

## Supplemental Appendix A for Takero Doi and Takeo Hoshi “Paying for the FILP”: Reevaluation of business assets held by public corporations

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This appendix documents our construction of the market value of business assets for each public corporation. We start out by dividing the amount of business assets (and the construction in progress) reported on the book into land (which does not depreciate) and other assets (which do depreciate). We need to know both how much of the business assets at the beginning of calculation (fiscal 1965 in our case) was land and how much of the new investment in each year has been in land. For the agencies that predominantly engage in construction projects, the information is obtained from *Kensetsu Gyōmu Tōkei Nenpō (Statistical Yearbook of Construction Business)* published by the Ministry of Construction (MOC). Some corporations, although the information is not found in the MOC publication, distinguish between land and the other business assets in their administrative cost statements. For such a case, we set the proportion of land business asset so that the ratio of the land to the other business assets as of the end of fiscal 2000 that we estimate is equal to the ratio of the land to the other business assets reported in the administrative cost statement. For two corporations (Japan Environment Corporation and Electric Power Development Company), we have not been able to find any information about the proportion of land in their assets. Thus, we assumed it to be constant over time at 20%. Table A.1 (second column) summarizes the data source for the proportion of land assets that we used for each public corporation. “MOC” denotes the information on the land intensity of the agency’s assets is taken from the MOF publication. “ACS” denotes the land intensity figures were estimated backward from the ratio reported in the administrative cost statement for fiscal 2000.

Let  $A_t$  be the book value of all business assets at the beginning of period  $t$ ,  $J_t$  be the book value of construction in progress at the beginning of period  $t$ , and  $D_t$  be the depreciation of business assets during the period  $t$  reported in the book. All of these are readily available in the financial statements that each public corporation publishes. Let  $\alpha$  be the proportion of land in the all business assets. We estimate the investment in land during the period  $t$  as:

$$(A.1) \quad IL_t = \alpha \{ (A_{t+1} + J_{t+1}) - (A_t + J_t) \}$$

Similarly, the investment in the business assets other than land is estimated as:

$$(A.2) \quad IK_t = (1 - \alpha) \{ (A_{t+1} + J_{t+1}) - (A_t + J_t) \} + D_t$$

We assume all the depreciation reported on the book is allocated to non-land business assets, assuming the corporation does not let the land depreciate. Note that the investments calculated using (A.1) and (A.2) can be either positive or negative. Negative investments would imply (net) depletion or sales of the assets.

We assume that the book value of the business assets (including the construction in progress) was equal to its market value at the end of fiscal 1965 (beginning of fiscal 1966). Let  $XL_t$  and  $XK_t$  be the market value of land and the business assets other than land in place respectively at the beginning of period  $t$  (including the construction in progress). Then our assumptions are:

$$(A.3) \quad XL_{1966} = \alpha(A_{1966} + J_{1966})$$

$$(A.4) \quad XK_{1966} = (1 - \alpha)(A_{1966} + J_{1966})$$

If the corporation was established after 1966, the above equalities are assumed to hold at the end of its first accounting year.

Letting  $p_{lt}$  be the land price and  $p_{kt}$  be the price of the other business assets respectively at the beginning of period  $t$ , and  $\delta$  be the economic depreciation rate of the (non-land) business assets, we can calculate the market values of the land and the other business assets for the following years recursively using the following formulas.

$$(A.5) \quad XL_t = \frac{p_{lt}}{p_{l,t-1}} XL_{t-1} + IL_t$$

$$(A.6) \quad XK_t = \frac{p_{kt}}{p_{k,t-1}} (1 - \delta) XK_{t-1} + IK_t$$

The market value of total business assets at the beginning of period  $t$  is calculated by summing up  $XL_t$  and  $XK_t$ .

The economic depreciation rates for the non-land assets held by public corporations are taken from Economic Planning Agency (1998). The depreciation rates used for each corporation are reported in the last column of Table A.1. For the price of business assets other than land, the deflator for the public investment reported in the national income accounts was used. Land price indices compiled by the Japan Real Estate Research Institute were used for the land price. Table A.2 lists the land price series that we used for each public corporation.

**Table A.1. Assumptions on Business Assets and Depreciations for Public Corporations**

Agency	Land as % of Total Business Assets	Life of Non-land Assets (years)	Depreciation Rate of Non-land Assets (%)
Urban Development Corporation			
Account for Urban Development	MOC	45	5.0
Account for Railroads	MOC	26	8.5
Japan Environment Corporation	20%	15	14.2
Teito Rapid Transit Authority	ACS	34	6.5
Japan Sewage Works Agency	ACS	15	14.2
Japan Highway Public Corporation	MOC	47	4.5
Metropolitan Expressway Public Corp.	MOC	47	4.5
Hanshin Expressway Public Corporation	MOC	47	4.5
Honshu-Shikoku Bridge Authority	MOC	45	5.0
Japan Railway Construction Public Corp.	ACS	26	8.5
New Tokyo International Airport Authority	ACS	17	12.7

Water Resources Development Public Corp.	MOC	49	4.6
Electric Power Development Company	20%	26	8.3

Source: Ministry of Construction, *Kensetsu Gyōmu Tōkei Nenpō (Statistical Yearbook of Construction Business)*, various issues, and *Tokushu Hōjin Sōran (Handbook of Special Public Corporations)*, various issues.

Notes: “MOC” denotes the information on the land intensity of the agency’s assets is taken from the MOF publication. Because the data are not yet available for fiscal 1999 and 2000, the simple average of the land intensity for fiscal 1994-1998 was used for fiscal 1999 and 2000. “ACS” denotes the land intensity figures were estimated backward from the ratio reported in the administrative cost statement for fiscal 2000.

Life of the non-land business assets for each corporation was calculated as the weighted average of the lifetimes for the components of the assets. The figures for each type of assets were taken from Economic Planning Agency (1998) and as follows: road (47 years), airport (17 years), assets held by Japan Railway Construction Public Corporation (26 years), subway (34 years), sewage (15 years), waste disposal facilities (15 years), flood control facilities (49 years), and assets held by Electric Power Development Company (26 years).

The depreciation rate for each corporation is calculated so that the scrap value of the assets at the end of their life is 10% (the scrap value of assets specified in the Japanese tax code) of the original value.

We tried to include all public corporations whose business assets mostly consist of physical capitals. We were not able to reevaluate the assets of Japan Regional Development Corporation and Japan Green Resources Corporation, because the change in the accounting rule in 1986 made it impossible for us to come up with consistent time series.

**Table A.2. Land Price Series**

Agency	Land Price Series Used
Urban Development Corporation Account for Urban Development Account for Railroads	JREI (6 largest cities, residential use) OPLP (Tokyo metropolitan, residential use)
Japan Environment Corporation	JREI (all urban areas, industrial use)
Teito Rapid Transit Authority	OPLP (Tokyo metropolitan, semi-industrial use)
Japan Sewage Works Agency	JREI (all urban areas, residential use)
Japan Highway Public Corporation	JREI (all urban areas, all uses)
Metropolitan Expressway Public Corporation	OPLP (Tokyo metropolitan, semi-industrial use)
Hanshin Expressway Public Corporation	OPLP (Osaka metropolitan, semi-industrial use)
Honshu-Shikoku Bridge Authority	JREI (outside 6 largest cities, residential use)
Japan Railway Construction Public Corp.	JREI (all urban areas, all uses)
New Tokyo International Airport Authority	OPLP (Tokyo metropolitan, semi-industrial use)
Water Resources Development Public Corp.	JREI (all urban areas, industrial use)
Electric Power Development Company	JREI (all urban areas, industrial use)

Notes: JREI denotes a series taken from *Index of Urban Land Prices* by the Japan Real Estate Institute. OPLP denotes a series taken from *Kōji Chika (Officially Published Land Prices)* by the Ministry of Land, Infrastructure, and Transport. OPLP is not available for the period before 1969. We extended the OPLP series back to fiscal 1965 by splicing the JREI indexes for 6 largest cities.

