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and forthcoming in *Implications of Behavioral Economics for Economic Policy*.

⁹ See A. Lusardi and O. Mitchell, "How Ordinary Consumers Make Complex Economic Decisions: Financial Literacy and Retirement Readiness," unpublished paper, March 2009.

¹⁰ D. Bernheim, D. Garrett, and D. Maki, "Education and Saving: The Long-term Effects of High School Financial Curriculum Mandates," *Journal of Public Economics* 85, 2001, pp. 435–565.

¹¹ See A. Lusardi, P. Keller, and A. Keller, "New Ways to Make People Save: A Social Marketing Approach,"

NBER Working Paper No. 14715, February 2009, and chapter 7 of the book, *Overcoming the Saving Slump: How to Increase the Effectiveness of Financial Education and Saving Programs*, University of Chicago Press, 2008, pp. 209–36.

Taxes and Market Work: A Cross-Country Comparison

Richard Rogerson*

Time devoted to work varies greatly among OECD countries. In Belgium, France, and Germany for example, total hours of market work relative to population are roughly 30 percent lower than in the United States, Japan, and Australia. The issue is not simply one of "European" versus "non-European" countries, as there are also large differences within Europe. Hours of work in Spain and Sweden are roughly midway between the two previously mentioned groups, and in Switzerland, hours of work are almost the same as in the United States. These differences dwarf the changes in hours of work that are associated with typical business cycle fluctuations. Because labor is one of the key inputs in production, time devoted to market work is a key determinant of the material well being of individuals in an economy. Identifying the factors that lead to such different outcomes in apparently similar economies promises important insights relevant for many public policy discussions.

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Time-Series Changes

As a first step, it is informative to look at the evolution of hours of work over time. Have these large differences been around for decades, or are they a more recent phenomenon? The answer to this question should provide important information about where to look for possible explanations. It turns out that these differences have not always been present. Comparable data exist going back to the mid-1950s, and at that time, hours of work in France and Germany were actually higher than they were in the United States. Specifically, whereas hours of work in the United States today are roughly similar to what they were in the mid-1950s, in France and Germany they have declined by more than 35 percent. The timing of this decline is also of interest—the pattern that one finds in these countries (as well as many others) is that there is a relatively constant rate of decline from the mid-1950s and lasting through the mid-1980s, at which time hours of work tend to flatten out.¹ The time-series analysis suggests that the key to understanding why hours of work are so different across countries today

is to understand why hours of work have changed so differently across countries since the mid-1950s.

A Digression: A Comparison with Unemployment Evolutions

The relationship between differences in hours of work across countries and differences in unemployment across countries is also noteworthy. A large literature has documented and studied the fact that unemployment in many European countries exceeds that in the United States, and that this difference has emerged over the last 30 years. Is that observation just another way of presenting the same information? The answer is a resounding "no." In a 2006 paper², I document that from a pure accounting perspective only a very small fraction of the differences in hours of work are explained by differences in unemployment. For example, if we transferred unemployed workers in France into employment to reduce the unemployment rate in France to the U.S. level, and we had these workers work the same number of hours as the average French worker, then the difference between hours of work in France and the United States

would drop from around 30 percent to around 27 percent.

Labor Taxes as a Driving Force

The time-series evidence has important implications for screening the potential forces behind the quite different time-series changes in hours worked across countries. In particular, we are looking for driving forces that change at a fairly steady rate from the mid-1950s to the mid-1980s, exhibit sizeable differences in the extent of this change across countries, and are plausibly linked to labor supply. One obvious candidate is labor taxes (including payroll taxes and consumption taxes in addition to labor income taxes). On the theoretical side, basic economic theory tells us that labor taxes used to fund transfer payments, either in kind or monetary, create a disincentive for individuals to work. And on the empirical side, between the mid-1950s and the mid-1980s there was substantial growth in the size of government, as measured either by total government receipts or total government outlays relative to GDP. Additionally, there is substantial variation in the extent of this growth across countries. Because labor taxes are the dominant source of government revenues, these patterns are also found in the evolution of labor taxes.

Lee Ohanian, Andrea Raffo, and I assess the extent to which increased labor taxes can account for the very different evolution of hours worked across countries.³ Using the framework of a standard growth model, we analyze aggregate time series for output, hours of work, consumption, and labor taxes for 15 countries over the period 1956–2004. We find that the timing and magnitude of changes in labor taxes can explain a large share of the timing and magnitude in changes in hours of work in the group of 15 countries that we studied.⁴ While this research suggests that labor taxes may be the domi-

nant source of differences in hours of work across countries, it does not say that labor taxes can explain all of the changes in hours of work; one important byproduct of this research was isolating those cases in which other factors also must have been at play. We still need to identify the other quantitatively important factors.

We also find that once one takes taxes into account, the experiences of some countries, such as those in Scandinavia, seemed puzzling in the opposite sense. That is, our framework suggests that hours of work should have declined by even more in these countries than it did. Put somewhat differently, it seems that taxes were having less effect in Scandinavia than elsewhere. In a 2007 paper⁵ I argue that understanding this requires a closer look at how governments spend tax revenues. A distinguishing feature of government expenditures in Scandinavia is the relatively large share of spending on “family policies” including such things as subsidized day care and elderly care. These programs are very important in the analysis of tax distortions to labor supply: whereas taxes on labor tend to discourage individuals from working in the market, these types of programs serve to subsidize market activity, thereby undoing some of the distortions associated with high tax rates on labor.

The Elasticity of Labor Supply

If differences in labor taxes are an important component of the explanation for the large differences in hours of work across countries, then it is implicitly the case that individual labor supply is responding quite significantly to changes in tax rates. A long literature in labor economics that examines hours of work of prime-aged males has routinely found that labor supply effects are small. How can one reconcile these two findings? Building on earlier work with Edward Prescott⁶, Johanna Wallenius and I

take up this issue.⁷ We show that the earlier findings from the labor literature often have been misinterpreted. While these studies show that the response for prime-aged individuals is small, we argue that this is perfectly consistent with a large overall response in hours worked if individuals choose to spend a shorter fraction of their life in employment, either by delaying entry into the labor force and/or retiring early. In fact, a key result from our analysis is that the aggregate response to a change in taxes is large, independent of the response of prime-aged individuals.

In addition to reconciling the cross-country evidence with the literature on labor supply, this work has two additional interesting implications. First, it implies that all of the employment differences across countries should show up as differences for young and old individuals. In fact, this is exactly what one finds if one compares France, Germany, and Belgium with the United States. Second, it predicts that higher labor taxes lead to both lower employment rates and lower hours of work for employed individuals, another feature that is found in the data. In a different setting, Lei Fang and I argue that this observation can distinguish labor taxes from many other distortions that one might suspect to be of importance.⁸

Sectoral Differences in Hours of Work

These last results suggest that it is likely to be of interest to go beyond the aggregate data in looking for supporting evidence on the role of various distortions. Another case in point has to do with the sectoral differences in hours of work across countries. In a paper published in 2007⁹, I look at differences in hours of work across three broad sectors: agriculture, industry, and services. A remarkable finding emerges if one compares the evolution of sec-

toral and aggregate hours of work for continental Europe with the United States. Virtually all of the relative decline in hours of work in Europe can be attributed to the fact that as Europe has caught up to the United States in terms of productivity, it has failed to develop a market service sector like the United States. I show that this pattern is also consistent with labor taxes being the dominant driving force. The underlying economic argument is a simple one: in addition to distorting the decision between consumption and leisure, taxes also distort the decision of whether to perform certain activities oneself (which economists refer to as home production) or to purchase them in the market. Important examples of home production include cooking meals, cleaning one's house, and taking care of one's children or other family members. All of these services can also be purchased in the market. Taxes on labor create an incentive for individuals to do more of these activities for themselves, since time spent in home production is not taxed.¹⁰ It follows that one would expect the largest differences in hours worked to occur in those sectors that have the greatest scope for home production. Cross-country data on differences in time devoted to home production are consistent with this prediction.¹¹

Summary and Future Work

I believe that the work summarized here points to differences in

labor taxes as an important source of the very large differences in hours of work across countries. This explanation fits well with time-series evidence for aggregate hours of work across countries, cross-country differences in employment rates over the life cycle, and hours worked across sectors, as well as cross-country differences in time devoted to home production. Nonetheless, there is still a need for additional work. One important direction is more explicit analysis of the actual tax and transfer programs in place across countries in models that allow for important sources of heterogeneity and how they interact with the detailed features of tax and transfer systems. I continue to work on these issues.

¹ These patterns and many others are documented in R. Rogerson, "Understanding Differences in Hours Worked," *Review of Economic Dynamics* 9 (2006), pp. 365–409.

² *Ibid.*

³ L. Ohanian, A. Raffo, and R. Rogerson, "Long-Term Changes in Labor Supply and Taxes: Evidence from OECD Countries, 1956–2004," *NBER Working Paper No. 12786*, December 2006, and *Journal of Monetary Economics* 55 (2008), pp. 1353–62.

⁴ This work represents a generalization of the earlier findings in E. Prescott, "Why Do Americans Work so Much More than Europeans?" *Federal Reserve Bank of Minneapolis Quarterly Review* 28

(2004), pp. 2–13.

⁵ R. Rogerson, "Taxes and Market Work: Is Scandinavia an Outlier?" *NBER Working Paper No. 12890*, February 2007, and *Economic Theory* 32 (2007), pp. 59–85.

⁶ E. Prescott, R. Rogerson, and J. Wallenius, "Lifetime Aggregate Labor Supply with Endogenous Workweek Length" *Review of Economic Dynamics* 12 (2009), pp. 23–36.

⁷ R. Rogerson and J. Wallenius, "Micro and Macro Elasticities in a Life Cycle Model with Taxes," *NBER Working Paper No. 13017*, April 2007, forthcoming in *Journal of Economic Theory*.

⁸ L. Fang and R. Rogerson, "Policy Analysis in a Matching Model with Intensive and Extensive Margins," *NBER Working Paper No. 13007*, April 2007, forthcoming in *International Economic Review*.

⁹ R. Rogerson, "Structural Transformation and the Deterioration of European Labor Market Outcomes," *NBER Working Paper No. 12889*, February 2007, and *Journal of Political Economy* 116 (2008), pp. 235–59.

¹⁰ For evidence on this see S. Davis and M. Henrekson, "Tax Effects on Work Activity, Industry Mix and Shadow Economy Size: Evidence from Rich Country Comparisons," *NBER Working Paper No. 10509*, May 2004.

¹¹ See, for example, R. Freeman and R. Schettkat, "Marketization of Household Production and the EU-US Gap in Work," *Economic Policy* 20 (2005), pp. 6–50.