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The macroeconomic effects of basic income funded by a land-holding tax in Korea

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Abstract

We examine the macroeconomic effects of the introduction of a scheme to pay a basic income of approximately $900 per year to each citizen through a land-holding tax. Unlike other studies, we address the issue of whether a sharp increase in the land-holding tax rate intended to raise funds for a basic income scheme causes landowners to sell their land. We also use the relationship between holding assets and reservation wages to determine whether household members supply their labor in accordance with the payment of basic income. Our simulation results obtained using data for Korea show that the introduction of the basic income scheme decreases real gross domestic product, total labor demand, and social welfare by 1.3%, 0.3%, and 0.4%, respectively.

JEL Classification: H24; E20; C61

Keywords: Basic income; Land-holding tax; Macroeconomic effects

1. Introduction

Political interest in basic income has recently been very high in Korea. In 2021, a plan to pay approximately $900 per year to each citizen was proposed by one of the country's presidential candidates. The outbreak of COVID-19 in March 2020 fueled discussion about basic income. Due to the pandemic, economic activity was greatly reduced, and many people found it difficult

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to maintain a basic livelihood. In response, the Korean government paid several emergency disaster subsidies. Similar to a basic income, the first emergency disaster subsidy was paid to the entire nation.

The basic income system solves the problems with the existing welfare system, which must first select its targets and then monitor them to prevent illegal demand. The basic income system solves these problems because it pays the same income to all citizens.

Nevertheless, the basic income system requires huge financial resources that are difficult to procure. In 2021, for both political and economic reasons, the presidential candidate referenced above suggested financing the basic income system through a land-holding tax. Politically, the Korean people were expected to be relatively unlikely to criticize a land-holding tax. The previous government raised the housing holding tax too high, causing numerous complaints. According to the National Tax Service of Korea, the comprehensive housing holding tax increased by approximately 11 times from 2017 to 2021, resulting in the highest housing holding tax ever. The political prediction of scant popular resistance to a land-holding tax was also based on the fact that most land-holding taxpayers are corporations, not individuals. According to the National Tax Service of Korea, as of 2021, approximately 82% of the comprehensive real-estate holding taxes for land were paid by corporations. Economically, the land-holding tax is efficient because, unlike capital and labor income taxes, it does not distort the tax base (Kalkuhl et al., 2018; Schwerhoff et al., 2022). Some opponents of the basic income system argue that it pays money to people who do not work, thereby reducing their motivation to supply labor. Below, we discuss existing studies of the basic income system.

Moutos and Scarth (2003) theoretically analyze the macroeconomic effects of the introduction of the basic income system in both a closed economy and an open economy. In the former case, because capital is given exogenously, the introduction of the basic income system does not affect the macroeconomy. In the latter case, capital is free to move abroad and is endogenously determined. Under such circumstances, if a capital income tax is levied to finance the basic income system, the price of capital rises. Firms reduce wages to offset the increased cost of capital. Under low wages, productivity is low, leading to a decrease in the gross domestic product (GDP).

Van der Linden (2004) investigates how the basic income system affects participation in the labor market using the dynamic general equilibrium model, which determines wages through labor-management negotiations. He considers the case of providing basic income only to those who participate in the labor market and the case of providing a basic income to everyone regardless of whether they participate in the labor market. In the former case, the labor market participation rate increases when a basic income is introduced. In the latter case, the labor market participation rate may decrease when a basic income is introduced because excessive taxation is required to provide a basic income to everyone regardless of whether they participate in the labor market.

Fabre et al. (2014) compare the welfare effects of a basic income system and the unemployment benefit system in the United States using the dynamic general equilibrium model. They find that unemployment benefit schemes are superior to basic income schemes because unemployment schemes can be more specific about who needs them than basic income schemes. They also show that the introduction of the basic income system increases the unemployment rate.

Nikiforos et al. (2017) examine the macroeconomic effects of the introduction of a basic income system in the United States using a Keynesian-type Levy macroeconomic model. They

introduce methods to finance the basic income system through government debt and taxation. They show that using government debt to pay every adult $1000 a month increases GDP by 12.56% after eight years and that using taxes to fund the program increases GDP by 2.62%. The reason for the first finding is that the economy grows when basic income is paid to households due to an increase in aggregate demand. The reason for the second finding is that the propensity to consume is greater in the low-income class (which pays less tax) than in the high-income class (which pays more tax), thus stimulating the economy.

Using the cases of Indonesia and Peru, Hanna and Olken (2018) show that in developing countries, selective transfer income is more effective than basic income. In developing countries, transfer income is provided by selecting recipients based on their income. However, it is difficult for the government to observe the income of a significant proportion of the population. Thus, the rich are often included among the beneficiaries of selective payments or those who must receive them are excluded. Nevertheless, selective payment is more effective than basic income because it can transfer more income to the poor on a per-person basis than basic income can.

Luduvice (2019) derives the macroeconomic effects of the introduction of the basic income system in the United States using the dynamic general equilibrium model. He considers ways to use existing welfare funds and taxation to obtain the financial resources required for a basic income system. In the former case, GDP increases by 5.2% because the inefficiency caused by the qualifications for the existing welfare system disappears. In the latter case, GDP decreases by 13.1% because increased taxes are required to obtain the financial resources required for the basic income system.

Magnani and Piccoli (2020) examine the effects of the introduction of the basic income system coupled with a flat income tax on the French economy using a micro-macro simulation model. They consider the way to use existing welfare funds to obtain the financial resources required for the basic income system. They show that introducing a basic income system with a flat income tax not only significantly reduces income inequality and poverty but also has moderately positive macroeconomic effects. The reason for this finding is the very low elasticity of labor supply to net real wages and other non-labor incomes in France. Furthermore, because existing welfare funds replace the financial resources required for the basic income system, additional funds are not required.

Caamal-Olvera et al. (2022) simulate four scenarios for Mexico involving direct money transfers equal to $1668 per month to individuals in multidimensional poverty, elderly people, families with children under 15 years old, and all populations, using the MEXMOD tax-benefit microsimulation. The best policy in terms of its distributive impacts is the unconditional transfer (basic income) policy. However, that scenario is also the most expensive and would cost 10.61% of GDP.

We extend the literature in several ways. First, previous studies do not address the issue of whether household members decide to sell the land endowed to them due to a sharp increase in the land-holding tax rate to raise funds for the payment of basic income. In contrast, this study reflects this decision endogenously. If basic income—which requires huge financial resources—is provided through a land-holding tax, household members who cannot afford the tax will sell their land. It is reasonable to reflect this phenomenon in the model. Second, other studies do not systematically address the relationship between holding assets and reservation wages in their analysis of basic income. In contrast, our study introduces this relationship to solve the problem of determining whether household members supply their labor when receiving basic income. Third, other studies do

not explicitly consider housing, land, and mortgage loans when analyzing basic income. Therefore, our study designs a more realistic model by reflecting these factors.

For the reasons set forth above, our objective is to systematically examine the type of economic ripple effect that would occur if a scheme to pay a basic income of approximately $900 per year to each citizen through a land-holding tax, as recently discussed in Korean political circles, were introduced. Simulation results obtained using data for Korea show that the introduction of such a scheme would have negative macroeconomic effects because the land-holding tax rate would need to be significantly raised to obtain the financial resources to pay the basic income. Such an increase in the land-holding tax rate would increase the number of landowners selling land due to an inability to withstand the rapid increase in the land-holding tax rate. This reduction in the number of landowners would lead to increased land-rental prices because of the decrease in the land-rental supply. This increased cost of renting land would lead to a decrease in the land demand of producing firms, resulting in a decrease in such firms' production and social welfare.

Interestingly, contrary to the arguments offered by opponents of the basic income system, we find that under such a system, the number of household members who want to supply labor increases. The reason for this finding is the decrease in net assets that follow a sharp increase in the land-holding tax rate.

The remainder of the study is organized as follows. Section 2 describes the main features of the model that serves as the theoretical framework for the study. Section 3 provides the simulation results. Section 4 presents the conclusions.

2. Model

2.1. Overview

We consider a dynamic general equilibrium model to address the issue of whether household members sell their land or supply their labor in accordance with the payment of basic income.[1] In the model economy, economic agents are divided into households and firms. Each household member decides whether to sell his or her land or to supply his or her labor in accordance with the payment of basic income. The fraction α represents a general firm, and the fraction $1-\alpha$ represents a housing-producing firm. The general firm produces general goods by combining labor, non-residential capital, and land. The housing-producing firm produces housing through labor and non-residential capital.

The first key feature of the model is the issue of whether household members decide to sell their land due to a sharp increase in the land-holding tax rate to raise funds for the payment of basic income. Korea introduced its comprehensive real estate holding tax on land in 2005. This policy greatly increased the tax burden on household members who owned land and triggered them to sell. According to the Korean Real Estate Board, the land area sold by individuals increased significantly immediately after the introduction of the comprehensive real estate holding tax (see Fig. 1). Jung and Park (2009) show that the excessive tax burden caused by Korea's comprehensive real estate holding tax increases the sales of land owned by household members.

[1] The model equations are reported in the working version of this paper (La, 2023).

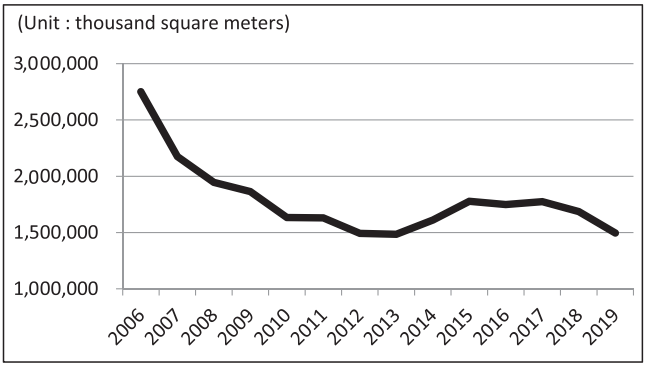

Figure 1. Land area sold by individuals in Korea,
Source: Korea Real Estate Board.

Based on this observation, we assume that household members sell their land when their taxes (i.e., the housing- and land-holding taxes) are higher than their wage income.[2] A reasonable household member sells if their wage income cannot cover the property holding tax.

The second crucial feature of the model is its use of the relationship between holding assets and reservation wages to solve the problem of determining whether household members supply labor in accordance with the payment of basic income. According to Bloemen and Stancanelli (2001) and Alexopoulos and Gladden (2006), reservation wages increase with holding assets. The problem of household members' decision to supply labor is addressed based on the relationships between them. The household member does not supply labor when their wage income is below a certain proportion of their net asset value; conversely, they supply labor when their wage income is greater than this proportion of their net asset value.

Other features of the model are as follows. We assume a unit elasticity of substitution between general goods and housing services, following Fernandez-Villaverde and Krueger (2011). The quantity of housing owned by each household member is assumed to provide the same number of housing services. In addition, the labor services vary in accordance with the labor productivity of household members even if the input hours are the same. Thus, wages are the price for labor services provided by the combination of labor productivity and labor supply time.

2.2. *Taking the model to the data*

The parameters of the model are calibrated to match observations made in Korea. For this purpose, we propose a model that covers one year. In addition, functional forms of the density function of land price and the density function of labor productivity are needed for calibration. We introduce Pareto distributions for these two density functions.[3]

[2] Only land sales are considered because the issue of household members deciding whether to sell or own housing is not considered.

[3] The main results do not change when the lognormal distributions are considered as the distributions of land price and labor productivity. As when we use the Pareto distributions, if $900 per year of basic income is paid to each citizen through the land-holding tax, then real GDP, total labor demand, and social welfare decrease by 1.4%, 0.3%, and 0.4%, respectively.

Table 1
Calibration targets.

Statistic	Data	Model
Ratio of total real capital to real GDP	3	3
Ratio of real facility investment to real GDP	0.1	0.1
Real interest rate	0.044	0.044
Ratio of sales in the construction industry to sales in all industries	0.1	0.1
Ratio of basic income to nominal GDP	0.03	0.03
Ratio of basic income to total other transfer income	0.6	0.6

It is difficult to observe the following parameters: the discount factor, the quantity of land, the share of non-residential capital demand of a general firm, the share of land demand of a general firm, the parameter determining the shape of the Pareto distribution for the land price, the share of the consumption of general goods, the basic income paid to all household members, the parameter determining the shape of the Pareto distribution for labor productivity, and the other transfer income of a household member. Thus, the values of these parameters are derived indirectly, using targeted data, as shown in (Table 1).

According to Hong and Kang (2015), the ratio of total real capital to real GDP in Korea is three. According to the Bank of Korea, in 2019, the ratio of real facility investment to real GDP was 0.1. The discount factor, the quantity of land, the share of non-residential capital demand of a general firm, the share of the land demand of a general firm, and the parameter determining the shape of the Pareto distribution for land price are set at 0.958, 0.5, 0.23, 0.1, and 1.004, respectively, to match the two above ratios. Furthermore, the value of the discount factor considers the 2019 real interest rate of 4.4% obtained from the World Development Indicators. The discount factor is closely related to the total real capital, real facility investment, and real interest rate. The remaining parameters affect real GDP. The ratio of total real capital to real GDP, the ratio of real facility investment to real GDP, and the real interest rate derived from the model are 3, 0.1, and 0.044, respectively.

According to statistics on for-profit corporations from Statistics Korea, in 2019, the ratio of sales in the construction industry to sales in all industries was 0.1. The share of the consumption of general goods is set to 0.9 to match this observation; this parameter affects sales in the construction industry. The ratio derived from the model is also 0.1.

According to census data from Statistics Korea, Korea's total population in 2019 was 51,779,203. Based on this number, the total annual amount required to pay $900 per year to each citizen is $46.6 billion. According to the International Monetary Fund, Korea's nominal GDP in 2019 was $1646.7 billion. Thus, the ratio of the basic income to the nominal GDP is 0.03. The basic income is set to 0.0217 to match this ratio. The ratio derived from the model is 0.03.

According to the Ministry of Economy and Finance, the current transfer expenditure to all households in 2019 was approximately $76.4 billion. This expenditure does not include the basic income. It can be regarded as the total other transfer income excluding the basic income. Thus, the ratio of the basic income to the total other transfer income is 0.6. The parameters determining the shape of the Pareto distribution for labor productivity and the other transfer income to a household member are set at 1.004 and 0.035, respectively, to match this ratio. These two parameters are closely related to the total other transfer income. The ratio derived

from the model is also 0.6. For the remaining parameters, we look to previous studies and observations made in Korea.[4]

3. Results

We examine the steady state of a model economy to pay a basic income of approximately $900 per year to each citizen through a land-holding tax in comparison with the steady state of a model economy without this event.

We first examine the changes in individual variables. The introduction of the scheme to pay a basic income of approximately $900 per year to each citizen produces a 110.3% hike in the land-holding tax rate because that rate needs to be raised to fund the basic income. The increase in the land-holding tax rate causes a 53.2% reduction in the critical land price, which determines whether household members choose to own land. In other words, the number of household members selling land increases because household members who are unable to withstand the rapid tax increase sell their land. The reduction in the number of landowners leads to a 1.7% hike in the land rental rate because the reduction in the number of landowners causes a decrease in the land rental supply. The hike in the land rental rate leads to a 3.1% decrease in the land demand of a general firm in accordance with the land rental demand function. The reduction in the land demand decreases the labor demand and non-residential capital demand of the general firm by 0.4% and 1.4%, respectively, as it is complementary to them. Furthermore, the production of general goods decreases by 1.4% because of the reduction in inputs. Additionally, the reduction in the production of general goods results in a 0.6% decrease in the consumption of general goods.

Basic income can increase the number of household members who do not want to provide labor. However, due to a decrease in net assets following a sharp increase in the land-holding tax rate, the number of household members who want to supply labor increases. In other words, critical labor productivity, which determines whether household members supply labor, decreases by 42.0%. The increase in the number of labor providers leads to a 1.0% reduction in the wage per efficiency unit of labor.

This wage reduction causes a 0.4% hike in the labor demand of a housing-producing firm in accordance with the labor demand function. Note that the labor demand of the general firm decreases even with the wage reduction because the effects of the reduction in the general firm's land demand on labor demand are greater than the effects of the wage reduction on labor demand. Additionally, the wage reduction leads to a 0.5% decrease in the labor supply time, in accordance with the labor supply function.

The rental rate of non-residential capital does not change because it is unaffected by any variable in the long-run equilibrium. If the rental rate of non-residential capital is unchanged, the reduction in the general firm's non-residential capital demand results in a 1.3% decrease in the claim on non-residential capital. The reason for this finding is that the reduction in the general firm's non-residential capital demand accompanies the decrease in the non-residential capital supply to fix the rental rate of non-residential capital in the non-residential capital market. Additionally, the reduction in the non-residential capital supply causes a 0.6% decrease in the non-residential capital demand of a housing-producing firm. This is because the demand and supply of non-residential capital move in the same direction when the rental rate of non-residential capital is fixed.

[4] Details regarding the calibration are in the working version of this paper (La, 2023).

Table 2
Changes in individual variables when a basic income of approximately $900 per year is paid to each citizen through the land-holding tax.

Variable	Change rate (%)
Land-holding tax rate	110.3
Critical land price	-53.2
Land rental rate	1.7
Land demand of a general firm	-3.1
Labor demand of a general firm	-0.4
Non-residential capital demand of a general firm	-1.4
Production of general goods	-1.4
Consumption of general goods	-0.6
Critical labor productivity	-42.0
Wage per efficiency unit of labor	-1.0
Labor demand of a housing-producing firm	0.4
Labor supply time	-0.5
Rental rate of non-residential capital	0.0
Claim on non-residential capital	-1.3
Non-residential capital demand of a housing-producing firm	-0.6
Production of housing	0.1
Price of housing	-0.7
Housing services	0.1
Mortgage borrowing	-0.6

Because the labor demand of a housing-producing firm contributes more to the production of housing than its non-residential capital demand does, housing production also increases by 0.1%. This hike in housing production causes a 0.7% reduction in the housing price. The decrease in the housing price leads to a 0.1% increase in housing services in accordance with the housing service demand function. Additionally, the reduction in the housing price produces a 0.6% decrease in mortgage borrowing. This is because the decline in the housing price causes the value of housing collateral to decrease (Table 2).

Next, we examine changes in macro variables based on the changes in the variables discussed above. The introduction of the scheme to pay a basic income of approximately $900 per year to each citizen through the land-holding tax decreases real GDP, total labor demand, real facility investment, total real capital, and total real consumption by 1.3%, 0.3%, 1.3%, 1.3%, and 0.6%, respectively. We define a change in social welfare due to the introduction of the basic income system as the percentage change in per-period consumption that household members in the initial steady state should receive to give them the same utility that they obtain if the basic income system is introduced. The introduction of the basic income system decreases social welfare by 0.4% (Table 3).

Table 3
Changes in macro variables.

Variable	Change rate (%)
Real GDP	-1.3
Total labor demand	-0.3
Real facility investment	-1.3
Total real capital	-1.3
Total real consumption	-0.6
Social welfare	-0.4

4. Conclusion

This research makes several important contributions. Previous studies do not address the issue of whether household members decide to sell their endowed land following a sharp increase in the land-holding tax rate caused by the basic income program. Our study explicitly confronts this issue in the theoretical general equilibrium model. Furthermore, it introduces the relationship between holding assets and reservation wages to solve the problem of determining whether household members supply their labor in accordance with the payment of basic income, whereas previous studies do not systematically deal with this relationship in the analysis of basic income. Additionally, our study designs a more realistic model than previous studies by reflecting housing, land, and mortgage loans.

Simulation results obtained using data for Korea show that the introduction of the scheme to pay a basic income of approximately $900 per year to each citizen through an increase in the land-holding tax decreases real GDP, total labor demand, and social welfare by 1.3%, 0.3%, and 0.4%, respectively. The main reason for these negative macroeconomic effects is that landowners who are unable to withstand the rapid tax increase sell their land—a fact that Korean policymakers overlook. Our study highlights this consideration, which is important to the recent political debate on the introduction of basic income in Korea.

We provide a theoretical model of the macroeconomic effects of basic income funded by an increase in the land-holding tax while leaving room for further research. We develop our model under the assumption that financial resources for the payment of basic income will be funded by land-holding tax. The development of a model in which a basic income scheme is funded by a robot tax, as proposed by several commentators, is left for the future.

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