

# Opponent's Report on Dissertation Thesis

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| Author:              | <b>Aleš Maršál</b>   |
| Advisor:             | Prof. Roman Horváth Ph.D.  |
| Title of the Thesis: | Asset prices and macroeconomics: towards a unified macro-finance framework |
| Type of Defense:     | <b>DEFENSE</b>   |
| Date of Pre-Defense  | March 4, 2020  |
| Opponent:            | Luboš Pástor Ph.D.   |

Address the following questions in your report, please:

- a) Can you recognize an original contribution of the author?
- b) Is the thesis based on relevant references?
- c) Is the thesis defensible at your home institution or another respected institution where you gave lectures?
- d) Do the results of the thesis allow their publication in a respected economic journal?
- e) Are there any additional major comments on what should be improved?
- f) What is your overall assessment of the thesis? (a) I recommend the thesis for defense without substantial changes, (b) the thesis can be defended after revision indicated in my comments, (c) not-defensible in this form.

*(Note: The report should be at least 2 pages long.)*

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I FIND MR. MARSAL'S DISSERTATION ACCEPTABLE IN ITS CURRENT FORM.

ENCLOSED IS MY REPORT ON ITS EARLIER VERSION. I HAVE NOTHING TO ADD AT THIS POINT.

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|-------------------------|---|
| Date:                   | April 13, 2020                              |
| Opponent's Signature:   |   |
| Opponent's Affiliation: | Luboš Pástor Ph.D.<br>University of Chicago |

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Lubos Pastor  
*Charles P. McQuaid Professor  
of Finance*

January 31, 2020

To: Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague

Re: **Aleš Maršál's dissertation thesis**

Thank you for the opportunity to comment on Aleš Maršál's dissertation thesis, titled "Asset prices and macroeconomics: towards a unified macro-finance framework."

Given my extensive time commitment to our own Ph.D. students at the University of Chicago, I am generally reluctant to comment on the work of students from other institutions. However, when Mr. Maršál asked me whether I'd be interested in reviewing his dissertation thesis, I gladly agreed because I had interacted with him on multiple occasions given his researcher position at the National Bank of Slovakia (NBS), where I also work. I have also had the opportunity to discuss his dissertation with him at the NBS. Despite this prior interaction with him, I do not know Mr. Maršál well personally, and our relationship is purely professional.

Mr. Maršál dissertation consists of three papers. Their common denominator is the use of state-of-the-art dynamic stochastic general equilibrium (DSGE) macroeconomic models to address important topics at the intersection of finance and macroeconomics. The two main topics are the valuation of government-issued fixed income securities, which is addressed in Mr. Maršál's first and second papers, and the government's fiscal policy, which is addressed in his second and third papers.

Let me start from the back. Mr. Maršál's third paper, "**Determinants of Fiscal Multipliers Revisited**," is already forthcoming in the *Journal of Macroeconomics*. This indicates that the paper has undergone a careful peer review. For that reason, I do not think that my assessment of this paper would add much value to this report. Suffice it to say that having a dissertation chapter published in a highly regarded international journal is a major achievement for any Ph.D. student. Mr. Maršál is to be congratulated on this accomplishment.

Mr. Maršál's first two papers both extend the DSGE model of Rudebusch and Swanson (2012; henceforth RS) in different ways. The RS model is a New Keynesian model that uses recursive (Epstein-Zin) preferences and Calvo pricing. This model has become popular because unlike other macro models, it is able to match not only many macroeconomic quantities but also the basic properties of bond prices. Specifically, by introducing recursive preferences into a canonical DSGE model, RS show that their model can produce a positive and variable term premium while also matching key macro variables.

Mr. Maršál's first paper, "**Trend Inflation Meets Macro-Finance: the Puzzling Behavior of Price Dispersion,**" extends the RS model by introducing low-frequency movements in inflation, or "trend inflation." The paper's main finding is that the addition of positive trend inflation—a very realistic feature—significantly hurts the model's ability to match the empirically observed dynamics of macroeconomic quantities and bond prices. On the macroeconomic side, the volatilities of quantities such as consumption and inflation rise to unrealistically high levels. On the finance side, the yield curve becomes too steep and too volatile.

My understanding of the mechanism on the macro side is as follows. Calvo pricing implies that some firms are unable to adjust their product prices in response to trend inflation. These firms face growing demand for their products (which are too cheap). Vice versa, firms that are able to reset their prices adjust them too much because they anticipate that they might not be able to respond to inflation in the future. As a result, the model produces a fair amount of price dispersion across firms. In addition, price-unadjusting firms produce too much while price-adjusting firms produce too little. This inefficiency is costly due to decreasing returns to scale, which drive up the former firms' marginal costs. The adverse outcomes of this inefficiency include aggregate output losses and higher macroeconomic volatility.

On the finance side, I believe the paper argues that the inclusion of trend inflation hurts the model because the yield curve becomes too steep and too volatile. To appreciate this effect on the yield curve, first note that in the original RS model, the covariance between inflation and consumption growth is negative, indicating that long-term bonds are poor hedges against drops in consumption (i.e., bond returns are low when consumption drops). Long-term bonds are therefore risky, and their high risk premium contributes to the upward-sloping yield curve in the RS model. In Mr. Maršál model extension, this effect is magnified because both inflation and consumption growth are more volatile, resulting in an even more negative covariance between these two quantities. (Holding the correlation between  $x$  and  $y$  constant, higher variances of  $x$  and  $y$  push up the covariance between  $x$  and  $y$ .) The model's failure on the finance side thus results from its failure on the macro side, I believe.

I find the model's failures quite interesting. At the same time, I would like to better understand their sources. Specifically, I do not fully understand why the inefficiency highlighted in the paper leads to such a large increase in macroeconomic volatility. I can see how price

dispersion across firms generates inefficiencies, but I'd expect this effect on macroeconomic volatility to be modest quantitatively. Intuitively, it seems to me that the inability of some firms to raise prices by, say, 2% for a year or two should lead to only modest price dispersion across firms, which in turn should lead to only modest inefficiencies, and I don't quite see why there should be any significant increase in macroeconomic volatility. There must be something in the model leveraging the effect, but I'm not sure what it is, and whatever it is, I'm not sure I'd find the mechanism convincing in a quantitative sense.

This comment is not intended to subtract from the paper; instead, I simply hope Mr. Maršál will view it as constructive feedback. My recommendation for him is to think a bit harder about the magnitudes. Perhaps it is possible to expand the explanation of the economic channel(s) through which the addition of trend inflation to the model generates such a large increase in macroeconomic volatility. Alternatively, perhaps the numerical inaccuracies emphasized in the paper also play a substantial role. Overall, I find this paper impressive, and I think it clearly demonstrates Mr. Maršál's ability to conduct high-quality research at the intersection of macro and finance.

Mr. Maršál's second paper, "**Government Spending and the Term Structure of Interest Rates in a DSGE Model**," extends the RS model in two ways: (i) by adding different types of government expenditures, ranging from productive to wasteful, and (ii) by adding uncertainty about government expenditures.

As for (i), while only wasteful government expenditures are included in the original RS model, this paper includes also three additional types of expenditures that are either productive or utility-enhancing in three different ways. The paper shows that the four types of expenditures have different effects on bond prices. For example, wasteful government expenditures reduce bond prices because they lead to inflation, which undermines the bonds' real value. In contrast, productive government expenditures of all three types have more favorable effects on bond prices because they generate less inflation risk. In addition, fiscal policy interacts with monetary in an interesting way. It is my understanding that productive government spending increases consumption and at the same time reduces inflation because in response to this spending, the central bank raises interest rates. In other words, in response to the expansion of fiscal policy, the central bank tightens its monetary policy, resulting in lower inflation. This interesting channel affects bond prices through the covariance between inflation and consumption growth.

As for (ii), the paper models each of the four types of government expenditures as an exogenous autoregressive process whose volatility captures the uncertainty about this particular type of government expenditures. Increases in this uncertainty have multiple effects on bond prices. On the one hand, a higher uncertainty about government expenditures makes bonds less valuable because these expenditures increase inflation risk in the economy, which hurts bond prices. On the other hand, a higher uncertainty about expenditures makes bonds more

valuable because they are a good hedge against this uncertainty. Investors want to hedge against higher expenditures, especially wasteful expenditures, and there does not seem to be a better way to do so in the model than to buy bonds. Investors presumably do not need to hedge as much against productive expenditures because they derive benefits from such expenditures. The relative magnitudes of these effects depend on the type of expenditures as well as on the parameter values.

The paper is significantly richer than my much-abbreviated summary. It provides a comprehensive and insightful analysis of how the term structure of interest rates depends on both the level and volatility of government spending. Like his first paper, this second paper clearly illustrates Mr. Maršál's strong analytical skills at both macroeconomic modeling and asset pricing.

Overall, I believe Mr. Maršál's papers make original contributions to the literature. Like his third paper, I expect the first two papers to be published in respected international academic journals. To facilitate the publication process, I think both papers could benefit from a slightly sharper focus, but that is a minor quibble. I am impressed by this thesis and I recommend it for defense without substantial changes.

Sincerely,

Lubos Pastor