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Some thought experiments on the changes in labor supply in Turkey ☆

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ABSTRACT

Turkey has the lowest hours worked (the product of total employment and annual hours per worker, divided by the size of the working-age population) among the OECD countries. We study the changes in hours of work following Ohanian, Raffo, and Rogerson (Journal of Monetary Economics, 2008) and find that the intratemporal first-order condition from the neoclassical growth model accounts for the decline in total hours worked during 1998–2009 in Turkey. Hours worked increased in Turkey since 2009 and the model accounts for half of that increase between 2009 and 2011. Our findings suggest that time-varying taxes on consumption and labor play significant roles in explaining the hours worked in Turkey. The model without subsistence consumption provides a better fit with the data after 2003. The presence of government consumption in the utility function does not seem very important.

1. Introduction

> *Erdős first did mathematics at the age of three, but for the last twenty-five years of his life, since the death of his mother, he put in nineteen-hour days…*
>
> [Paul Hoffman (1998, p.7)]

The recent literature documents large differences in hours of work across OECD countries, and presents evidence on how they have evolved over time.[1] For example, Rogerson (2006) studies 21 OECD countries and argues that the changes in technology and government are promising candidates to explain the broad changes over the period 1956–2003.[2] Ohanian et al. (2008) study the same countries between 1956 and 2004 using the intratemporal first-order condition from the neoclassical growth model, augmented with taxes on labor income and consumption expenditures. They find that the model closely accounts for changes in hours worked.[3] We study one country in depth that has not been covered by the studies mentioned above: Turkey. The reason is that Turkey has the lowest hours worked among the OECD countries. Fig. 1 illustrates this point.

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[1] Most of the discussion on this topic has been centered around the decline in aggregate hours of market work in Europe, particularly relative to the United States. The question, *Why have Europeans worked less than Americans since the 1970s?*, has led to many studies exploring the changes in aggregate hours of work (see, e.g., Alesina et al., 2005; Bell and Freeman, 2001; Blanchard, 2004; Erosa et al., 2012; Koyuncu, 2011; Olovsson, 2009; Prescott, 2004; Rogerson, 2008).

[2] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

[3] McDaniel (2011) constructs a growth model extended to include home production and subsistence consumption to study differences in market hours worked for 15 OECD countries and finds that the forces influencing market hours in the selected OECD countries to be changes in labor income tax rates and productivity growth in the home and market sectors over the period 1960–2004. Ngai and Pissarides (2011) find that the large differences in the allocation of market work across the countries of the OECD can be attributed to the differences in taxation, the subsidization of social work, and the market–home production substitution by making use of data on taxes and social expenditure from 19 OECD countries, home production data from time use surveys, and disaggregated data on hours of work by sector. Ragan (2013) studies 13 OECD countries and shows how differences in tax rates can explain much of the variation in market work, meal preparation and maintenance activities, as well as time spent in other home production activities, such as child care, across the countries.

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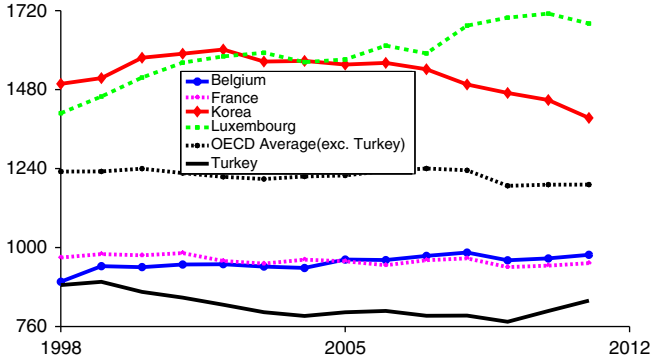

Fig. 1. Hours worked in OECD, 1998–2011.

Fig. 1 shows the distribution of hours worked across OECD during 1998–2011. For each country, the measure of aggregate hours of work is the product of employment and annual hours of work per person in employment. To take into account the fact that countries differ in population size, our statistics are then normalized by the size of population aged 15–64.[4] The dispersion of hours worked across countries is very large. During 1998–2011, Korea and Luxembourg are the two countries with the highest total hours worked per annum among all other OECD countries. On the other hand, Belgium and France are the two countries with the lowest total hours worked per annum among all other OECD countries (excluding Turkey). The striking observation is that the total hours worked in Turkey is the lowest among the OECD members. Total hours worked in Turkey was 49.9% of that of in Luxembourg, 60.2% of that of in Korea, 85.8% of that of in Belgium, and 88.0% of that of in France in 2011.[5]

This paper tries to determine the possible factors that are important for labor supply in Turkey. Specifically, we study the changes in hours of work following Ohanian et al. (2008) and use a variant of the neoclassical growth model, augmented with government consumption, subsistence consumption, and taxes on labor income and consumption, to provide an explanation for the observed changes. To do so, we focus on the key equation that determines the equilibrium worked hours: a static optimality condition that equates the marginal rate of substitution of consumption for leisure with the marginal product of labor. In our benchmark model, private and government consumption, without subsistence consumption, enters into the household's utility function. In addition, there are taxes on consumption and labor income.

We find that our benchmark model accounts for the decline in total hours worked during 1998–2009 in Turkey. Hours worked increased in Turkey since 2009 and the model accounts for half of that increase between 2009 and 2011. We next explore the quantitative roles of the subsistence term, taxes and government consumption; and consider several variations and robustness checks to show which aspects of the model are important for our quantitative results. We show that if the model ignores taxes on labor income and consumption, then its explanatory power decreases significantly. In other words, the primary force driving changes in hours is the changes in the tax wedge. On the other hand, the presence of government consumption in the utility function does not seem very important. We find that the inclusion of the subsistence term does not change the results during 1998–2003. The model without subsistence consumption provides a better fit with the data after 2003.

This paper, with results on the importance of taxes on aggregate labor supply, complements the econometric studies, which focus on the effect of changes in labor costs on employment levels in Turkey. For example, Betcherman et al. (2010) study the effects of a series of regional incentive schemes (subsidizing employers' social security contributions, employee personal income taxes, energy consumption and land) legislated through, aimed at increasing investments and employment opportunities in low-income provinces. They find that these schemes lead to significant increases in employment among firms registered with the social security system; however, much of this increase appears to be the result of existing firms registering rather than the creation of new jobs. Papps (2012), using longitudinal data from the Turkish Household Labor Force Survey for 2002 to 2005, reports evidence that an increase in labor costs caused by a rise in social security tax rates results in greater job loss than an equal-sized increase in costs brought about by a rise in the minimum wage.

This paper also contributes to the literature on the cross-country estimates of tax rates on factor incomes and consumption presenting new estimates of the tax rates on labor income and consumption for Turkey.[6] We calculate the tax wedge, using the tax rates on labor and consumption, during 1998–2011 using the revised national accounts for Turkey. The tax wedge provides information on labor and consumption tax rates combined and it is of interest because this measures the relevant tax burden for choices between supplying labor and enjoying leisure. In addition, we calculate the corresponding tax rates during 1987–2006 using the previous version of the system of national accounts; and repeat the calculations for which we compare the model to the data. We note that the actual tax systems are much more complicated than what we have in this paper. Nevertheless, our calculations provide comparable tax rates and complement some studies regarding the Turkish economy, such as Adamopoulos and Akyol (2009), Ünlükaplan and Arısoy (2010), and Çiçek and Elgin (2011).

Finally, this paper complements the studies focusing on the productivity growth in Turkey from a historical perspective, since understanding the evolution of labor supply in Turkey is relevant, given the importance of labor input on the productivity measurement and on the catching-up process of the Turkish economy to the frontier.[7] For example, Adamopoulos and Akyol (2009) state that the proximate explanation for Turkey's underperformance to the United States and Southern Europe, from 1960 to 2003, lies in the relative deterioration of aggregate labor input and the less than stellar rise in relative labor productivity.

We emphasize that our labor supply measure is hours worked per working-age person. The two principal margins of work effort are hours actually worked by employees (intensive margin) and the fraction of the working-age population that works (extensive margin). Fig. 2 shows the two margins of work effort for Turkey between 1998

[4] Data on civilian employment and population aged 15–64 for each country (except for Turkey) are from the OECD Annual Labour Force Statistics Summary Tables (OECD, 2013). Data on employment and population aged 15+ for Turkey are from the Ministry of Development of Turkey, Economic and Social Indicators (1950–2010), Table 8.7 (T. R. Ministry of Development, 2012) and from the "Labour Force Status By Non-Institutional Population, Years And Sex" tables by TurkStat (using the OECD sources for employment and population data for Turkey does not change the qualitative nature of the argument). Labor statistics for Turkey are based on the Address Based Population Registration System (ABPRS) covered by Household Labor Survey. We use the OECD series of average annual hours actually worked per person in total employment for each country. Missing observations are filled using The Conference Board Total Economy Database (2014).

[5] We note that the data for hours actually worked per person are intended for comparisons of trends over time; they may not be suitable for comparisons of the level of average annual hours of work for a given year because of the differences in their sources, i.e., each country collects its own data, and their methods may be not always be perfectly comparable.

[6] Mendoza et al. (1994) propose a method for estimating effective tax rates on factor income and consumption, by combining the *Revenue Statistics of OECD* with data from the *OECD National Income Accounts*. Their formulas are the most well-known measures of the effective tax rates on labor, capital, and consumption. For example, Trabandt and Uhlig (2011), following Mendoza et al. (1994), calculate and provide new data for these tax rates in the United States and individual EU-14 countries during 1995–2007. Carey and Rabesona (2002) provide a detailed discussion of the Mendoza et al. (1994) formulas and propose a number of modifications to them (see, also, OECD, 2001; McDaniel, 2007).

[7] See Adamopoulos and Akyol (2009), Altuğ et al. (2008), Çiçek and Elgin (2011), İmrohoroğlu et al. (2013), and Ismihan and Metin-Ozcan (2009) for some recent studies investigating the evolution of aggregate growth and productivity in Turkey from a historical perspective.