This paper provides a meta-analysis of how total hours worked respond to permanent and transitory changes in the tax code. Chetty, Guren, Manoli, and Weber’s thesis is that existing studies provide important information about the Hicksian and Frisch elasticities of labor supply. The labor supply elasticity has been a key parameter in most macroeconomic models since Lucas and Rapping (1969), and so the authors argue that we need systematic evidence to pin down its value. In particular, they conclude that the elasticity of labor supply in response to a transitory shock to after-tax earnings is about 0.25 on the extensive margin and twice as large on the intensive margin. This is far smaller than macroeconomic models need in order to explain the volatility of employment and hours worked over the business cycle.

The authors illustrate the discrepancy between microeconomic and macroeconomic elasticities of labor supply by examining three real-world changes in the tax code through the lens of a particular life cycle model with indivisible labor (Rogerson and Wallenius 2009). Iceland cut taxes to zero for one year, in 1987. In response, employment rose, as most theories would predict. However, when they simulate the tax cut in the laboratory of the Rogerson Wallenius model, the model predicts an employment response that is an order of magnitude larger than what happened in reality. Similarly, Canada significantly reduced the taxes of some welfare recipients for three years. In response, many of the workers eligible for the tax break entered the labor force. But once again, when they simulate the tax cut in the Rogerson Wallenius laboratory, the theory predicts an employment response that is an order of magnitude larger than what happened in reality. The third experiment, the permanent introduction of the EITC in the United States, caused a
modest increase in employment, in line with what the Rogerson Wallenius model predicts.

This is an impressive paper and I have no major qualms with any component of the analysis. Instead, I will concentrate my comments on the interpretation of the results. In particular, how should we reconcile the low elasticity of labor supply in response to temporary tax changes with the large volatility of employment relative to real wages over the business cycle? The authors state that,

Any macro model that relies primarily on changes in labor supply to generate business cycle fluctuations must feature a large extensive margin Frisch elasticity. As a result, any such model will overpredict the response to temporary wage changes, such as the tax holiday in Iceland and work subsidies in Canada.

They therefore conclude that their analysis points “in favor of recent macro models that feature a cyclical ‘labor wedge’ between the marginal rate of substitution of consumption for leisure and the marginal product of labor” and that their “estimates could be used to calibrate the labor supply component of models that seek to explain aggregate fluctuations with labor wedges.”

My discussion explores the validity of this conclusion. I show formally that if workers are not on their labor supply curve—for example, because wages are rigid—then a model can simultaneously generate a small micro elasticity (response to a tax cut) and a large macro elasticity (response to business cycle shock), consistent with the evidence in this paper. Interestingly, however, in a simple example, neither the micro nor the macro elasticity reveal any information about the structural parameter of interest, the elasticity of labor supply. Instead, both reveal something about the nature of the wage rigidity. This significantly changes the interpretation of the results in this paper, an issue I return to at the end of my discussion.

I focus on a simple continuous time model with a representative household and a representative firm. The household chooses how much to consume \( c(t) \) and how much leisure to enjoy \( l(t) \) to maximize its expected utility

\[
E_0 \int_0^\infty e^{-\gamma t} (\log c(t) + \phi(l(t))) dt
\]

subject to a lifetime budget constraint

\[
E_0 \int_0^\infty q(t)(c(t) - (1 - \tau(t))w(t)n(t)) dt = a_0,
\]
where $w(t)$ is the pretax wage, $n(t)$ is labor supply, $\tau(t)$ is the labor income tax rate, $q(t)$ is the price of consumption at date $t$ relative to date 0 (so $q(0) = 1$), $a_0$ is the present value of wealth and transfer income, and the household has a unit endowment of time to either work or enjoy leisure, $n(t) + \ell(t) = 1$. With this specification of preferences, the Frisch elasticity of labor supply is $-\phi'(1 - n)/n\phi''(1 - n)$.

A firm chooses how much labor to hire to maximize its expected profits

$$\mathbb{E}_0 \int_0^\infty q(t)(A(t)k(t)^\alpha n(t)^{1-\alpha} - x(t) - w(t)n(t))dt$$

subject to the law of motion for capital $\dot{k}(t) = x(t) - \delta k(t)$, where $x(t)$ is investment and $\delta$ is the depreciation rate on capital. This notation is deliberately vague about the nature of uncertainty, which might reflect variation in productivity and taxes. Still, to start I will restrict attention to onetime shocks that do not affect the probability distribution over future outcomes.

In a competitive economy, household optimization implies that the marginal rate of substitution between consumption and leisure is equal to the after-tax wage, while firm optimization implies that the marginal product of labor is equal to the wage. Eliminating the wage gives

$$n(t)^\alpha \phi'(1 - n(t)) = (1 - \alpha)(1 - \tau(t))A(t)k(t)^\alpha \sigma(t)^{-1}.$$

A onetime shock to the tax rate or to productivity that does not alter the probability distribution over future outcomes cannot affect the capital stock and does not affect consumption. Therefore, their impact on labor supply is closely linked:

$$\frac{d \log n(t)}{d \log(1 - \tau(t))} = \frac{d \log n(t)}{d \log A(t)} = \frac{1}{\alpha - \{n\phi''(1 - n)/[\phi'(1 - n)]\}}.$$

Two conclusions follow. The first is that if the capital share of income is positive, $\alpha > 0$, neither experiment uncovers the Frisch labor supply elasticity because of the general equilibrium impact on wages. The second is that this model cannot explain why the real-world response to the two experiments is so different.

One possibility is that wages do not adjust to clear the labor market. For expositional purposes, suppose there is a minimum wage $\bar{w}$ that exceeds the equilibrium wage $w(t)$. At this wage, households are rationed on their labor supply. That is, although households can choose how much to consume, $n(t)$ is pinned down from firms’ labor demand, which equates the marginal product of labor to the binding minimum
wage: \( (1 - \alpha)A(t)k(t)\alpha n(t)^{-\alpha} = \bar{w} \). We can now redo the tax experiment and the productivity shock experiment:

\[
\frac{d \log n(t)}{d \log (1 - \tau(t))} = 0 \quad \text{and} \quad \frac{d \log n(t)}{d \log A(t)} = \frac{1}{\alpha}.
\]

According to the definitions in this paper, the former is a micro elasticity of labor supply (zero) while the latter is a macro elasticity (three, if the capital share of income is one-third). Although these elasticities are very different, neither of them has anything to do with the Frisch elasticity of labor supply \(-\phi'(1 - n)/n\phi''(1 - n)\).

Of course, the assumption that a minimum wage binds for most workers is untenable, so the relevance of this toy model may seem limited. But the basic insights from this model carry over to a search theoretic environment with wage rigidities (Hall 2005; Shimer 2012a, 2012b). My treatment here follows Shimer (2012b). As before, there is a representative household that has preferences over consumption and leisure and faces a single lifetime budget constraint:

\[
\max_{c(t)} \mathbb{E}_0 \int_0^\infty e^{-\rho t} (\log c(t) + \phi(t(t))) dt
\]

s.t. \( \mathbb{E}_0 \int_0^\infty q(t)(c(t) - (1 - \tau(t))w(t)n(t)) dt = \alpha \).

In this formulation, I assume that the household is large and so interpret \( n(t) \) as the fraction of household members who are employed. Unfortunately, the household cannot control the path of \( \tau(t) = 1 - \tau(t) \), which instead is determined by firms’ recruiting decisions. It therefore makes its consumption decision taking the path of employment and leisure as given.

The representative firm chooses investment \( x(t) \) and recruiting \( v(t) \) to maximize the present value of its profits

\[
\mathbb{E}_0 \int_0^\infty q(t)(A(t)k(t)^\alpha (n(t) - v(t))^1-\alpha - x(t) - w(t)n(t)) dt
\]

subject to a law of motion for capital \( \dot{k}(t) = x(t) - \delta k(t) \) and a law of motion for employment \( \dot{n}(t) = \mu(\theta(t))v(t) - sn(t) \). The firm employs \( n(t) \) workers. Of those, \( n(t) - v(t) \) are engaged in production with the usual Cobb–Douglas technology, while \( v(t) \) are recruiters, attracting workers at rate \( \mu(\theta(t)) \), the job-filling rate. The job-filling rate in turn depends on the recruiter–unemployment ratio, \( \theta(t) = v(t)/\ell(t) \). The representative firm takes the recruiter–unemployment ratio as given, although of course it
is determined in equilibrium. Finally, workers separate for unemployment at rate \( s \).

A key feature of this model is that there is a range of wages at which households are willing to supply labor and firms are willing to employ workers. In what follows, I assume that the wage path is unaffected by transitory tax and productivity shocks. One can think of wage rigidities as coming from a self-fulfilling prophecy: on this wage path, every worker strictly prefers employment to unemployment and every firm prefers employing its workers rather than firing them. There is, therefore, no compelling reason for the wage path to adjust following a small shock. This is the essential insight of Hall (2005).

Given the setup of the model, it is straightforward to verify that recruiting and investment at time \( t \) depend on the endogenous state variables \( k(t) \) and \( n(t) \), on the exogenous path for future wages \( w(t') \), \( t' > t \), on the endogenous path for intertemporal prices \( q(t') \), and on future productivity shocks \( A(t') \). Intertermporal prices are in turn pinned down from the household first-order condition and so depend only on consumption growth, \( E_t q(t')/q(t) = e^{-\mu(t'-t)}E_t c(t)/c(t') \). Two conclusions follow immediately. First, household preferences over leisure have absolutely no impact on employment or the response of employment to shocks. In particular, there is no way to recover the Frisch elasticity of labor supply from either micro or macro experiments in this model economy. Second, taxes only affect employment by changing consumption growth and hence the intertemporal price \( q(t) \). In contrast, productivity shocks also have a direct effect on employment by altering the marginal product of labor. It therefore will always be the case that sufficiently transitory productivity shocks will have a bigger impact on employment than will equally transitory tax changes, as in the toy model I started with.

Of course, this model is still highly stylized and the robustness of some of these conclusions may be suspect. For example, I have imposed for expositional simplicity that households have no control over employment. Shimer (2012a) assumes that households also have a search decision, allocating nonemployed workers between unemployment \( u(t) \) and leisure \( C(t) \), with employment \( n(t) = 1 - u(t) - C(t) \) given. Unemployed workers are more likely to find a job than nonparticipants, but nonparticipants get more leisure. In this case, productivity shocks still directly impact firms’ recruiting decisions, but now taxes affect households’ labor force participation decision. Still, a regression of employment on taxes does not directly reveal the elasticity of labor supply because firms will respond to an increase in workers’ job search by
economizing on recruiting so as to stabilize employment near their desired level. Conversely, firms’ desire to recruit in response to a productivity shock is mitigated if households offset any increase in recruiting with a reduction in their search intensity. This suggests that the response of employment to a productivity shock will depend on the elasticity of labor supply even if wages are fixed.

The bottom line is that rigid wages models offer a reasonable hope of reconciling the low micro elasticity of labor supply with the high macro elasticity; however, it is as yet unclear whether either source of variation will be useful for identifying the true preference parameter, at least without imposing a full structural model.

The final question is why we care what the function \( \phi \) looks like if it does not have much impact on these sorts of outcomes. There are two potential answers. First, the elasticity of labor supply is important for understanding the costs of cyclical fluctuations and of tax rate distortions. The more elastic is labor supply, the less households suffer from their inability to choose employment at each moment. Second, a deeper theory of wage determination might recognize that if households are very dissatisfied with the current level of employment, they will find a mechanism for changing the wage and so changing employment. This suggests that an elastic labor supply is necessary for wages to be rigid in response to large, persistent shocks. These claims are both speculative at this stage, but there is no doubt that Chetty, Guren, Manoli, and Weber have highlighted some important unresolved issues in the literature on labor supply.

Endnotes

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1. This last conclusion would not hold exactly if the shock were persistent, which explains why I focus on onetime shocks.

References