Towards a quantitative theory of automatic stabilizers: The role of demographics

Alexandre Janiak [a], Paulo Santos Monteiro [b,*]

[a] University of Chile, Chile
[b] University of York, United Kingdom

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ABSTRACT

Employment volatility is larger for young and old workers than for the prime aged. At the same time, in countries with high tax rates, the share of total hours supplied by young/old workers is lower. These two observations imply a negative correlation between government size and business cycle volatility. This paper assesses in a heterogeneous agent OLG model the quantitative importance of these two facts to account for the empirical relation between government size and macroeconomic stability.

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1. Introduction

The motivation for this paper consists of two observations. The first is the substantial evidence that countries or regions with large governments display less volatile business cycles, as shown in Galí (1994) and Fatás and Mihov (2001). The second observation, documented by Clark and Summers (1981), Ríos-Rull (1996) and Gomme et al. (2005), is that fluctuations in hours of market work over the business cycle vary quite dramatically across different demographic groups of the population, with the young experiencing much greater volatility of employment and total hours worked than the prime-aged. Moreover, in a recent paper Jaimovich and Siu (2009) find that changes in the age composition of the work-force account for a significant fraction of the variation in cyclical volatility observed in G7 countries. Hence, this paper poses the following question: can the relationship between government size and macroeconomic stability be explained by changes in the demographic composition of the workforce resulting from distortionary taxation?

The hypothesis we put forward is that large governments stabilize the economy because the share of total market hours supplied by young and old workers is smaller in countries with high tax rates, implying a lower *aggregate* labor supply elasticity. Thus, in the tax-distorted economy we analyze, a relationship emerges between government size (measured by the share of taxes in GDP) and aggregate volatility, consistent with the notion of automatic stabilizers.[1]

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* Corresponding author at: Department of Economics and Related Studies, University of York, Heslington, York, YO10 5DD, UK.
  E-mail addresses: ajaniak@gmail.com (A. Janiak), paulo.santosmonteiro@york.ac.uk (P. Santos Monteiro).

[1] So-called 'built-in stabilizers' are features of the tax structure that make tax liabilities automatically respond to current economic conditions (for instance, distortionary labor and capital income taxes) and reduce aggregate volatility. The stabilizing effect of the income tax is traditionally thought to operate via an assumed sensitivity of consumption demand to changes in current tax liabilities. But this sensitivity is zero according to the Ricardian proposition. Thus, Christiano (1984) concludes that under the Ricardian proposition, the income tax cannot play a role as an automatic stabilizer. Nonetheless, distortionary taxes may affect macroeconomic stability by affecting the aggregate supply and, in particular, the aggregate labor supply elasticity.

The suggestion that time devoted to market work is affected by changes in tax and transfer policies has received considerable attention. Recent work by Prescott (2004), Rogerson (2008) and Ohanian et al. (2008) argues that these changes account for a large share of the difference in the amount of hours spent working in Europe and in the US. Rogerson and Wallenius (2009) document that the differences in employment rates between Europe and the US are due almost exclusively to differences among young and old workers. This observation offers further motivation for our paper.

We examine the strength of automatic stabilizers using a heterogeneous agent OLG model along the lines of Ríos-Rull (1996), and based on the link between the tax system and the aggregate labor supply elasticity.[2] The model includes heterogeneous preferences and, in particular, labor supply elasticities that change over the life-cycle. These changes are calibrated to match differences in the relative cyclical volatility of employment over the life-cycle and differences in employment rates in high and low tax countries.

To be sure, several factors explain why different age groups experience different labor market fluctuations over the business cycle (Choi et al., 2014). These factors are related, for example, to family formation, human capital accumulation, saving behavior, retirement age and unemployment dynamics, among others. We do not model these elements explicitly and, in particular, abstract from involuntary unemployment. Clearly, differences in employment volatility across demographic groups are partially accounted for by differences in unemployment dynamics. But, we interpret the assumed heterogeneity in labor supply elasticities as a reduced form way to capture all these factors.

A related calibration strategy has recently been explored by Dyrda et al. (2012) who, for similar reasons, also generate age differences in the volatility of hours with differences in preferences. They provide a measurement of the aggregate labor supply elasticity that, although consistent with micro estimates, yields a much higher macro elasticity. In our paper we establish a similar result in the context of a large OLG economy. The labor supply elasticity of the prime-aged is small, as implied by the meta-analysis of quasi-experimental studies by Chetty et al. (2012) but, given the heterogeneity in preferences, the aggregate labor supply elasticity of the baseline calibration is equal to 0.84, a value recommended by Chetty et al. (2012) to calibrate stand-in agent RBC models.[3]

An important aspect that differentiates this paper from the literature examining the stabilizing role of the government sector is that we conduct a quantitative study, based on a carefully calibrated model.[4] The baseline calibration accounts for about 75% of the strength of automatic stabilizers. This is the result of changes in the workforce demographic composition that affect the aggregate labor supply elasticity.

The remainder of the paper is organized as follows. Section 2 documents the empirical motivation. Section 3 presents the model. Section 4 establishes three results on the aggregate labor supply elasticity. Section 5 examines the quantitative performance of the model. Finally, Section 6 concludes.

2. Motivating evidence

The hypothesis we put forward is that large governments are stabilizing because they lead the demographic groups with high labor supply volatility to work relatively less. Here we document empirical evidence to motivate this mechanism. We start by showing that in all OECD countries, employment volatility exhibits a u-shaped profile over the life-cycle. The employment share of the young and old is lower in countries with large governments and these difference affect business cycle volatility.

2.1. The employment volatility profile over the life-cycle

We begin by documenting the relationship between age and employment volatility: the employment volatility of young and old workers is larger than that of prime-age workers. Jaimovich and Siu (2009) show that, in the G7, young and old workers experience much greater business cycle volatility of employment and hours worked than the prime-aged. We show that this empirical regularity is found in all OECD countries. To illustrate this fact, we follow the approach of Gomme et al. (2005) and Jaimovich and Siu (2009), who report cyclical employment volatilities for various age groups.

We use annual data on employment by age group from the OECD for an unbalanced panel of 25 countries from 1970 to 2009, and build seven categories: individuals aged between 15 and 19 years old, 20–24, 25–29, 30–39, 40–49, 50–59 and 60–64 years old. For each of these categories, we extract the business cycle component of employment by applying the Hodrick–Prescott (HP) filter to the logged series with smoothing parameter equal to 6.25 and we calculate the standard

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[2] To be sure, our paper is not suitable to study the welfare implications of automatic stabilizers. Optimal taxation must balance distortions versus insurance. But, in our OLG framework, as in Ríos-Rull (1996), markets are sequentially complete. Thus, the insurance gains from automatic stabilizers are negligible. See McKay and Reis (2013) for a detailed study of the insurance role of automatic stabilizers in an incomplete markets DSGE model.

[3] Mennuni (2013) in the context of an OLG model similar to ours, explores the possibility that changes in the composition of labor affect the evolution of aggregate volatility, but focuses on differences across gender and schooling.

[4] Earlier work focuses on the sign of the relationship. Greenwood and Huffman (1991) and Galí (1994) study if income taxes and government purchases behave as automatic stabilizers in the basic RBC model. Both papers obtain a counterfactual relationship between government size and macroeconomic stability. Andrés et al. (2008) extend the analysis in Galí (1994) and study how models of the business cycle featuring nominal rigidities and costs of capital adjustment can generate a negative correlation between government size and volatility.