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Aggregate external financing and savings waves

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ABSTRACT

US data display aggregate external financing and savings waves. Firms can allocate costly external finance to productive capital, or to liquid assets with low physical returns. If firms raise costly external finance and accumulate liquidity, either the cost of external finance is relatively low or the total return to liquidity accumulation, including its shadow value as future internal funds, is particularly high. We formalize this intuition by estimating a dynamic model of firms' financing and savings decisions, and use our model along with firm level data to construct an empirical estimate of the average cost of external finance from 1980 to 2014.

There is a strong, positive time series correlation between aggregate external financing and savings activity in the US corporate sector. As a result, we observe aggregate external financing and savings waves in US data 1980–2014. Aggregating all but the very largest firms, the correlation between external finance raised and liquidity accumulated is a statistically significant 0.57. This high correlation is not due to some firms raising external finance, and other firms saving. Conditioning on firms that raise external finance, the aggregate correlation increases to 0.80. In addition, the time series of the percentage of firms raising external finance and, more importantly, the time series of the cross-sectional correlation between external finance and savings, are highly correlated with traditional proxies for the cost of external finance such as the default spread, index of lending standards, and sentiment index.

Motivated by these stylized facts, our research proposes and implements a method for using data on firms' sources and uses of funds in the cross-section in order to make inferences about the aggregate level of the cost of external finance at each date. The basic intuition is as follows: firms which raise costly external finance can invest the issuance proceeds in productive capital assets, or in liquid financial assets with a low physical rate of return. If firms raise costly external finance and allocate some of the funds to liquid assets, either the cost of external finance is relatively low at that time or the total return to liquidity accumulation, including its shadow value as future internal funds, is particularly high.

To formalize this intuition, our study constructs and estimates a quantitative, dynamic model economy consisting of a panel of heterogeneous firms in partial equilibrium. Firms have identical risk-neutral objective functions and maximize the present value of their net payouts. They are heterogeneous ex post due to variation in their idiosyncratic productivity realizations. Firms choose external finance, investment, and savings as a function of their size, savings balance, and idiosyncratic productivity shock, and the aggregate level of productivity and of the cost of external finance. Our estimation strategy then uses variation in firms' investment returns and the economy's implied cross-sectional moments in order to

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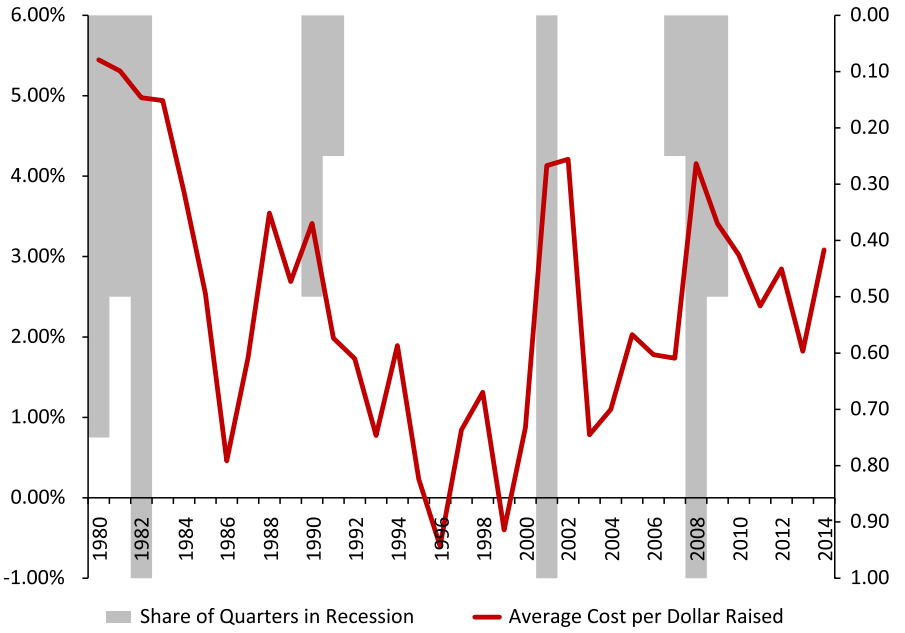

Fig. 1. Estimated average cost of external finance paid per dollar of external finance raised using cross-sectional moments at each date.

quantitatively measure variation in the aggregate cost of external finance. In the model, as in the data, firms typically finance investment with operating cash flows. However, when the cost of external finance is low, firms in our model raise external finance, invest some of the proceeds, and save the remainder in liquid assets. As a result, when the aggregate cost of external finance is low, firms are more likely to both raise external finance and accumulate liquid assets. Consistent with this idea, in the model and in the data, cross-sectional moments describing the incidence of firms raising external finance, and importantly, the co-incidence of firms raising external finance and saving the proceeds, are informative about the aggregate level of the cost of external finance. Our study is aimed at providing an estimate of the aggregate cost of external finance in the US time series from 1980 to 2014 based on this intuition. We do so formally using the quantitative implications of our structurally estimated model.

The key parameters of our model are estimated using Simulated Method of Moments. In the model, variation in the aggregate average cost of external finance raised can be almost fully explained by variation in two key moments describing firms' financing and savings decisions. These two moments are the fraction of firms raising external finance, and the cross-sectional correlation between aggregate net external finance raised and liquidity accumulation, which we call "excess external finance". Accordingly, our study provides a continuous series for this average cost using a regression based cost-of-external finance index. Specifically, index weights are computed by running a time series regression using model data of the cost of external finance at each date on the cross-sectional moments describing firms' external financing and savings decisions on that date. The model implied weights, along with the empirical moments from Compustat data, are then used to construct an estimate of the empirical cost of external finance in US data. Fig. 1 graphs the resulting series, which exhibits substantial and intuitively appealing variation over our sample. Our estimate of the average cost of external finance is 2.3% per dollar raised, which is close to existing empirical estimates. Moreover, it has an economically reasonable standard deviation of 1.6% and an autocorrelation of 0.63, which is close to that of the Baa-Aaa default spread.

In addition to these main results, our paper discusses the model's additional implications and presents robustness checks. In particular, a formal statistical test of our model featuring both aggregate productivity and aggregate cost of external finance shocks against a nested alternative model with a constant cost of external finance is provided. The model with constant costs can be rejected statistically and also performs poorly on key empirical moments. In fact, the constant cost model at estimated parameters does not generate aggregate external financing and savings waves. The key distinction between our model and earlier business cycle models with costly external finance, such as Bernanke and Gertler (1989), Kiyotaki and Moore (1997), Carlstrom and Fuerst (1997), and Gomes et al. (2003), is the addition of shocks to the cost of external finance. These shocks break the otherwise tight relationship between TFP and the demand for external finance, and thereby allow for aggregate issuance and savings waves as well as a significantly better overall statistical fit.

1. Related literature

This paper contributes to the growing literature at the intersection of finance and macroeconomics which studies the interaction between firm financing, savings, and investment decisions, and the macroeconomy. Two recent prominent