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The anatomy of the aggregate labor supply elasticity ☆

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ABSTRACT

We show that the aggregate Frisch elasticity of labor supply can greatly exceed the corresponding individual-level parameter, and we illustrate the "anatomy" of the former in terms of intensive and extensive margins. The methodology consists of using micro data from the PSID to construct a panel of individuals and an aggregate time series obtained by aggregating these individuals each year. These two data sets represent *exactly* the same sample at different levels of aggregation, and we use them to identify the parameters of two distinct MaCurdy-type micro and macro equations. We find a micro elasticity of about 0.1 and a much larger macro elasticity that ranges from 1.1 to 1.7. There is no conflict between the two estimates: the micro one reflects only the intensive margin while the macro one reflects, in addition, the much more volatile extensive margin. Furthermore, aggregation of only continuously employed individuals allows us to provide a reliable estimate of the intensive margin elasticity in the range 0.3–0.4. This implies an extensive margin elasticity in the range 0.8–1.4. These findings suggest that micro evidence is not a benchmark for assessing how large the Frisch elasticity of labor supply should be in a model of the aggregate economy.

1. Introduction

In this paper we provide an empirical reconciliation of micro and macro labor supply elasticities. Our goal is to show that the aggregate Frisch elasticity of labor supply is much larger than the corresponding individual-level elasticity and yet is fully consistent with it. From analyses of panel data it is well known that individual hours are relatively wage inelastic in the short run. This fact is often regarded as a challenge to the benchmark real business cycle (RBC) model (Prescott, 1986). The RBC methodology rests on Lucas's (1980) suggestion to draw parameters from census information and panel data, but the model requires that aggregate labor be elastic in order to generate fluctuations that are consistent with business cycle facts (Kydland and Prescott, 1982; Prescott, 2006). This is not necessarily a challenge because the micro and macro Frisch elasticities of labor supply are conceptually different objects. The micro parameter is the elasticity of individual hours conditional on being employed whereas the macro parameter is the elasticity of total hours, which reflects variations in hours per worker as well as in the employment level (Heckman, 1993; Browning et al., 1999). In other words, the aggregate elasticity reflects both the intensive and extensive margins.

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We contribute to this line of research by estimating mutually consistent micro and macro Frisch elasticities of labor supply for the same population. By "mutually consistent" we mean that the two estimates are based on the same micro data and the same specification; the only difference is the level of aggregation. Specifically, we estimate two distinct, MaCurdy-type (after MaCurdy, 1981) labor supply equations. The first, the micro equation, relates individual hours to the individual wage rate and is estimated using data from the Panel Study of Income Dynamics (PSID). The second, the macro equation, relates aggregate hours to the aggregate wage rate and is estimated in a time series obtained by aggregating the single waves of the PSID each year. We find a micro elasticity of about 0.1, a small value in line with benchmark microeconometric estimates, and a much larger macro elasticity in the range 1.1–1.7.[1] Two additional results are worth emphasizing. First, the use of micro data allows us to decompose the macro elasticity into intensive and extensive margins for the whole sample and for subgroups of interest. When looking at subgroups, we document that individuals who are non-prime age, married or cohabitating with partners who work, and/or low educated are "marginal workers" who make aggregate labor much more elastic than at the individual level. We find mixed evidence about women. Second, by focusing on the special subgroup of continuously employed individuals (for whom the extensive margin is inactive) we provide an estimate of the intensive margin that presumably removes, via aggregation, most of the bias affecting estimates on disaggregated data. Such an estimate is in the range 0.3–0.4. The fact that this is larger than the corresponding estimate on disaggregated data confirms that the bias is towards zero.

This paper contributes to a large and expanding literature. The first generation of microeconometric estimates of the Frisch elasticity of labor supply ranges from about 0 to about 0.2 for men and from about 0 to about 1 for married women.[2] The macroeconomic evidence is far less numerous and somewhat conflicting. In their seminal paper, Lucas and Rapping (1969) estimate an elasticity of 1.4. At the other extreme, Mankiw et al. (1985) reject the intertemporal substitution hypothesis altogether, but they explicitly focus on the "labor input per member of the adult population" (p. 235)—that is, an intensive margin. The importance of including the extensive margin as well is nicely illustrated by Alogoskoufis (1987), who rejects the intertemporal substitution hypothesis for fluctuations in hours per worker but cannot reject the same hypothesis for fluctuations in aggregate employment. This is not surprising, given that the bulk of the cyclical adjustment of total hours occurs via adjustments in the employment stock (Hansen, 1985; Kydland, 1995; see also our own computations in Section 2).

The necessity of reconciling the large aggregate elasticity assumed in calibration studies with the small elasticity estimated in microeconometric studies led to the development of variants and extensions of the benchmark RBC model in order to better accommodate the data. A precursor is the seminal work of Kydland and Prescott (1982) based on nonseparability of leisure at different points in time. A prominent position in the field is occupied by the indivisible labor model (Rogerson, 1988; Hansen, 1985), where people can either work a fixed number of hours or not work at all. In that model, all labor changes take place at the extensive margin.

A second generation of empirical studies reduces the elasticity gap by arguing that benchmark micro regressions are misspecified. Examples include the omission of: home production (Rupert et al., 2000), actual expectations of wage changes (Pistaferri, 2003), time devoted to accumulating human capital (Imai and Keane, 2004; Wallenius, 2011), nonseparability of consumption and leisure (Ziliak and Kniesner, 2005), and liquidity constraints (Domeij and Flodén, 2006). Although it is very important to obtain a correct estimate of the micro elasticity, our work shows that the elasticity gap, per se, is not an issue. Chetty et al. (2011a, 2011b) review the empirical evidence on the intensive and extensive margins elasticities generated by quasi-experimental variations. The intensive margin elasticity they report (0.3–0.5) is in line with our estimate based on continuously employed workers (0.3–0.4). However, the latter in combination with our estimate of the aggregate elasticity implies an extensive margin elasticity in the range 0.8–1.4, substantially larger than the corresponding estimate reported by Chetty, Friedman, Manoli, and Weber (0.2–0.3).

A few studies have performed a similar exercise starting from a calibrated micro elasticity. Chang and Kim (2006) combine the indivisible labor assumption and the heterogeneity of reservation wages in an incomplete markets model. Assuming an individual elasticity of 0.4, they find an aggregate elasticity of about 1. Rogerson and Wallenius (2009) assume an individual elasticity ranging from 0.05 to 1.25 and find that the corresponding macro elasticity ranges between 2.25 and 3 in a model where the mapping between hours of work and labor services is initially flat. Our paper can be regarded as the empirical counterpart of these calibration studies.

A related work that employs survey data is Gourio and Noual (2009), who use 14 years of monthly observations (National Longitudinal Survey of Youth data from 1979 to 1992) to estimate the aggregate elasticity as the hazard rate of the distribution of reservation wages. Their estimate is 1.3.[3] The basic idea in Gourio and Noual is the same as in Chang and Kim (2006) and in this paper: labor is more elastic at the aggregate than at the individual level because of marginal workers who move into and out of employment in response to wage changes. There are important differences between this work and ours. First, Gourio and Noual shut down the intensive margin, so one cannot tell how their estimate compares with the underlying micro elasticity. Second, estimating two MaCurdy equations allows us to avoid making distributional assumptions

[1] For samples that are more representative of the US population, we estimate the aggregate elasticity to be in the range 0.6–1.1. However—as discussed in detail later in the paper—this range should be regarded as a lower bound for the US economy.

[2] See the surveys of Pencavel (1986), Killingsworth and Heckman (1986), Card (1994), and Blundell and MaCurdy (1999).

[3] Browning et al. (1999) observe that the intertemporal elasticity of substitution is typically larger at higher frequencies than at lower frequencies.