Dissertation Evaluation: "Essays in Macroeconomics with Heterogeneous Agents and Portfolio Choice" by Ivo Bakota

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This is an external evaluation report for the dissertation "Essays in Macroeconomics with Heterogeneous Agents and Portfolio Choice" by Ivo Bakota for awarding a PhD degree at CERGE-EI. The report gives a brief summary and comments for each chapter and concludes with an overall evaluation of the thesis. The conclusion also lists the comments in each chapter that are thought to be of greater importance and need to be addressed to some extent.

1 Firm leverage and wealth inequality

Ivo's first paper "*Firm leverage and wealth inequality*" analyzes the implications of a change in firms' capital structure (the leverage ratio) on household wealth inequality. Both variables have experienced substantial time-series variations over the last decades and the paper asks whether there is a link between them. To study the question, the author builds an overlapping generations economy where households make consumption and portfolio choice decisions and adds aggregate risk. Firms acquire funds from households either in the form of debt (safe bonds) that pay households back with certainty or in terms of claims to firms' profits (risky equity). The split of capital between debt and equity is exogenous in the model and captured by parameter λ.

The main experiment increases λ and analyzes what happens in terms of wealth inequality. The paper finds that an increase in firm leverage leads to an decrease in wealth inequality. Therefore the paper's findings do not support the hypothesis that wealth inequality rose to some extent due to an increase in leverage. If anything, the increase in wealth inequality could have been even larger had leverage not have increased between 1950-1990 (although the decrease in leverage after 1990 might indeed explain the increase in wealth inequality after that

period). The mechanism as I understand it is as follows: A higher leverage implies lower taxes for the firm since debt is tax deductible. This leads to a higher return on savings and higher capital. As a consequence, households increase their savings and at the same time receive a higher wage. Both of these effects decrease wealth inequality. The author highlights the role of taxes by showing a case where there is no tax deduction (and hence, the Mogdilliani-Miller theorem holds). Indeed in this case the wealth Gini changes insignificantly.

Comments:

1. The model's computation seems state of the art. On the one hand, the model includes households with idiosyncratic shocks and portfolio choice. This is hard to solve to begin with. But the model adds general equilibrium and aggregate risk which increases substantially the complexity of the solution. I am not sure which type of models in the literature have such complexity. It would be useful if the author places the contribution of the paper also in terms of model elements. For example, which class of papers include idiosyncratic heterogeneity and which add aggregate risk? And how about portfolio choice? A useful reference to consider is Bayer, Luetticke, Pham-Dao, and Tjaden (Ecta, 2020) that consider multiple assets with idiosyncratic and aggregate risk.

2. According to the numerical appendix, the author uses the endogenous grid point method to solve the model. A question is how does the author apply the method given that there is a fixed cost of participation? Doesn't this induce some form of non-linearity that makes the method had to implement? I would be very interested to understand how the author solves the model. In any case the solution of the model is definitely impressive.

3. Is it correct to claim that $\lambda = 1$ approximates the Aiyagari economy (with overlapping generations)? In this economy aggregate risk should not matter for the household because the firm only uses debt as a means to finance its investment. That could also be a useful comparison model.

4. To my understanding, λ is the fraction of capital demand that takes the form of safe assets. As a consequence, a higher λ would increase the demand for household savings that take the form of savings in bonds. In this case, shouldn't the return for bonds increase to incentivize households to save more in safe assets? According to Table 5 the opposite happens. For example, in a simple Aiyagari setup if the firm demands more capital (perhaps due to a rise in aggregate productivity) then the real interest rate should increase. It would be useful for the author to provide more details in terms of the demand and supply of capital in bond and equity markets. Who is on each side and how do the curves change once λ increases? That would make readers come quickly to the main mechanism.

5. A minor comment: There is a change in notation in the text from r_b to R_b. Is this a typo or they have a different meaning?

6. An interesting outcome from the model is that the equity volatility is larger when leverage is higher. Therefore it seems that high leverage decreases cross-sectional wealth inequality but increases individual income volatility (especially for those with high share of stocks in their portfolio). I did not see a corresponding discussion in the welfare analysis so perhaps the author can mention or measure this effect.

2 Capital taxation with portfolio choice

Ivo's second paper "*Capital taxation with portfolio choice*" analyzes the implications of taxing differently safe assets and risky assets. The main motivation for this exercise is that wealthier households hold a larger fraction of risky assets in their portfolio. Therefore, taxing differentially these assets has direct implications on the distribution of income. The setup is similar with the first paper in the dissertation namely households with idiosyncratic shocks and portfolio choice. On top of that the author adds a government that raises the same amount of revenue every period and decides how to finance the budget through tax on risky versus tax on safe assets. The paper finds that taxing risky assets more is beneficial because it generates a more equal distribution of income and also reducing the after-tax variability or returns.

Comments:

1. The simple example is really nice but it would be helpful if there was a stronger connection with the results in the full model. What elements in the full model make the differential taxation of assets optimal? Is it just heterogeneity in labor income? It would be useful to be clearly spelled out what elements in the full model will break the uniform commodity result outlined in the simple example.

2. Related to the above, the paper highlights two mechanisms that influence the optimal tax on safe and risky assets. First, the redistribution channel: poor household have a larger fraction of safe assets in their portfolios so they benefit from lower tax on bonds. Second, the elasticity channel: households respond differently with respect to investing in bonds and stocks so taxing their returns has a different amount of distortion. It seems that the paper gives a lot of weight on the first channel but gives less attention to the second channel. I would be interested to understand what the model predicts on the sensitivity of investing in bonds versus stocks.

   In particular, I am wondering if the sensitivity depends on the $\beta(1+r^s)$ versus $\beta(1+r^b)$. To my understanding, the zero capital taxation in the Ramsey literature comes from the fact that $\beta(1+r)=1$ in the steady state (because the supply of savings is perfectly elastic). In an OLG framework this need not be the case of course. So the natural question is what are the sensitivities when we have two assets? Is investing in bonds a

more elastic decision or investing in stocks and why? In sum, it would be great if the author could put more emphasis on the elasticity channel.

3. According to the paper: "The reasoning behind the fact that a wealthy household invests a larger share of their wealth in a risky asset is illustrated in the following way: wealthy agents do so because they have big capital stock to act as a buffer against the idiosyncratic risk of their future labor income, which allows them to bear more risk in the financial markets." I am not sure if this is exactly the intuition in the literature. Typical models predict that households with higher wealth should invest less in risky assets. This is because their capital income consists a larger portion of their total income so they are particularly cautious about it (e.g., they invest in relatively safe assets). The paper indeed breaks this result by using non-homothetic preferences.

4. I could not find how the risky share and participation in stock market changes if we tax less the safe asset. Does participation decreases substantially because of a larger tax on equity?

3 Avoiding root-finding in the Krusell-Smith algorithm simulation

Ivo's third paper "*Avoiding root-finding in the Krusell-Smith algorithm simulation*" proposes a new method to solve economies with aggregate risk more efficiently. These class of models are difficult to solve because we need to keep track of the distribution of workers over states. The paper follows the Krusell-Smith algorithm by approximating the capital evolution based on first moments but introduces a modification that saves computational time. In particular, the algorithm skips the step of finding the true equilibrium prices and uses the excess demand as updating information. The author finds that this solution method decreases computational time by around 25% (Table 3). This is a very nice paper on computational procedures for economies with aggregate risk. I only have a couple of comments.

Comments:

1. In models of portfolio choice endogenous grip point can be implemented over both investment decisions for bonds and stocks and skip the root-finding step. The paper claims it uses root-finding over one dimension. This does not have to be the case necessarily and computing time can be further reduced.

2. It would be useful for the paper to show the time difference in the original one bond economy. In that model there is no P^e updating. So the question is: is the proposed algorithm useful for portfolio choice models or it also saves a lot of time in the original one bond Krusell-Smith economy?

4 Overall Evaluation

Ivo's dissertation is a great addition to the literature on heterogeneous agents with portfolio choice and aggregate risk. The topics are original and well executed. In my view, the thesis meets the necessary requirements for awarding a PhD degree. I view comments 2 and 4 about the first chapter, comment 2 about the second chapter, and comment 2 about the third chapter, as comments that need to be addressed to some extent. Given the necessary revisions I would recommend without hesitation the dissertation to advance to the defense stage.

Please let me know if you have any questions about my recommendation.

Best,

Marios Karabarbounis