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Macroeconomic implications of financial policy

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ABSTRACT

This paper studies the effects of financial policy in a model with heterogeneous agents, incomplete markets and portfolio restrictions. For an economy calibrated to replicate key aspects of the U.S. wealth distribution, we find that the quantitative effects of financial policy are relatively small. The reason is that the households determining aggregate behavior are relatively well insured and can therefore offset the actions of the firm by modifying their portfolio allocations. However, financial policy has important effects on asset prices. Whereas a higher level of debt in the capital structure of the firm introduces more risk into the economy by increasing the volatility of the equity return, it enhances the liquidity of households by increasing the supply of bonds. In an economy with a substantial amount of heterogeneity, this last effect dominates and leverage leads to a decrease in the equity premium. This is in contrast to the findings in representative agent models, in which leverage unambiguously increases the premium through a higher equity return volatility.

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1. Introduction

The Modigliani–Miller theorem (1958, 1963) on the irrelevance of the firm's financial policy has been shown to hold in a wide range of environments. In particular, Stiglitz (1969, 1974) extended the partial equilibrium argument developed by the previous authors to a multi-period general equilibrium setup with uncertainty, showing that financial policy is irrelevant for the equilibrium allocations and the value of firms. Moreover, DeMarzo (1988) and Gottardi (1995) showed that this result holds in a more general setting with incomplete financial markets. The previous studies, however, have maintained the convenient assumption of the absence of binding borrowing limits. Given this, they have abstracted from the possibility that financial policy has real effects due to the fact that agents are borrowing constrained.

The aim of this paper is to contribute towards filling this gap by providing a quantitative evaluation of the effects of the firm's financial policy in an environment with incomplete markets, substantial wealth heterogeneity and constraints on borrowing that are effectively binding in equilibrium. This is motivated by two main considerations. First, the friction we study is empirically relevant. The literature documents that there is a fairly high share of borrowing constrained households that ranges between 20% and 30% depending on the assets considered and the type of surveys (see e.g. Jappelli, 1990 or Budria et al., 2002). It is thus important to understand to what extent this interacts with the composition of the capital structure of the firms. For example, by determining the supply of assets though its financial policy, the firm could directly affect the share of households who are at the borrowing constraint.

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Second, the presence of binding borrowing limits breaks the traditional Modigliani–Miller result, which relies on the possibility that households can undo the financial policy of the firm by changing their portfolio allocations. Clearly, in an environment with borrowing constraints, households for whom the trading limits are binding will be restrained in their ability to change their portfolio following a change in financial policy. Given this, the effects of financial policy on the portfolio composition of households could have a fairly large effect on the allocations and macroeconomic aggregates. In addition, financial policy can also affect asset prices. For example, by issuing debt, firms could potentially enhance the liquidity of households by allowing them to accumulate bonds. In turn, this increase in liquidity could potentially offer better self-insurance for borrowing constrained households and decrease the market price of risk.

To investigate these conjectures, we analyze a model with incomplete markets and heterogeneous agents which closely matches the earning process and the distribution of asset holdings in the United States. Households face both idiosyncratic uncertainty and aggregate risk. Idiosyncratic uncertainty arises from a stochastic earnings process that matches the Gini coefficient of earning in the U.S., while aggregate risks arise from productivity shocks and unemployment fluctuations. Markets are assumed to be incomplete, since households can only partially self-insure against these risks by trading in risk free bonds and risky stocks, against which they cannot borrow. This type of incomplete markets economy was originally developed and analyzed by Krusell and Smith (1997) and it has become a standard workhorse for quantitatively analysis (see also Pijoan-Mas, 2007 and Cocco et al., 2005). However, the focus has been on the households' portfolio allocations and financial policy has been ignored. In the present paper, we model firms as dynamic entities by adopting the value maximization firm objective studied by Duffie and Shaffer (1986), DeMarzo (1988) and Carceles-Poveda and Coen-Pirani (2009). Further, we embed the financial policy of firms by assuming that they can raise external finance using two types of contracts: a risk free bond and risky equity. Even though the capital structure is determined exogenously by the leverage ratio, our approach constitutes a first step towards the study of the real effects of financial policy in models with heterogeneous shareholders.

Using the framework described above, the effects of financial policy are quantified by comparing environments with different levels of leverage. We first study the properties of a benchmark economy with a leverage ratio that is close to the one observed in the U.S. (see Rajan and Zingales, 1995). The benchmark model closely matches both the Gini of earnings and the share of households that are borrowing constrained in stocks, while it generates a high Gini coefficient for the risky asset holdings, as in the data. We then evaluate to what extent a change in firm financial policy modifies the macroeconomic properties and asset prices alongside with the wealth distribution and the portfolio allocations. Our main results can be summarized as follows.

First, we find that financial policy has important effects on asset prices. In particular, an increase in leverage has two opposite effects on the equity premium, which can be written as the product of the equity return standard deviation and the sharpe ratio. On the one hand, leverage makes equity riskier by increasing the spread between the payoffs in good and bad times and this tends to increase the premium. On the other hand, the sharpe ratio decreases with leverage in the presence of household heterogeneity and this tends to decrease the equity premium. Overall, the latter effect dominates when we move from an economy with no leverage to a leveraged economy, in which case we find that a higher level of leverage leads to a decrease in the premium. Further, the two effects seem to almost cancel with higher levels of leverage, in which case the premium is relatively constant. Interestingly, our findings are in contrast to the ones in representative agent economies such as the one studied by Jermann (1998). In this case, the latter effects on the sharpe ratio are not present, and the premium increases considerably with a higher level of leverage due to a higher volatility of stock returns. In sum, financial policy has important effects on asset prices in the presence of household heterogeneity through its effects on the degree of risk sharing.

Several important effects explain the decline in the sharpe ratio and the premium in the presence of household heterogeneity and borrowing constraints. On one hand, the introduction of leverage provides an additional way of smoothing consumption by allowing households to accumulate more risk free bonds.[1] Since households can reduce their exposure to risk thanks to the bonds issued by firms in a leveraged economy, they will then demand a lower compensation for holding risky assets. Moreover, the fact that a higher level of leverage has a similar effect to the one of loosening the borrowing constraints on debt implies that the risk free rate will increase with leverage. This has important consequences on the portfolio allocations and the wealth distribution. In particular, the agents that price in an economy with no leverage are mostly the ones with the highest labor market risk. However, following an increase in leverage, some of the households facing low risks will incorporate bonds to their portfolio and become pricing agents. This implies that the pool of pricing agents will incorporate people with relatively low consumption fluctuations and will loose people with relatively high consumption fluctuations following an increase in leverage.

Second, in spite of the effects of leverage on asset prices and the wealth distribution, we find that the Modigliani Miller irrelevance result approximately holds in this environment. In other words, the effects of firm leverage on the real allocations and the value of the firm are negligible, in spite of the fact that borrowing constraints are binding for a high share of the population. The key insight for this result is related to the approximate aggregation result found by Krusell and Smith (1997, 1998) in a similar model with no leverage. In this class of incomplete market models, the effective insurance achieved with only one asset is almost perfect in utility terms. Further, the marginal propensity to save of the well-insured

[1] To a certain extent, this result is similar to the effects of a higher government debt that is described in Aiyagari and McGrattan (1998), with the difference that these authors focus on long term stationary equilibria and therefore ignore the effects of more debt on asset price fluctuations.