Labor Supply Elasticities in Korea: Estimation with Borrowing-Constrained Couples*

Won Hyeok Kim† Myungkyu Shim‡ Hee-Seung Yang§

November 20, 2020

Abstract

This paper aims to provide reliable estimates for labor supply elasticities in Korea. Following Bredemeier et al. (2019), we exploit information on a worker's relative contribution to household earnings when estimating the Frisch labor supply elasticity to mitigate the downward bias in the presence of borrowing constraints. Using the Korean Labor and Income Panel Study data (2000–2018), we find that the labor supply elasticity in Korea is 0.23. In addition, elasticities are estimated to be 0.27 for men and 0.21 for women, confirming a greater bias for men than for women when the borrowing constraint is ignored.

JEL classification: E24, E32, J01, J22

Keywords: Frisch Labor Supply Elasticity, Borrowing Constraint, Korea

---

*The authors thank the anonymous referee for helpful suggestions. Shim and Yang acknowledge the financial support from Yonsei University (Yonsei University Future-Leading Research Initiative (2020-22-0088 and 2019-22-0201, respectively)). Hye Rim Yi provided excellent research assistance.

†Postdoctoral researcher, Center for Research on Innovation and Competition, Sogang University. Email: whkim0703@sogang.ac.kr.

‡Corresponding author, Assistant professor, School of Economics, Yonsei University, Yonsei-ro 50, Seodaemun-gu, Seoul 03722, Republic of Korea. Phone: (+82) 2 2123 2481, Email: myungkyushim@yonsei.ac.kr.

§Associate professor, School of Economics, Yonsei University. Email: heeseung.yang@yonsei.ac.kr.

1 Introduction

The labor supply elasticity plays an important role both in macroeconomics (see Hansen (1985); and Chang and Kim (2006)) and public finance (see Blundell and Macurdy (1999); and Hoynes and Eissa (2006)).[1] Despite its importance, however, micro evidence on the labor supply elasticity in Korea is scarce.[2] Given that there has been a huge debate over welfare policies in Korea, information on the labor supply elasticity is essential for estimating the effect of changes in fiscal policies. Furthermore, the previous estimates for the elasticity in Korea might be biased; Domeij and Flodén (2006) find that estimated elasticities are biased downward in the presence of borrowing constraints. According to Noh (2020), about 13% of the total households in Korea are borrowing-constrained, implying a potential bias in the estimated labor supply elasticity without considering such a constraint.

This paper aims to estimate the Frisch elasticity by adding an interaction term between an individual's average contribution to household earnings and expected wage growth into an otherwise standard labor supply equation, a method suggested by Bredemeier et al. (2019). Hence, this paper contributes to the literature in three dimensions. First, we provide an unbiased estimate for the Frisch elasticity in Korea, which is in transition to a welfare state. Second, we study the robustness of Bredemeier et al. (2019) in the case of a country that has a different tax system from the U.S. Under the joint taxation system in the U.S., the primary earner's income has a substantial effect on the secondary earner's income tax. On the contrary, Korea has an individual-based tax system where each spouse pays taxes on his or her own income, implying that a joint borrowing constraint might have a smaller effect. Thus, this paper investigates whether considering a joint borrowing constraint is still important even in a country with a different tax system. Third, we also identify the risk aversion parameter in Korea. Our identification does not depend on either time-series framework (Kang (2008)) or survey questions (Kim and Lee (2012)), and hence our analysis complements previous findings.[3]

For the empirical analysis, we use the Korean Labor and Income Panel Study (KLIPS) data, which is a longitudinal survey of households in Korea. Using data from 2000 to 2018, we find that the magnitude of the Frisch labor supply elasticity is about twice higher when considering borrowing constraints; the elasticity is estimated to be 0.14 without consideration of borrowing constraints while the bias-corrected

[1]In this paper, labor supply elasticity refers to the Frisch elasticity.
[2]A few exceptions are Moon and Song (2016) and Hur and Rhee (2020).
[3]We thank an anonymous referee for pointing this out.

estimate is 0.23, which is consistent with Bredemeier et al. (2019). Our findings are robust to different instrumental variables and sample selections.[4]

2 A Labor Supply Model with Borrowing Constraints

In this section, we briefly discuss the model introduced in Bredemeier et al. (2019) in which a household faces joint labor supply decisions under the borrowing constraint. Each household faces the following periodic utility function:

$$u(c_t, h_t^i) = \frac{c_t^{1-\sigma}}{1-\sigma} - \sum_{i=m,f} \xi^i \frac{\left(h_t^i\right)^{1+1/\psi}}{1+1/\psi} \tag{2.1}$$

subject to

$$c_t + a_{t+1} = \sum_{i=m,f} w_t^i h_t^i + (1+r_t)a_t, \tag{2.2}$$

$$a_{t+1} \geq 0, \tag{2.3}$$

where both consumption (c_t) and saving (a_{t+1}) are determined at the household level, $i \in \{m, f\}$ denotes gender (male (m) or female (f)) of worker i, ξ^i is an individual-specific preference shifter, $\sigma \geq 0$ denotes constant relative risk aversion (henceforth CRRA), $\psi > 0$ is the gender-neutral Frisch labor supply elasticity, and $a_{t+1} \geq 0$ is the borrowing constraint.

If the household is not borrowing-constrained, one can derive the following labor supply equation à-la Altonji (1986):

$$\Delta \ln h_t^i = \psi \mathbb{E}_t \Delta \ln w_t^i + \chi_t + \varepsilon_t^i, \tag{2.4}$$

where for any variable x_t, $\Delta \ln x_t \equiv \ln x_{t+1} - \ln x_t$, χ_t is the time fixed effect, and ε_t^i is the associated error term. $\mathbb{E}_t \Delta \ln w_t^i$ is obtained by regressing the actual log wage differences on instrumental variables, of which we will discuss in detail later.

[4] For example, an analysis with different periods (2000-2008/2009-2018) to consider the financial crisis hardly changes results.

Thus, one can estimate the above equation to obtain ψ when the household is not borrowing-constrained. However, in the presence of constraints, one can derive the alternative specification:

$$\Delta \ln h_t^i = \left(\psi - \frac{\sigma\psi(\psi+1)}{\sigma\psi+1} \bar{s}_i \right) \mathbb{E}_t \Delta \ln w_t^i + \chi_t + \varepsilon_t^i, \tag{2.5}$$

where $\bar{s}_i = \frac{w_t^i h_t^i}{\sum_i w_t^i h_t^i}$ denotes the average earnings contribution of worker i in the household. Hence, one should include an interaction term between the average earnings share and expected wage growth of the worker in the estimation to correct the downward bias that occurs when the household faces a borrowing constraint. We further note that once ψ is estimated, σ can be also identified from the coefficient for the interaction term, $\frac{\sigma\psi(\psi+1)}{\sigma\psi+1}$.

In our empirical analysis, we mainly estimate equation (2.5). To obtain the expected wage growth, $\mathbb{E}_t \Delta \ln w_t^i$, we run a first-stage equation that regresses the actual wage growth rate on a set of instrumental variables including (1) age, age squared, years of schooling, and an interaction term between age and years of schooling as in Bredemeier et al. (2019) and (2) lags of the log wage difference and log wage rate as in Domeij and Flodén (2006).

3 Data

For our empirical analysis, we use the KLIPS data from 2000 to 2018. The KLIPS surveys 5,000 households living in urban areas of Korea every year and is the only labor-related household panel data in Korea which allows us to use wage growth as the main regressor and lagged variables as instruments.

Our sample includes full-time employed workers aged 25 to 54.[5] The working hour variable is calculated by the sum of regular and overtime hours worked per week. The wage variable is a monthly labor earning expressed as Korean won and is deflated using the consumer price index (2015=100) from the Korea Statistics Information Service.

4 Empirical Findings

Table 4.1 presents the main results. The first two columns show our benchmark results that include all control variables in the first-stage regression. Next two columns (IV 1) and the last two columns

[5] Self-employed workers, unpaid family workers, unemployed individuals, and observations whose wage or hour is below 0 and earnings contribution ≥ 1 are excluded.

(IV 2) present results with control variables in Bredemeier et al. (2019) and in Domeij and Flodén (2006), respectively. Odd (resp. even) columns present estimated coefficients in the regression of hours growth on expected wage growth without (resp. with) the interaction term between an individual's average earnings contribution and expected wage growth. Consistently with Bredemeier et al. (2019), the elasticities obtained with consideration of borrowing constraints are larger than those without the interaction term. Our preferred approach using each worker's earnings contribution yields a Frisch elasticity of 0.23. Compared to an elasticity estimated without the interaction term, the bias-corrected estimate is about two times higher, implying that elasticities without considering borrowing constraints are subject to substantial downward bias. The CRRA parameter is estimated to be about 0.5, a value consistent with the estimates from the previous literature (Kim and Lee (2012)).

Table 4.1: Frisch Labor Supply Elasticity in Korea (2000–2018)

	Benchmark		IV 1		IV 2	
	(1)	(2)	(3)	(4)	(5)	(6)
Expected wage growth	0.139***	0.226***	0.133	0.265	0.138***	0.218***
	(0.015)	(0.044)	(0.091)	(0.172)	(0.016)	(0.047)
Expected wage growth ×		−0.116*		−0.153		−0.109*
Earnings contribution		(0.057)		(0.233)		(0.060)
CRRA Parameter (σ)		0.461***		0.521		0.448***
		(0.154)		(0.571)		(0.171)
Time fixed effects	O	O	O	O	O	O
Observations	40,743	38,839	40,743	38,839	40,743	38,839

Note: Robust standard errors are in parentheses. Benchmark includes all control variables, IV 1 includes variables in Bredemeier et al. (2019), and IV 2 includes variables in Domeij and Flodén (2006).

Table 4.2 shows results by gender. The Frisch labor supply elasticity is estimated to be 0.14 for both men and women when we ignore borrowing constraints. On the contrary, with the interaction term, the estimated elasticities are 0.27 for men (column (2)) and 0.21 for women (column (5)), suggesting a greater bias for men.[6] This is because the bias due to the joint borrowing constraint is greater for individuals who contribute more to household income and men are usually the primary earners in Korea. As a complementary analysis, we further estimate the same equation with an interaction between expected wage growth and a dummy variable indicating whether the individual has a higher wage rate than the spouse, and thus, is the primary earner in the household. The effect of being a primary earner on the estimated Frisch elasticity is negative (columns (3) and (6)), but it is significant

[6] In the U.S., the elasticity is usually higher for women than men. Our finding indicates that the individual-based tax system might lower women's elasticity in Korea as the system does not substantially affect the marginal tax rate.

only for men. This corroborates that men are more likely to be primary earners in Korea and the labor supply elasticities are estimated to be substantially lower for primary than for secondary earners when borrowing constraints are ignored, which is consistent with Bredemeier et al. (2019).

Table 4.2: Frisch Labor Supply Elasticity by gender in Korea

	Men			Women		
	(1)	(2)	(3)	(4)	(5)	(6)
Expected wage growth	0.140***	0.265***	0.273***	0.140***	0.207***	0.185***
	(0.019)	(0.077)	(0.067)	(0.027)	(0.061)	(0.035)
Expected wage growth ×		−0.161*			−0.079	
Earnings contribution		(0.090)			(0.105)	
Expected wage growth ×			−0.094**			−0.046
Primary earner			(0.038)			(0.053)
CRRA Parameter (σ)		0.552***	0.519***		0.338	0.219***
		(0.168)	(0.118)		(0.380)	(0.235)
Time fixed effects	O	O	O	O	O	O
Observations	27,074	25,780	25,780	13,669	13,059	13,059

Note: Robust standard errors are in parentheses. All control variables suggested by Bredemeier et al. (2019) and Domeij and Flodén (2006) are included in the first-stage regression.

Lastly, in Table 4.3, we report results by earnings level. In particular, we divide the sample of men to those in the upper 25% of the earnings distribution and those in the bottom 25%, and estimate the standard labor supply regression as well as the bias-corrected one. If we do not consider borrowing constraints (columns (1) and (3)), the labor supply of workers with high earnings seems to be substantially less elastic compared to that of workers with low earnings. However, this difference in labor supply elasticities might be overestimated. As workers with high earnings contribute larger shares to household income, the interaction term approach shows that unbiased estimates for labor supply elasticities are similar between both earnings groups, which again confirms findings by Bredemeier et al. (2019).

Table 4.3: Frisch Labor Supply Elasticity by men's earnings level in Korea

	Top 25% Earnings		Bottom 25% Earnings	
	(1)	(2)	(3)	(4)
Expected wage growth	0.044**	0.232**	0.256***	0.221**
	(0.020)	(0.100)	(0.037)	(0.086)
Expected wage growth ×		−0.208*		0.041
Earnings contribution		(0.114)		(0.118)
Expected wage growth ×				
Time fixed effects	O	O	O	O
Observations	9,263	9,263	2,768	2,638

Note: Robust standard errors are in parentheses.

5 Concluding Remark

Without considering each worker's earnings contribution within a household, the estimated labor supply elasticity is likely to be subject to a downward bias due to the joint borrowing constraint. Our analysis indicates that findings in the previous literature using U.S. data are still observed in a country with a different tax system, although the elasticity for men is estimated to be higher than that for women in Korea. Hence, it is suggested for future research to seriously consider the financial constraint when estimating the labor supply elasticity.

References

Altonji, Joseph G. (1986), "Intertemporal substitution in labor supply: Evidence from micro data." *Journal of Political Economy*, 94, S176–S215.

Blundell, Richard and Thomas Macurdy (1999), "Labor supply: A review of alternative approaches." In *Handbook of Labor Economics* (Orley C. Ashenfelte and David Card, eds.), North-Holand.

Bredemeier, Christian, Jan Gravert, and Falko Juessen (2019), "Estimating labor supply elasticities with joint borrowing constraints of couples." *Journal of Labor Economics*, 37, 1215–1265.

Chang, Yongsung and Sunbin Kim (2006), "From individual to aggregate labor supply: A quantative analysis based on a heterogenous agent macroeconomy." *International Economic Review*, 47, 1–27.

Domeij, David and Martin Flodén (2006), "The labor-supply elasticity and borrowing constraints: Why estimates are biased." *Review of Economic Dynamics*, 9, 242–262.

Hansen, Gary D. (1985), "Indivisible labor and the business cycle." *Journal of Monetary Economics*, 16, 309–327.

Hoynes, Hilary and Nada Eissa (2006), "The hours of work response of married couples: Taxes and the earned income tax credit." In *Tax Policy and Labor Market Performance* (Jonas Agell and Peter Birch Sorensen, eds.), MIT Press.

Hur, Joonyoung and Wooheon Rhee (2020), "Multipliers of expected vs. unexpected fiscal shocks: The case of korea." *Economic Modelling*, 85, 244–254.

Kang, Min-woo (2008), "An empirical study on the equity premium and the risk aversion coefficient in the korean stock market." *Korea Review of Applied Economics*, 10, 33–49.

Kim, Young-Il and Jungmin Lee (2012), "Estimating risk aversion using individual-level survey data." *Korean Economic Review*, 28, 221–239.

Moon, Weh-Sol and Sungju Song (2016), "Estimating labor supply elasticity in korea." *Korean Journal of Labor Economics*, 39, 35–51.

Noh, Sanha (2020), "Debt risk of vulnerable households under covid-19: Assessment and implications." *Capital Market Focus*, 1–10.