



Labor supply response and preferences specification: Estimates for prime-age males in Japan[☆]

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ARTICLE INFO

Article history:

Received 16 July 2010
Received in revised form 24 May 2011
Accepted 29 May 2011
Available online 25 June 2011

JEL classification:

H21, H24, H31, J22

Keywords:

Male labor supply
Personal income taxes in Japan
Maximum likelihood estimation
Discrete labor hour supply

ABSTRACT

In this paper, we estimate labor responses of Japanese prime-age males by taking into consideration the Japanese income tax system and utilizing a large micro-data set. We employ three maximum likelihood methods: (i) a modified version of Hausman (1979, 1981), which assumes a linear labor supply function; (ii) that given by Zabalza (1983), which assumes CES preferences; and (iii) that given by Van Soest (1995), which employs the translog utility function and assumes discrete labor hour choice. While the estimates based on the Hausman and Zabalza methods fare poorly, those based on the Van Soest method result in more plausible labor responses. However, these responses are larger than those of the North American and European counterparts.

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1. Introduction

The evaluation of the market response to taxation has profound implications for the assessment of public policy. Since taxes distort an economy to the extent that consumer choices are affected by taxation, the design of an optimal tax structure requires parameters that describe how individuals respond to tax changes. In addition, if taxes are distortionary, the marginal cost of public funds (MCPF) may be greater than unity, thereby enlarging the effective cost of an expenditure program to over its nominal value. Given the fact that labor taxes account for a major portion of tax revenues in most developed countries, the estimation of the labor supply response to taxation has been a prime focus in empirical literature (Blundell & MaCurdy, 1999; Pencavel, 1986).

In contrast to the rich stock of empirical studies on this subject pertaining to North America and Europe, few analogous attempts have been made in Japan.¹ There are several reasons for this. First, very few Japanese studies

[☆] This paper is a substantially revised version of the earlier manuscript titled “The CES Utility Function, Non-linear Budget Constraints and Labor Supply: Results on Prime-age Males in Japan” (PRI Discussion Paper Series 05A-15, 2005). We are grateful for the comments provided by an anonymous referee for this Journal and by other commentators on various occasions. We would also like to thank the Research Centre for Information and Statistics of Social Science at the Institute of Economic Research at Hitotsubashi University for providing the micro-level data from the Employment Status Surveys for 1997. The data provided herein are strictly confidential under the relevant Japanese law. The usual disclaimer also applies. Hayashi acknowledges financial support by the Grant-in-Aid for Scientific Research (B) 20330064.

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¹ Hayashi (2009), a translation of an article published in 2003 in Japanese, identifies only 21 published studies that estimate the wage effects on labor supply. From among these, nine studies employed micro-data, while the others utilized data aggregated either at the national or prefectural level.

adequately include the effect of the tax system on the budget constraints of consumers.² With a progressive taxation system, the marginal tax rates on personal labor income depend on the hours worked. This makes an individual budget constraint piecewise linear, where each of its segments is identified with a linear line defined by the after-tax wage rate—the slope—and the “virtual income”—the intercept of the linear line that extends from that segment. Since labor hours vary, both the after-tax wage rate and virtual income also vary, which causes endogeneity problems in estimating labor supply responses. Although this is the standard argument in the literature, typical Japanese studies have not considered this issue.

Second, the labor supply of prime-age male workers has been of little interest, despite the fact that they contribute a substantive portion of income tax revenues in Japan.³ Given the practices in Japanese labor markets, Japanese economists tend to question the applicability of the standard leisure–consumption choice model. They often assume that workers only either accept or reject the set of wages and working hours proposed by prospective employers since they are thought to be unable to respond to wage-rate changes. With fixed working hours, the elasticity of the labor supply along the *intensive* margin is zero.⁴ This type of modeling is deemed more suited to prime-age male workers. However, the standard labor supply model does not necessarily require workers to freely choose their working hours in exchange for a given wage rate. The model can be predicated on an environment where workers select a combination that consists of a wage rate and labor hours from among the various combinations that are offered by several possible employers. Thus, we can interpret selected combinations as labor supply functions that represent workers’ preferences from among given set of wage rates and working hours (Blundell & MaCurdy, 1999).

Third, despite such a paucity of empirical estimates, a series of tax simulations in Japan has utilized computable general equilibrium (CGE) models to examine the effects of tax changes on individuals.⁵ Of course, CGE models require parameters that characterize consumer preferences, which in turn condition labor responses to tax changes. However, as argued above, only a few Japanese studies adequately consider the effect of the tax system on budget constraints, and a majority of Japanese studies estimate labor supply by employing the *before*-tax wage rate as an explanatory variable, rather than the after-tax one. Since the gross wage elasticity of labor supply is relevant only when the tax structure does not vary, a tax policy evaluation based on such estimates would be problematic (Blomquist, 1988).

Given this state of Japanese literature, the present study estimates the labor supply response for Japanese prime-age males (aged 25–55 years) and takes into consideration the abovementioned issues. Since our data for the hours worked are coded with intervals, we employ the estimation method that is based on the maximum likelihood (ML) principle. We utilize three ML estimation techniques that have been originally proposed by Hausman (1979, 1981), Zabalza (1983), and Van Soest (1995), all of which consider the tax system in place. We adjust their methods in accordance with our data structure and compare the results estimated by the three methods. The Hausman method assumes a linear labor supply and has been criticized (MaCurdy, Green, & Paarsch, 1990). In particular, a series of Monte Carlo studies indicate that the estimates of the Hausman method may be rather sensitive to measurement errors in the variables utilized (Blomquist, 1996; Eklöf & Sacklén, 2000; Ericson & Flood, 1997). The Zabalza method is less popular. However, since it relies on the constant elasticity of substitution (CES) specification of consumer preferences, the model is a good fit for the setup typically used in tax simulation studies as consumer preferences are frequently specified in CES form in Japan (cf., Hashimoto, 2009). However, the CES utility may be rather inflexible and could impose excessive restriction on the model to be estimated. On the other hand, the method by Van Soest, assuming the flexible translog specification of the direct utility function, avoids such restriction and permits for the examination of, for example, the convexity of preferences. In addition, the estimation technique, which is also called the discrete labor hour model or discrete choice model, is robust to the possible non-convexity of budget constraints imposed by the tax system (Creedy & Kalb, 2005).⁶ Furthermore, a Monte Carlo study indicates that the method is robust to a different number of points in the discrete choice set and to measurement errors in income and hours worked, except the case where the error in hours worked is excessively large (Flood & Islam, 2005).

The remainder of this paper is organized in the following manner. In Section 2, we introduce the three estimation methods proposed by Hausman, Zabalza, and Van Soest, adjust them for our data structure, and derive corresponding log-likelihood functions. In Section 3, we provide an explanation of our sample, data set, and the construction of key variables. In Section 4, we compare the estimates and discuss their implications. In Section 5, we present the conclusion.

² Possible exceptions may include Akabayashi (2006). However, the study focused on female labor supply.

³ For example, Yamada et al. (1999) estimated the labor supply of males aged between 25 and 39 years. However, they used aggregate datasets and did not adequately consider the effects of the tax system. Shimada and Sakai (1980) use micro-data; however, again, they ignore the effect of the tax system. Bessho and Hayashi (2005), whose prime focus is the estimation of the marginal welfare costs of personal labor income taxes, utilize the labor elasticity estimates using the Hausman method from the older discussion-paper version of the current study.

⁴ See Higuchi and Hayami (1984).

⁵ See references in Hashimoto (2009) for examples of the tax simulations that use CGE modeling in Japan.

⁶ However, the budget constraint for prime-age males in Japan is convex, as will become evident in the text.

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