Demographics and Hours Worked in the U.S.

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Abstract

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1 Introduction

Trend changes in hours worked across OECD countries have shown some remarkable differences. Ohanian, Raffo and Rogerson (2006) document that the neoclassical model enhanced by taxes captures some of these changes. However, significant discrepancies between theory and data remain. For example, in their results model generated hours worked for the U.S. trends down while the data does not display a trend. Among the factors that may help bridge the gap between theory and data are demographics and changes in retirement programs. In this paper we examine the changes in hours worked in the U.S. between 1960 and 2006 using an 85 period overlapping generations model where observed changes in demographics, fiscal policy, and productivity are all accounted for.

The well know fact of the ageing of the U.S. population is evident in Figure 1 which displays changes in the age distribution of 21-64 versus 65+ in the U.S. during 1960-2006.

During the same period, taxes and the benefits associated with the social security system have also changed significantly as displayed in Figure 2.

One might expect all of these changes to impact the hours worked during this time period in addition to the changes in personal income taxes and total factor productivity. As can be seen from Figure 3 average hours per person in the U.S. display several periods of significant surge. There seem to be at least two peaks, the first one in 1969 and the other in 1999.

The purpose of this paper is to assess the quantitative importance of changes in demographics, fiscal policy and total factor productivity in explaining the medium term fluc-
Figure 2: Social Security

Figure 3: Hours per person
tuations in hours worked that is evident in Figure 3. Our setup is a calibrated general equilibrium model populated with overlapping generations of households which incorporates potentially important public institutions like social security that can address the change in the size of the retirement benefits over time, as well as actual time paths of TFP growth rates and government fiscal policy instruments. Individuals in the model face mortality risk and borrowing constraints, and may live a maximum of 90 periods. Private annuity markets and credit markets are closed by assumption. Until the mandatory retirement age, agents in this economy choose how much to work and accumulate assets to provide for old age. After retirement agents receive social security benefits that are financed by a payroll tax. The return on asset holdings and the wage rate are determined by the profit maximizing behavior of a firm with a constant returns to scale technology. We specify the optimization problem of the individual as a finite state, finite horizon dynamic program and use numerical methods to solve the dynamic programs and to characterize equilibria. We calibrate the model to U.S. data for the 1960-2006 period. We conduct deterministic simulations to quantify the effects of changes in the social security system, demographics, and the growth rate of TFP on the average hours worked.

Our results indicate that despite the large demographics changes that took place, medium term fluctuations in hours worked are hardly impacted by them.

A relatively easy way to demonstrate the impact of each variable is to start the economy in 1960 and assume that all the exogenous variables will continue at their 1960 values all the way to the steady state. This generates the flat hours profile in Figure 4 labeled “all 1960 values”. The flat hours profile that we use as a starting point misses all the demographic changes that took place in the U.S. as well as changes in taxes, social security and total factor productivity. Next we introduce the time series path of each exogenous variable to demonstrate their impact on hours worked. Series labeled demographics+tfp+ss in Figure 4 displays the model generated hours per person when time series data for demographics, growth rate of TFP and payroll taxes are incorporated into the model. While some discrepancies between the data and the model remain, the model is capable of capturing the main medium term fluctuation. More detailed counterfactual exercises reveal that the main driving forces in this graph are fluctuations in TFP and payroll taxes.
Figure 4: Data and Model