

Early Japanese Development and the Role of Trade: A Correction

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A 1988 paper on the relationship between trade and growth in early Japan (Grabowski, 1988) presented results of a simultaneous equation model and a simulation analysis (Tables 4 and 5). Errors in the program used to estimate the simultaneous equation model have since been discovered. Some of the data were typed incorrectly, and several variables in the input statement were mislabeled. The program has been corrected, and the model has been reestimated using three stage least squares.

The results derived from the reestimation are presented in Table 4 (amended) and Table 5 (amended). The original Tables 4 and 5 also are reproduced with definitions of the symbols used.

The results of the original and new simulations, Table 5 and Table 5 (amended), are similar concerning the impact of raising the ratio of exports to gross national expenditure. This would result in a significant increase in the overall rate of growth. When the ratio of gross capital formation to gross national expenditures rises, the corrected results differ significantly from the original. Instead of the rate of growth rising, it falls. In the case of a 100 percent increase in the ratio of gross capital formation to gross national expenditures, the growth rate becomes negative.

The last result is particularly troublesome, as it is difficult to understand under what circumstances this could occur. This likely reflects a weakness in the model itself. If one substitutes the equation for $\Delta K/K$ in Table 4 (amended) into the equation for $\Delta GNE/GNE$, the system can be described in two equations. The ratio GCF/GNE thus has an indirect negative influence on the equilibrium value of $\Delta E/E$. For any given value of $\Delta GNE/GNE$, $\Delta E/E$ will be reduced as GCF/GNE rises. It is this fact that causes the equilibrium $\Delta GNE/GNE$ to fall (given the signs of the estimated coefficients). The weakness of the model then is that there is no way that changes in GCF/GNE can influence $\Delta E/E$ directly. That is, the variable GCF/GNE does not appear directly in the equation for $\Delta E/E$.

A second problem with the model is that the results are sensitive to changes in the lag structure for DG . Varying the lag structure causes the impact of changes in GCF/GNE and EXP/GNE on $\Delta GNE/GNE$ to vary.

Table 4 (amended)
Three Stage Least Squares

$$\Delta GNE/GNE = -.03 + 1.20 \Delta N/N + .89 \Delta K/K + .41 \Delta E/E - .5 \Delta L/L + .08 DG - .0002 T$$

(-.97) (1.09) (0.96) (2.86)*** (-0.04) (0.72) (-0.27)

$$\Delta K/K = .02 - .003 EXP/GNE + .37 GCF/GNE - .28 GNE/POP + .05 \Delta E/E + .0005 T$$

(1.08) (-0.02) (4.54)*** (-1.91)* (1.29) (1.19)

$$\Delta E/E = .008 - .0004 WT + 3.21 \Delta GNE/GNE - .44 EXP/GNE + .001 T$$

(0.08) (-0.017) (4.24)*** (-0.58) (0.23)

The figures in parentheses represent t-statistics

- * Significant at the 10 percent level
- ** Significant at the 5 percent level
- *** Significant at the 1 percent level

The symbols are defined as:

$\Delta N/N$	= Rate of growth of the employed labor force;
$\Delta K/K$	= Rate of growth of capital stock;
$\Delta L/L$	= Rate of growth of land;
DG	= Difference between the growth rate of output one period ago and the growth rate two periods ago;
T	= Time;
$\Delta GNE/GNE$	= Rate of growth of gross national expenditure;
$\Delta E/E$	= Rate of growth of exports;
EXP/GNE	= Exports as a share of gross national expenditures;
GCF/GNE	= Gross capital formation as a share of gross national expenditures;
WT	= Index of the volume of world trade.

Table 4
Three Stage Least Squares Estimates of Model (7)

$$\Delta GNE/GNE = .002 - .29 \Delta N/N + .54 \Delta K/K + .21 \Delta E/E - .56 \Delta L/L + .43 DG + 2.31 e^{-14} T$$

(.12) (-.28) (1.33) (3.18)*** (0.78) (5.71)*** (1.50)

$$\Delta K/K = -.005 + .04 EXP/GNE + .32 GCF/GNE - .11 GNE/POP + .03 \Delta E/E - 8.43 e^{-15} T$$

(-.86) (1.08) (7.28)*** (-2.15)** (1.70) (-2.27)

$$\Delta E/E = .19 - .003 WT + .73 \Delta GNE/GNE + 1.74 EXP/GNE - 2.01 e^{-14} T$$

(2.51)*** (-2.55)** (1.25) (2.41)** (-2.24)**

- * Significant at the 10 percent level
- ** Significant at the 5 percent level
- *** Significant at the 1 percent level

Table 5 (amended)
Average Percentage Growth Rates

1. Actual Growth Rate	3.6
2. Simulation One (Historical values for exogenous variables)	3.5
3. Simulation Two (EXP/GNE, 10 percent greater)	4.0
4. Simulation Three (EXP/GNE, 100 percent greater)	8.1
5. Simulation Four (GCF/GNE, 10 percent greater)	2.5
6. Simulation Five (GCF/GNE, 100 percent greater)	-6.9

Table 5
Average Percentage Growth Rates

1. Actual Growth Rate	3.6
2. Simulation One (Historical values for exogenous variables)	3.5
3. Simulation Two (EXP/GNE, 10 percent greater)	3.8
4. Simulation Three (EXP/GNE, 100 percent greater)	7.0
5. Simulation Four (GCF/GNE, 10 percent greater)	3.7
6. Simulation Five (GCF/GNE, 100 percent greater)	5.9

References

1. Grabowski, Richard, "Early Japanese Development: The Role of Trade, 1885-1940," *Quarterly Journal of Business and Economics*, 27, no. 1 (Winter 1988), pp. 104-129.

