms have a level of leverage of around 45%. This number declines to roughly 30% for the firms that are 21 years old or above. In contrast, firms in MI countries have lower leverage at all ages, and the life cycle slope is flatter. Another way to see this finding is that, on average, the youngest firms in the MI countries have leverage close to the level observed for the oldest firms in the HI countries.

Concerning the cost of debt financing, the negative correlation between interest rate spreads and age is in line with the notion that, compared with old firms, younger firms are riskier and more opaque. At all ages, firms in MI countries pay higher spreads. These results suggest that the lower leverage observed for MI firms could be explained by the higher cost of debt financing in those countries.

In both regions, younger firms are more likely to use external equity. Further, conditional on an equity injection, they invest larger amounts relative to their capital. For example, more than 15% of age 0 firms use external equity, while this number is around 10% for 20-year-old firms. At all ages, firms in MI countries are more likely to use external equity. Young firms in MI countries also use external equity in larger amounts, with age 0 firms having equity injections of close to 30% of their capital. After age 10, the difference in the size of equity financing between the two regions is not statistically significant. These results suggest that external equity is a relevant channel through which young firms access external financing. Particularly for young firms located in MI countries.

### Discussion

Additional questions arise from these empirical findings. What explains the differences in firms' use of external financing in HI and MI countries? Is this explained by the supply of credit, i.e., by the characteristics of the financial sector? Or is this explained by the demand, i.e., by the firms' characteristics? Answering these questions is important from a policy perspective. If these differences are mostly driven by the availability and the cost of debt financing, credit-enhancing

policies could play an important role. In contrast, if firms in MI countries optimally decide to use more equity financing, because of the nature of their business e.g., this type of policies will have a limited impact. Towards answering these questions, in ongoing work, Kochen (2021) develops and quantifies a model of firm dynamics to rationalize the observed differences in financing between these countries and to study their macroeconomic implications. The model features default risk and learning over the life cycle. These two elements aim to capture the fact that young firms require more external financing while simultaneously being the ones facing the largest uncertainty.

### References

- Boar, Corina; Kochen, Federico and Midrigan, Virgiliu. “Four Facts About Finance Over the Life Cycle of Firms.” Unpublished manuscript, New York University, 2021.
- Kochen, Federico. “Finance Over the Life Cycle.” Unpublished manuscript, New York University, 2021.

### Endnotes

<sup>1</sup> The 11 high-income countries included in the analysis are Austria, Belgium, Germany, Denmark, Norway, Spain, Finland, France, United Kingdom, Italy, and Sweden. The 7 middle-income (MI) countries are Czechia, Croatia, Hungary, Poland, Romania, Slovenia, and Slovakia.

<sup>2</sup> The regression used in the analysis is

$$y_{it} = \sum_{a \in A} (\gamma_a + \gamma_a MI_i) D_{it}^a + \alpha_n + \alpha_c + \alpha_t + \varepsilon_{it},$$

where  $y_{it}$  is the financial variable of interest,  $D_{it}^a$  equals 1 if firm  $i$  belongs to the age group  $a$  at period  $t$ . The variable  $MI_i$  is equal to one if firm  $i$  is in one of the MI countries and zero if it is in a HI country. The variable  $n$  denotes 4-digit industry fixed effects, using NACE Rev. 2 classifications. The variables  $c$  and  $t$  correspond to cohort and time fixed effects, respectively. The Deaton-Hall normalization on the time dummies is used to address the well-known collinearity problem of simultaneously controlling for age, cohort, and year effects.