



# Heterogeneous expectations and the distribution of wealth



Jan Acedański

University of Economics in Katowice, 1-go Maja St. 50, 40-287 Katowice, Poland

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## ABSTRACT

This study examines the extent to which heterogeneity of expectations affects wealth distribution, through the use of a standard heterogeneous agent model with uninsured idiosyncratic risk and aggregate uncertainty. A simple stylized model of heterogeneous expectations is considered to demonstrate that the impact of expectations' heterogeneity on wealth inequality depends nonlinearly on the level and persistence of expectations' dispersion. It is also shown that the heterogeneity of expectations generated by the empirically validated learning-from-experience model (Malmendier, Nagel, Q J Econ 2016) has a moderate but ambiguous impact on the distribution of wealth. The effect is sensitive to the calibration of the macroeconomic and learning parts of the model.

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## 1. Introduction

It is generally accepted that expectations play an important role in explaining many economic phenomena. A growing body of literature also emphasizes that agents' expectations are heterogeneous (see [Pesaran and Weale, 2006](#); [Hommes, 2011](#)). However, while most research has focused on the empirical validation or rationalization of the expectations' heterogeneity, less attention has been given to an examination of its consequences. This study intends to fill this gap by studying the role of heterogeneous expectations in shaping the distribution of wealth in the incomplete markets model with uninsured idiosyncratic risk and aggregate uncertainty of [Krusell and Smith \(1998\)](#).

The key problem in examining implications of the expectations' heterogeneity is the lack of a single, commonly accepted theoretical setup. Instead, several different models are considered in the literature, as discussed by [Pfajfar \(2013\)](#), with possibly contradictory properties regarding the level and persistence of expectations' dispersion. The models cannot be thoroughly verified because of a scarcity of empirical evidence.

In order to overcome this difficulty, a general model of heterogeneous expectations is developed, which serves as an approximation of the various specifications considered in the literature. In this model, the level and persistence of the expectations' dispersion are specified exogenously. This tool is used to investigate theoretically how the interplay of these two characteristics affects wealth inequality.

Subsequently, the learning-from-experience model of heterogeneous expectations ([Malmendier and Nagel, 2016](#)) is analyzed to examine which channels are relevant in the empirically grounded model. The model was developed to match the

E-mail address: [jan.acedanski@ue.katowice.pl](mailto:jan.acedanski@ue.katowice.pl)

observed heterogeneity in inflation expectations between agents of different age groups. Basically, this is a standard adaptive learning model with a heterogeneous and time-varying gain parameter. Its implications for wealth inequality and the underlying properties of the induced dispersion of expectations are studied.

This study is related to three areas of the literature. First, it builds on the literature that documents the heterogeneity of expectations. Several studies explore survey data and find evidence on the heterogeneity of expectations related to the stock market outlook (Vissing-Jorgensen, 2003), exchange rates (MacDonald and Marsh, 1996; Elliott and Ito, 1999; Dreger and Stadtmann, 2008), inflation (Mankiw et al., 2003; Capistran and Timmermann, 2009; Doornik et al., 2012; Pfajfar and Santoro, 2013), and other macroeconomic variables (Dreger and Stadtmann, 2008). Bryan and Ventkau (2001) and Gnan et al. (2011) also report significant variations in inflation expectations between different socio-economic groups. Pesaran and Weale (2006) and Hommes (2011) present a more detailed review of the survey-based evidence. Kurz (1994), Brock and Hommes (1998) and Branch (2004) have made theoretical contributions that suggest rational agents may hold heterogeneous expectations. Heterogeneity of expectations is usually rationalized by differences in forecasting models, information sets, and the capacity for information processing. Pfajfar (2013) presents a detailed review of the more recent contributions to this field.

The study contributes to the literature on the role of information in macro models with incomplete markets. Porapakkarm and Young (2008) consider a model where partially-informed agents must rely on the Kalman filter to extract estimates of the state of the economy based on observed prices. They find that an economy with partially-informed agents is characterized by considerably lower wealth concentration compared to an economy with fully-informed agents. The same model is studied by Graham and Wright (2010) who investigate properties of equilibrium. Cogley et al. (2014) study wealth dynamics in a model with partially- and fully-informed agents; they also show that under incomplete markets the learning agents accumulate wealth, while the fully-informed agents are driven to their debt limit.

This study is closely related to the work of Giusto (2014) who utilizes the Krusell-Smith model with an adaptive learning scheme to investigate the impact of boundedly-rational but homogeneous expectations on wealth distribution. His work demonstrates that once the perceived level of aggregate capital exceeds the equilibrium level, wealth inequality rises due to opposite effects on optimal consumption levels of capital-rich and capital-poor agents.

Finally, this study also adds to the literature on the sources of heterogeneity in wealth that was initiated in the influential studies of Aiyagari (1994) and Huggett (1993). Accounting only for heterogeneous employment histories, these early models do not generate a realistic distribution of wealth and income. A number of solutions have been proposed for this problem. Krusell and Smith (1998) propose a version that utilizes a heterogeneous, time-varying time preference. In this setup, more patient agents accumulate more wealth. However, the volatility of the discount coefficient prevents them from gathering all the wealth in the economy. The heterogeneity of the time preference is also examined by Hendricks (2007). Castaneda et al. (2003) and Chang and Kim (2006) utilize heterogeneous and time-varying labor productivity. Their models are calibrated to match income inequality and generate empirically reasonable wealth concentration. Quadrini (2000) and Cagetti and Nardi (2006) add entrepreneurs who accumulate a large share of wealth. Conversely, Castaneda et al. (2003) and De Nardi (2004) emphasize the importance of intergenerational transfers within the overlapping generations framework to explain the observed wealth inequality. Luo and Young (2009) and Suen (2014) posit a solution to the problem by accounting for wealth in a utility function, which represents the agents' demand for status. The recent work of del Rio (2015) takes into account heterogeneity in labor disutility and the market skills of agents. Finally, Bielecki et al. (2015) develops a model with rich ex ante heterogeneity of agents. An extensive survey of wealth inequality models is presented by De Nardi (2015).

The results of the study can be summarized as follows. The general model of heterogeneous expectations indicates that if the differences in expectations are persistent, then even a small heterogeneity would result in substantial wealth inequality. The reason for this effect is that heterogeneous expectations imply different saving rates for different agents. The agents who anticipate higher interest rates and lower wages have a tendency to save more, on average, than the agents who expect that the opposite will occur. If the differences in expectations persist, then the rise in wealth inequality can be significant. Conversely, if the agents frequently alter their expectations, then the wealth inequality can decrease. This is because the agents' expectations are almost identical, considering averages across time, and their decision rules are primarily driven by the expectations and to a smaller extent by their current employment status and the aggregate state of the economy. These two effects are amplified by a high dispersion of expectations.

It is also seen that the expectations' heterogeneity generated by the learning-from-experience model considerably affects the distribution of wealth. However, the sign and the magnitude of the impact are sensitive to the calibration of the macroeconomic and learning parts of the model.

The study is organized as follows. Section 2 contains a brief description of the workhorse model of Krusell and Smith. In Section 3, the general model of heterogeneous expectations is considered. Subsequently, the learning-from-experience model is examined. Section 5 concludes the paper.

## 2. The model

This study utilizes the standard Krusell–Smith heterogeneous agent model with uninsured idiosyncratic risk and aggregate uncertainty. Aggregate variables are denoted by capital letters, while individual characteristics are represented by small letters.

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