Generating Growth in the Japanese Economy by Attracting Overseas Investors in Cheap-Yen Environment

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The Japanese economy, shrouded in gloom against the backdrop of a declining birth rate, an aging population, and increasingly global competition, has now seen the yen fall and stock prices rise since last December on expectations over "Abenomics". A cheap yen often invites focus on the export competitivity of the Japanese economy. But also important is to recognize that it enables overseas players to come and invest on the cheap. It offers Japan a chance to attract foreign capital. Tokyo's winning the 2020 Olympics bid will also accelerate such a chance.

Also attracting attention of late, as in other developed countries, is the effect of corporate taxation on foreign direct investment (FDI), raising calls for lower corporate tax rates in the context of an economic growth strategy. As a backdrop to this is the declining rate of savings stemming from a decreasing birth rate and an aging population, and the international competition to attract capital to counteract this phenomenon, and the efficient management of international capital in an increasingly globalized economic environment.

Indeed, Germany, the United Kingdom, the Netherlands and other European countries have been cutting corporate tax rates in order to attract overseas investors, while Hong Kong, Singapore, and other countries in Asia have followed suit, ramping up the competition to attract investment among Japan and its neighbors.

Thus, many countries and regions have been lowering corporate tax rates. However, the impact of corporate taxation on FDI with regard to the movement of international capital is not well understood. Therefore, estimating the significance of this impact is very important in the policy debate regarding the reduction of corporate tax rates.

In the 1980s, D. G. Hartman, Michael J. Boskin and W. G. Gale, and K. H. Young pioneered empirical analysis of the relationship between international capital movements and the tax regime. The problem with this body of work was that the estimation took very little account of non-taxation factors. In the next decade, David Wheeler and Ashoka Mody, and S. L. Brainard took those factors into account and concluded that the impact of corporate taxes was not significant. More recently, however, Michael P. Devereux and Rachel Griffith, Roger H. Gordon and James R. Hines, and others have conducted empirical analyses taking non-taxation factors fully into account as well as tax rates, and concluded that it is highly likely that corporate taxes and other elements of taxation do have an effect on international capital movements. Agnès Bénassy-Quéré and others, moreover, have demonstrated in an empirical analysis of FDI between 11 OECD member countries that the impact of reducing corporate tax rates on FDI is significant.

There have also been a small number of empirical analyses in Japan concerning international capital movements and tax regimes. Masahiro Hidaka and Minoru Maeda, in 1994, and Satoko Maekawa, in 2005, concluded that the impact of corporate taxes is significant, while Kyoji Fukao and Hoon Chung and others have found to the contrary. In particular, Hidaka and Maeda, and Maekawa, harbor the same doubts as Hartman, and the impact of corporate taxation has not necessarily been clarified within the context of international capital movements. Thus, it is important to confirm its significance once more while taking into account non-taxation factors (such as levels of education and degrees of investment security).

Here, I will introduce part of my recent empirical analysis on the significance of the impact of corporate taxation on FDI.

The data in this analysis consist of panel data spanning 23 years from 1981-2003 whose cross-section categories consist of 31 mainly OECD member countries (Ireland, the United States, the UK, Italy, India, Indonesia, Australia, Austria, the Netherlands, Canada, South Korea, Singapore, Switzerland, Sweden, Spain, Thailand, China, Denmark, Germany, Turkey, New Zealand, Norway, Pakistan, the Philippines, Finland, France, Belgium, Malaysia, Mexico, Portugal, and Greece).

The following estimation model includes the impact of non-taxation factors on FDI.

The amount of Japanese FDI (flow) into host country j in year t is represented by the dependent variable $FDI_{i,t}$, the corporate tax rate (statutory) by the explanatory variable $\tau_{i,t}$, the other explanatory variables (k = 1,2,……, 10) by $X^k_{i,t}$, the fixed effects by $\mu_{i,t}$, and the disturbance term by $\varepsilon_{i,t}$.

$$FDI_{i,t} = \alpha \cdot \tau_{i,t} + \Sigma \beta_k \cdot X^k_{i,t} + \mu_{i,t} + \varepsilon_{i,t} \quad (※)$$

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The following is an overview of the data for each variable and the sign condition for each coefficient.

- $FDI_{i,t}$: Amount of FDI (flow), derived by converting FDI in nominal yen to real US (million) dollars using the exchange rates and GDP deflator (data sources: "Foreign Direct Investment", Ministry of Finance, and *Monthly Finance Review* for FDI (nominal yen); *World Development Indicators*, World Development Bank, for exchange rate and GDP deflator).
- $\tau_{i,t}$: Statutory corporate tax rate (host country) expressed as a percentage (data source: *World Tax Database*, Ross School of Business, Michigan). Theoretically, this coefficient carries a minus sign.
- $X^1_{i,t}$: Real GDP (host country), converted to real (billion) US dollars (data source: *World Development Indicators*, World Bank). The

larger the host country economy is, the more likely it is that the variable carries a plus sign when investment increases. It is defined with horizontal, not vertical, FDI in mind. (Note: "Horizontal FDI" means the kind of FDI where a multinational corporation goes overseas to expand the sales market for its product, while "vertical FDI" means the kind of FDI where a multinational corporation goes overseas to take advantage of cheap production factors. In the latter case, goods produced in the host country are often shipped home or to third countries without being sold and consumed in the host country.)

- $X^2_{i,t}$: Real GDP (Japan), converted to real US (billion) dollars (data source: *World Development Indicators*, World Development Bank). This coefficient carries a plus sign since it is natural to assume that the higher GDP is in the home country, the more likely it is that investment will increase.
- $X^3_{i,t}$: Investment barrier index, derived by subtracting the value of the inbound FDI ratio (the amount of inbound FDI outstanding as a fraction of GDP) expressed as a percentage from 100 (data source: *World Development Indicators*, World Bank). This coefficient carries a minus sign since it is natural to assume that the higher the investment barrier index is in the host country, the more likely it is that investment will decrease.
- $X^4_{i,t}$: Population density, represented by the ratio of population to area (data source: *World Development Indicators*, World Bank). Defined with horizontal FDI in mind, this coefficient carries a plus sign since it is natural to assume that the higher population density is in the host country, the more likely it is that investment will increase.
- $X^5_{i,t}$: Inflation rate, represented by the value of the consumer price index (data source: *World Development Indicators*, World Bank). This coefficient carries a minus sign since it is natural to assume that the higher the inflation rate is in the host country, the more likely it is that investment will decrease.
- $X^6_{i,t}$: Currency exchange rate, represented by the host-country-yen rate derived by dividing the host country currency-dollar rate (LCU/$) by the yen-dollar rate (¥/$) (data source: *World Development Indicators*, World Bank).
- $X^7_{i,t}$: Trade barrier index (host country), derived by subtracting the value of the degree of openness to trade (the amount of exports and imports as a fraction of GDP) expressed as a percentage from 100 (data source: *Penn World Table*, http://pwt.econ.upenn.edu/). The effect of the trade barrier index on FDI depends on whether the relationship between traded goods and investment goods is substitutionary or complementary. In a substitutionary relationship, the higher the cost of trade (imports), the more investment there is as the substitute. In a complementary relationship, the higher the cost of trade (imports), the less investment there is. When the traded goods are a factor of production or intermediate goods, the higher the cost of trade (imports), the more it hampers the procurement of material and hence the less investment there is. In the case of vertical FDI, the higher the cost of trade (exports), the more it hampers the post-production transport of manufactured goods and hence the less investment there is. Thus this coefficient may carry a minus or plus sign.
- $X^8_{i,t}$: Trade barrier index (Japan), derived by subtracting the value of the degree of openness to trade (the amount of exports and imports as a fraction of GDP) expressed as a percentage from 100 (data source: *Penn World Table*). The effect of the trade barrier index on FDI depends on whether the relationship between traded goods and investment goods is substitutionary or complementary. In a substitutionary relationship, the higher the cost of trade (imports), the more investment there is as the substitute. In a complementary relationship, the higher the cost of trade (imports), the less investment there is. When the traded goods are a factor of production or intermediate goods, the higher the cost of trade (imports), the more it hampers the procurement of material and hence the less investment there is. In the case of vertical FDI, the higher the cost of trade (exports), the more it hampers the post-production transport of manufactured goods and hence the less investment there is. Thus, this variable may carry a minus or plus sign.
- $X^9_{i,t}$: Years of education defined as the average years of education for the population 25 years old and older (data source: *edstats*, World Bank website). Since these data are available only once every five years, values for the intermediate years are interpolated using the averages of the values for the two nearest years for which the data are available. Notwithstanding, the 1985 value is extrapolated for the years 1981-1984 and the 2000 value for 2001-2003. The more years of education there are in the host country, the easier it is to secure good human resources, which means that investment may rise. On the other hand, the more years of education there are, the higher wages will be, which means that investment may decrease. Thus, this coefficient may carry a minus or plus sign.
- $X^{10}_{i,t}$: Degree of investment security, representing the level of credit evaluation gauging the likelihood of default (data source: "Investment Credit Rating", *The Institutional Investor* magazine). This coefficient carries a plus sign since it is natural to assume that the higher the degree of security is in the host country, the more likely it is that investment will be higher.

Using these estimation model equations (※) and data, a time-series panel-data analysis (fixed effects) was conducted to estimate the significance of the impact of corporate taxation on international capital movements. In these estimates, some of the explanatory variables in $X^k_{i,t}$ were omitted in order to confirm the sign condition and significance of each variable. Theoretically, statutory corporate tax rate (host country) and real GDP as the proxy variable for wages should be the main explanatory variables that affect FDI.

The results are shown in *Charts 1-6*. The estimation model for the charts is given in *Chart 7*. Model 1 uses all the explanatory variables in equation (※), while models 2 through 5 each omits an explanatory variable in descending order of significance. This was done in view of the criticism against Hidaka and Maeda, like Hartman, for not taking non-taxation factors into consideration, so that the effect of non-

CHART 1

Model 1: Case including all explanatory variables

Estimation method: fixed-effects, time-series panel-data analysis
Dependent variable: FDI (original series)

	Coefficient	Standard error	t value
Corporation tax rate (host country)	-49.07***	17.62	-2.78
Real GDP (host country)	0.83***	0.30	2.74
Real GDP (Japan)	0.22	0.33	0.67
Trade barrier index	-13.38	18.08	-0.74
Population density	-0.04	0.57	-0.06
Inflation rate	2.53	9.80	0.26
Exchange rate	-0.01	0.14	-0.07
Trade barrier index (host country)	-1.12	6.70	-0.17
Trade barrier index (Japan)	88.28***	32.47	2.72
Years of education	-614.28**	282.62	-2.17
Degree of investment security	-5.71	15.08	-0.38
Constant	1142.35	3499.92	0.33
Number of samples 660			
Adjusted R-squared 0.689395			
Correlated random effects – Hausman test			
Test summary	statistic: χ2	χ2. d.f.	p value
Cross-section random	32.70	11	0.0006

*Note: ***, **, and * on coefficients indicates significance at 1%, 5%, and 10% significance levels, respectively.*
Source: Author

CHART 2

Model 2: Case excluding exchange rate as explanatory variable

Estimation method: fixed-effects, time-series panel-data analysis
Dependent variable: FDI (original series)

	Coefficient	Standard error	t value
Corporation tax rate (host country)	-48.98***	17.57	-2.79
Real GDP (host country)	0.83***	0.30	2.75
Real GDP (Japan)	0.22	0.33	0.67
Trade barrier index	-13.40	18.06	-0.74
Population density	-0.04	0.57	-0.06
Inflation rate	2.57	9.77	0.26
Trade barrier index (host country)	-1.11	6.69	-0.17
Trade barrier index (Japan)	88.45***	32.34	2.74
Years of education	-615.71**	281.66	-2.19
Degree of investment security	-5.62	15.02	-0.37
Constant	1131.12	3493.48	0.32
Number of samples 660			
Adjusted R-squared 0.708718			
Correlated random effects – Hausman test			
Test summary	statistic: χ2	χ2. d.f.	p value
Cross-section random	33.09	10	0.0003

*Note: ***, **, and * on coefficients indicates significance at 1%, 5%, and 10% significance levels, respectively.*
Source: Author

CHART 3

Model 3: Case excluding exchange rate & population density as explanatory variables

Estimation method: fixed-effects, time-series panel-data analysis
Dependent variable: FDI (original series)

	Coefficient	Standard error	t value
Corporation tax rate (host country)	-48.90***	17.51	-2.79
Real GDP (host country)	0.83***	0.30	2.76
Real GDP (Japan)	0.22	0.33	0.67
Trade barrier index	-13.38	18.04	-0.74
Inflation rate	2.54	9.75	0.26
Trade barrier index (host country)	-1.16	6.64	-0.17
Trade barrier index (Japan)	88.57***	32.27	2.74
Years of education	-617.90**	279.30	-2.21
Degree of investment security	-5.65	15.01	-0.38
Constant	1131.42	3490.67	0.32
Number of samples 660			
Adjusted R-squared 0.690393			
Correlated random effects – Hausman test			
Test summary	statistic: χ2	χ2. d.f.	p value
Cross-section random	33.55	9	0.0001

*Note: ***, **, and * on coefficients indicates significance at 1%, 5%, and 10% significance levels, respectively.*
Source: Author

CHART 4

Model 4: Case excluding exchange rate, population density & trade barrier index (host country) as explanatory variables

Estimation method: fixed-effects, time-series panel-data analysis
Dependent variable: FDI (original series)

	Coefficient	Standard error	t value
Corporation tax rate (host country)	-49.00***	17.49	-2.80
Real GDP (host country)	0.83***	0.30	2.75
Real GDP (Japan)	0.23	0.32	0.73
Trade barrier index	-13.94	17.75	-0.79
Inflation rate	2.63	9.73	0.27
Trade barrier index (Japan)	86.83***	30.67	2.83
Years of education	-611.96**	277.00	-2.21
Degree of investment security	-5.75	14.98	-0.38
Constant	1201.49	3464.84	0.35
Number of samples 660			
Adjusted R-squared 0.690876			
Correlated random effects – Hausman test			
Test summary	statistic: χ2	χ2. d.f.	p value
Cross-section random	34.18	8	0.0000

*Note: ***, **, and * on coefficients indicates significance at 1%, 5%, and 10% significance levels, respectively.*
Source: Author

taxation factors on FDI could be recognized. Finally, model 6 is an estimate that uses, other than the constant, only the corporate tax rate and real GDP in the host country.

An overview of the estimation results in *Charts 1-6* shows that the significance of the coefficients of the variables and the signs on the variables are stable through all cases. Of these, corporate tax rate (host country), real GDP (host country), trade barrier index (Japan), and years of education are the four coefficients that are significant at the 10% significance level. The coefficients for the corporate tax rate (host country), real GDP (host country), real GDP (Japan), trade barrier index, exchange rate, trade barrier index (host country), trade barrier index (Japan), and years of education generally match the sign conditions. The coefficients for the trade barrier index (host country) and years of education have plus signs, which may indicate the impact in cases where the traded goods are intermediate material and factors of production. The slightly negative exchange rate coefficients may reflect the effect of a stronger yen facilitating the securement of local material and making investment more attractive.

CHART 5

Model 5: Case excluding exchange rate, population density, trade barrier index (host country) & inflation rate as explanatory variables

Estimation method: fixed-effects, time-series panel-data analysis
Dependent variable: FDI (original series)

	Coefficient	Standard error	t value
Corporation tax rate (host country)	-42.17***	16.61	-2.54
Real GDP (host country)	0.80***	0.30	2.70
Real GDP (Japan)	0.21	0.31	0.68
Trade barrier index	-14.81	17.52	-0.85
Trade barrier index (Japan)	84.04***	29.77	2.82
Years of education	-565.91**	269.10	-2.10
Degree of investment security	-6.41	14.51	-0.44
Constant	1068.91	3317.62	0.32
Number of samples 677			
Adjusted R-squared 0.690360			
Correlated random effects – Hausman test			
Test summary	Statistic: χ2	χ2. d.f.	p value
Cross-section random	24.11	7	0.0011

*Note: ***, **, and * on coefficients indicates significance at 1%, 5%, and 10% significance levels, respectively.*
Source: Author

CHART 6

Case excluding corporate tax rate (host country) & real GDP (host country)

Estimation method: fixed-effects, time-series panel-data analysis
Dependent variable: FDI (original series)

	Coefficient	Standard error	t value
Corporate taxation rate (host country)	-49.85***	13.03	-3.83
Real GDP (host country)	0.92***	0.28	3.29
Constant	2433.67***	547.39	4.45
Number of samples 680			
Adjusted R-squared 0.684098			
Correlated random effects – Hausman test			
Test summary	statistic: χ2	χ2. d.f.	p value
Cross-section random	16.75	2	0.0002

*Note: ***, **, and * on coefficients indicates significance at 1%, 5%, and 10% significance levels, respectively.*
Source: Author

The coefficients for population density, inflation rate, and degree of investment security do not match the sign conditions. The sign conditions expected for population density and degree of investment security were minus, but the estimation results were minus. The reason for this may be the fact that FDI from Japan includes not only horizontal FDI but also vertical FDI. Many of the countries where the impact of vertical FDI is strongly reflected also have a low investment security environment, which may be reflected in the signs for degree of investment security environment. The sign condition for the inflation rate is minus but the estimation result is plus. Inflation can be an instability factor for investment in host countries, but only in cases where the inflation rate is excessively high. Price levels are often on an upward trajectory when the economy is going strong; the estimation results may be a reflection of this point.

Next, when we focus on the impact of corporate taxation on international capital movements, the estimation results from the models in *Charts 1-6* show that it has a negative impact at the 1% significance level. Moreover, the coefficients of determination in *Charts 1-6* are generally distributed between 0.68~0.70. Thus, much of FDI can be explained by the corporate tax rate and real GDP in the host country.

CHART 7

Estimation model

	Chart 1 Model 1	Chart 2 Model 2	Chart 3 Model 3	Chart 4 Model 4	Chart 5 Model 5	Chart 6 Model 6
Corporation tax rate (host country)	○	○	○	○	○	○
Real GDP (host country)	○	○	○	–	–	○
Real GDP (Japan)	○	○	○	○	○	–
Investment barrier index	○	○	○	○	○	–
Population density	○	○	–	–	–	–
Inflation rate	○	○	○	○	–	–
Exchange rate	○	–	–	–	–	–
Trade barrier index (host country)	○	○	○	○	○	–
Trade barrier index (Japan)	○	○	○	○	○	–
Years of education	○	○	○	○	○	–
Degree of investment security	○	○	○	○	○	–
Constant	○	○	○	○	○	○

Source: Author

As we have seen, corporate tax rate (host country), real GDP (host country), trade barrier index (Japan), and years of education are the four coefficients significant at the 10% significance level. Of these, corporate tax rate (host country), real GDP (host country), and trade barrier index (Japan) are significant at the 1% significance level.

Thus, empirical analysis using the estimation model functions (※) and data concerning Japan's outbound FDI indicates the possibility that corporate taxation has a significantly negative effect on international capital movements.

The comparison of *Charts 1-6* in this analysis, moreover, indicates the possibility that many of the factors affecting FDI can be explained by the corporate tax rate and the real GDP of the host country. In other words, the results of the analysis can be interpreted as follows: even when non-taxation factors, such as years of education and degrees of investment security, have been included, only a very small number of variables, such as the corporate tax rate and real GDP in the host country, have a large impact on FDI, and it is possible that the number of factors other than the tax regime that impact FDI are small.

All of this makes it clear that if this estimation is valid, reforming the overall revenue structure including corporate tax rate reduction and the consumption tax as part of the growth strategy will become an urgent challenge in Japan, as is the case in other developed countries, against a persistent backdrop of a declining birth rate and aging population and globalization. A long-term scenario in which Japan's economic edge is gradually eroded with regard to the East Asian countries that continue to grow rapidly in the near future is within the realm of possibility. Thus, it is necessary to move forward on corporate tax reform step by step, keeping in mind the state of progress in fiscal and social security reform at home and corporate taxation reform abroad, on the basis of a long-term perspective and strategy. And the low exchange rate for the yen provides the perfect opportunity for this. JS

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