Current Account, Government Budget and World Output Shares

(An incomplete version)

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Chulsoo Kim
Department of Economics
Sookmyung Women's University
Seoul 140-742 Korea
E-mail: chulsoo@sookmyung.ac.kr
Tel: 82-2-710-9503

1. Introduction

There are many explanations for the large U.S. current account deficits such as low savings in the U.S., large government deficits, glut of savings in the emerging countries, capital market imperfections in the emerging markets, and artificially cheap currencies in the emerging markets. Although many studies have examined if the current account deficit is sustainable, Engel and Rogers (2006) note that a country can be optimizing in a simple intertemporal small country model even if it runs a current account deficit in all periods, its current account deficit grows forever, and its debt/GDP ratio rises forever. Hence, Engel and Rogers (2006) examine if the U.S. current account deficit is consistent with intertemporal optimizing behavior. Engel and Rogers (2006) find that the large U.S. current account deficits can be the outcome of optimizing behavior. This paper extends Engel and Rogers (2006) by adding non-Ricardian consumers and taxes to Engel and Rogers' model.

Engel and Rogers (2006) build a model in which a country will run a current account deficit if the discounted sum of future shares of world GDP exceeds its current share of the world GDP. This model captures two aspects of standard neoclassical model of current account. First, if a country expects higher future income, the country should borrow now and run a current account deficit. Second, poor growth prospects in the rest of the world will induce a country to save more, which will lead to lower interest rates. The lower interest rates, in turn, will induce the country to borrow more now and run a current account deficit.

Their model successfully explains the large U.S. current account deficit in 2004, but does not adequately explain the increasing U.S. current account deficit in recent years since the model implies shrinking, not increasing, current account deficits after an initial large deficit when a country expects higher world shares. However, using surveys of economic forecasters, Engel and Rogers (2006) show that forecasters consistently underestimated U.S. shares, and hence their model can also explain the increasing U.S. current account deficits.

This paper extends Engel and Rogers (2006) in two ways. First, this paper introduces rule-of-thumb consumers as well as Ricardian consumers. If consumers are liquidity constrained or possibly myopic, their consumption will depend on current income instead of their life time income or permanent income. Second, this paper introduces taxes. Since Ricardian equivalence holds in Engel and Rogers (2006) model, they ignored the effects of taxes on current account. But many have suggested, including Engel and Rogers (2006), that the large U.S. budget deficit is one of the main reasons for the large U.S. current account deficits. Including rule-of-thumb consumers in the model allows us to examine the effects of government budget deficits on current account deficits, and to examine if the recent tax cuts have caused the recent increases in the U.S. current account deficit. Furthermore, with a government budget balance explicitly modeled, this paper attempts to examine if we can explain the large current account surpluses of the emerging economies of East Asia. According to Engel and Rogers (2006), large current account surplus, which is equal to private saving, implies slower growth in future output shares, which may be inconsistent with spectacular economic growth experienced in East Asian countries. In this paper, private saving is equal to the difference between current account surplus and government budget surplus, instead of current account surplus alone, and it will indicate future output growth prospects. Furthermore, this paper attempts to cover more countries included in the rest of the world, not just G7 plus Switzerland, Sweden and Norway as in Engel and Rogers (2006), in order to see if the U.S. output shares have been increasing as claimed in Engel and Rogers (2006).

2. The Model

This paper extends Engel and Rogers (2006) by including Ricardian consumers as well as non-Ricardian consumers. This is a two-country model. Suppose there exist two groups of agents in each country: the first group is rule-of-thumb (non-Ricardian) consumers as in Campbell and Mankiw (1989, 1990, and 1991) and the second group is Ricardian consumers. We assume that the first group receives λ_t share of total disposable income in the home country and the second group receives (1- λ_t) share of total disposable income for $0 \leq \lambda_t \leq 1$. Superscript ^{NR} denotes variables for non-Ricardian consumers and superscript ^{R} denotes variables for Ricardian consumers. The corresponding variables for the foreign country are denoted with a *.

G_t is government expenditure at time t, and we assume that G_t is thrown away, giving no utility to consumers and is exogenous. T_t is total lump-sum tax collected at time t, and must satisfy the budget constraint for the government:

$$T_0 + \frac{T_1}{R_1} + \frac{T_2}{R_1 R_2} + \frac{T_3}{R_1 R_2 R_3} + ... = R_0 B_0^G + G_0 + \frac{G_1}{R_1} + \frac{G_2}{R_1 R_2} + \frac{G_3}{R_1 R_2 R_3} + ...$$

where R_t is the real gross interest rate in period t, and B_0^G is the stock of real government debt at time 0. We assume that financial markets of the home country and the foreign country are integrated so that there exists an identical interest rate in both countries.

Non-Ricardian consumers simple consume their current disposable income as a rule-of-thumb:

(1) $C_t^{NR} = Y_t^{NR} - T_t^{NR} = \lambda_t (Y_t - T_t)$

Y_t is real output in the home country, net of investment where $T_t^R + T_t^{NR} = T_t$. Non-Ricardian consumers may be liquidity constrained or possibly myopic.

Ricardian consumers maximize their infinity horizon utilities under perfect foresight:

$$\text{Max} \sum_{t=0}^{\infty} \beta^t \log C_t^R$$

$$\text{subject to } B_{t+1} \equiv R_t B_t + Y_t^R - T_t^R - C_t^R$$

where β is discount rate which is assumed to be identical for both the home country and foreign country, and B_t is the home country's real claim on the foreign country at time t. Since non-Ricardian consumers neither save nor dissave, we assume $B_0^{NR} = 0$. Hence, $B_t = B_t^R$. The life time budget constraint for Ricardian consumers then becomes:

(2) $$C_0^R + \frac{C_1^R}{R_1} + \frac{C_2^R}{R_1 R_2} + \frac{C_3^R}{R_1 R_2 R_3} + ... = R_0 B_0^R + Y_0^R - T_0^R + \frac{Y_1^R - T_1^R}{R_1} + \frac{Y_2^R - T_2^R}{R_1 R_2} + \frac{Y_3^R - T_3^R}{R_1 R_2 R_3} + ...$$

The Euler equation for Ricardian consumers is

$$(3) \quad \frac{C_{t+1}^{R}}{C_{t}^{R}} = \beta R_{t+1}$$

The world resource constraint implies that

$$Y_t^W \equiv Y_t + Y_t^* = Y_t^{NR} + Y_t^R + Y_t^{*NR} + Y_t^{*R} = C_t^{NR} + C_t^R + C_t^{*NR} + C_t^{*R} + G_t + G_t^*$$

$$= (Y_t^{NR} - T_t^{NR}) + C_t^R + (Y_t^{*NR} - T_t^{*NR}) + C_t^{*R} + G_t + G_t^*,$$

where the world net output, Y_t^W, is the sum of net output for the home and foreign countries. Hence,

$$C_t^R + C_t^{*R} = Y_t^R + T_t^{NR} + Y_t^{*R} + T_t^{*NR} - G_t - G_t^*$$

$$= (Y_t^R - T_t^R) + (Y_t^{*R} - T_t^{*R}) + (T_t - G_t) + (T_t^* - G_t^*)$$

$$(4) \quad = (Y_t^{WR} - T_t^{WR}) + BS_t^W$$

where $Y_t^{WR} \equiv Y_t^R + Y_t^{*R}$ is world net income for Ricardian consumers, $T_t^{WR} \equiv T_t^R + T_t^{*R}$ is world total tax for Ricardian consumers, and $BS_t^W \equiv (T_t - G_t) + (T_t^* - G_t^*)$ is world government budget surplus.

Using (3) and (4), we derive

$$(5) \quad R_t = \frac{Y_t^{WR} - T_t^{WR} + BS_t^W}{\beta(Y_{t-1}^{WR} - T_{t-1}^{WR} + BS_{t-1}^W)}$$

When world disposable net income is growing faster, the world interest rate increases since Ricardian consumers want to borrow against higher future disposable net income. Non-Ricardian consumers do not affect the interest rate since they simply consume their current disposable income and hence do not participate in the loanable fund market. When world budget surplus is growing faster, there will be more resources available for Ricardian consumers to consume after governments' expenditures, and hence the world interest rate increases now.

Using (2), (3) and (5), we derive

$$C_t^R = (1-\beta)R_t B_t + (1-\beta)\frac{(Y_t^R - T_t^R)}{\gamma_t}[\gamma_t + \beta\gamma_{t+1} + \beta^2\gamma_{t+2} + \beta^3\gamma_{t+3} + ...]$$

where $\gamma_t = \frac{Y_t^R - T_t^R}{Y_t^{WR} - T_t^{WR} + BS_t^W}$ is the ratio of the home country's net disposable income for Ricardian consumers and the sum of the world net disposable income for Ricardian consumers and the world budget surplus. When Ricardian consumers expect higher growth in their disposable net income, they would want to consume more today by borrowing from abroad. When the foreign country's disposable net income is expected to grow slower or when the world budget surplus is expected to grow slower, the foreign country will save more, which would reduce the world interest rate. The lower world interest rate in turn encourages Ricardian consumers in the home country to increase their consumption today. Instead of output shares in Engel and Rogers (2006), net disposable income shares for Ricardian consumers are the relevant variables in this paper since only Ricardian consumers participate in the loanable fund market. Furthermore, the world budget surplus is also relevant in this paper since it can provide additional resources for Ricardian consumers.

If λ_t is constant, Ricardian equivalence holds for Ricardian consumers since current tax savings and future tax burdens are proportionally shared between Ricardian consumers and non-Ricardian consumers. Hence, if λ_t is not constant, changes in taxes will affect Ricardian consumers as well as non-Ricardian consumers.

From the national income accounting identity,

$$Y_t = C_t + G_t + NX_t = C_t^{NR} + C_t^R + G_t + NX_t$$

where NX_t is net exports. The current account CA_t is defined as

$$CA_t = NX_t + (R_t - 1)B_t.$$

Hence,

$$CA_t = Y_t - C_t^{NR} - C_t^R - G_t + (R_t - 1)B_t$$

$$= Y_t^R + T_t^{NR} - C_t^R - G_t + (R_t - 1)B_t$$

(6) $$= (Y_t^R - T_t^R)(1 - (1-\beta)\frac{1}{\gamma_t}[\gamma_t + \beta\gamma_{t+1} + \beta^2\gamma_{t+2} + \beta^3\gamma_{t+3} + ...]) + (T_t - G_t) + (\beta R_t - 1)B_t$$

If there exist no non-Ricardian consumers, λ_t=0, equation (6) becomes analogous to Engel and Rogers (2006): current account is lower when discounted current and future share of world net outputs is high relative to its current share of world net output.

Further, according to equation (6), more future Ricardian consumers in the home country imply lower current account since there will be more future resources which can be borrowed against. Lower future tax growth rates, which mean lower future government growth rates, imply lower current account since future disposable net income growth rates will be higher. Tax cuts today will lead to lower current account due to a higher budget deficit today. With higher λ_t, changes in taxes today affect current account more since there are more non-Ricardian consumers. This paper will examine these implications.

Equation (6) can potentially explain the current account surpluses of East Asian countries. As Parker (1999) suggests, if the U.S. has experienced more relaxation of credit constraint, there will be more Ricardian consumers in the U.S. compared to the East Asian countries. If due to underdeveloped financial markets, the East Asian countries' share of non-Ricardian consumers is expected to increase compared to the U.S., their current account could be higher. Alternatively, if their future tax burdens are expected to increase due to their bigger government sectors, their current account can be also higher.

Figure 1 shows current account/GDP and (current account - government budget surplus)/GDP in the U.S. Since the early 1980s, U.S. current account is negative while the difference between current account and budget surplus is positive. In other words, instead of expecting higher future U.S. output shares, people may be expecting lower future U.S. output shares, which may be more consistent with the sentiments in the early 1980s. Instead of arguing that people consistently underestimated the future U.S. output shares as in Engel and Rogers's (2006), this model is consistent with the pessimistic mood of the1980s. Furthermore, recent tax cuts in the U.S. may have contributed to the recent increase in the U.S. current account deficit.

Figure 2 shows the same ratios for China, Japan, Korea and Singapore. For China, government budgets tend to be in deficit, which makes the difference between current account and budget surplus even more positive. It is more difficult to explain the current account surpluses in China with future output shares. Similarly Japan tends to have government budget deficits, which leads to even more positive difference between current account and budget surplus. Maybe Japanese are expecting slower output growth after the 1990s. For Korea, government budget tends to be near balance and the two ratios do not look very different. Singapore government tends to have significant budget surpluses and hence the difference between current account and budget surplus seems to be significantly less positive than current account alone. Even high output growth prospects could potentially explain Singapore's current account surpluses.

3. A simple simulation

Assume a simple autoregressive model for γ_t: $\gamma_{t+1} = \alpha\gamma_t + (1-\alpha)\bar{\gamma}$ where $\bar{\gamma}$ is the long-run steady state share for γ. Since $\gamma_{t+i} = \alpha^i\gamma_t + (1-\alpha^i)\bar{\gamma}$, equation (6) becomes

$$CA_t = (Y_t^R - T_t^R)[1-(\frac{1-\beta}{1-\alpha\beta} + \frac{\beta(1-\alpha)}{1-\alpha\beta}\frac{\bar{\gamma}}{\gamma_t})] + (T_t - G_t) + (\beta R_t - 1)B_t$$

Hence,

$$\frac{CA_t}{Y_t^R - T_t^R} = 1-[\frac{1-\beta}{1-\alpha\beta} + \frac{\beta(1-\alpha)}{1-\alpha\beta}\frac{\bar{\gamma}}{\gamma_t}] + \frac{T_t - G_t}{Y_t^R - T_t^R} + \frac{(\beta R_t - 1)B_t}{Y_t^r - T_t^R}$$

This can be inverted to find the needed long run increase in γ to explain the current account.

$$\frac{\bar{\gamma}}{\gamma_t} = 1-\frac{1-\alpha\beta}{\beta(1-\alpha)}[\frac{CA_t}{Y_t^R - T_t^R} - \frac{T_t - G_t}{Y_t^R - T_t^R} - \frac{(\beta R_t - 1)B_t}{Y_t^r - T_t^R}]$$

$$= 1-\frac{1-\alpha\beta}{\beta(1-\alpha)}[\frac{CA_t}{(1-\lambda_t)(Y_t - T_t)} - \frac{T_t - G_t}{(1-\lambda_t)(Y_t - T_t)} - \frac{(\beta R_t - 1)B_t}{(1-\lambda_t)(Y_t - T_t)}]$$

In 2004, CA/GDP= -5.55%, Net Government Saving/GDP = -3.51% and (CA-Net Gov. Saving)/(GDP-Investment-Tax) = -3.63% in the U.S.. Campbell and Mankiw (1989, 1990, 1991) estimated γ = 0.35 – 0.65. Following Engel and Rogers (2006), this paper assumes that the annual discount rate, β, is equal to 0.98, the adjustment speed to the steady states, α, is equal to 0.95, 0.98 and 0.75, and for now assume $\beta R_t \approx 1$. According to Table 1, these parameters imply that over the next 25 years, γ should grow by 4.5% - 11.2% (not percentage point). This paper will examine if these estimates are reasonable, (work in progress.)

4. Conclusion

From the savings and investment identity,

Investment = savings

= private savings + public savings + the rest of the world savings

= private savings +government budget balance – current account balance

Hence,

Current account balance = private savings + government budget balance – investment. Engel and Rogers (2006) examine if current account balance can be explained with private savings, implicitly holding government budget balance and investment constant. This paper extends Engel and Rogers (2006) by examining if current account balance can be explained with private savings and government budget balance, implicitly holding only investment constant. Future work should consider the effects of all of private savings, government budget balance and investment.

References

Bernanke, B. (2005), "The global saving glut and the US current account deficit," Homer Jones Lecture, Sr. Louis, Missouri.

Bohn, H. (2005), "The sustainability of fiscal policy in the United States," Working Paper, UC Santa Barbara.

Campbell, J.Y., and N.G. Mankiw (1989), "Consumption, income, and interest rates: Reinterpreting the time series evidence," *NBER Macroeconomics Annual*, edited by O.J. Blanchard and S. Fischer, pp.185-216. Cambridge, MA: MIT Press.

Campbell, J.Y., and N.G. Mankiw (1990), "Permanent income, current income, and consumption," *Journal of Business & Economic Statistics*, Vol 8, No. 3, pp. 265-279.

Campbell, J.Y., and N.G. Mankiw (1991), "The response of consumption to income: A cross-country investigation," *European Economic Review* 35, pp. 723-767.

Cooper, R.N. (2005), "Living with global imbalances: A contrarian view," *Policy Briefs in International Economics*, November, Institute for International Economics.

Edwards, S. (2005), "Is the US current account deficit sustainable? And if not, how costly is adjustment likely to be?" *NBER Working Paper* #11541.

Engel, C. (2005), "The US current account deficit: A re-examination of the role of private saving," Working Paper, Reserve Bank of Australia.

Engel, C., and J.H. Rogers (2006), "The US current account deficit and the expected share of world output," *NBER Working Paper* #11921.

Gourinchas, P., and H. Rey (Forthcoming), "From world banker to world venture capitalist: U.S. external adjustment and the exorbitant privilege," *G7 Current Account Imbalances: Sustainability and Adjustment,* edited by R. Clarida, The University of Chicago Press.

Kouparitsas, M. (2005), "Is the US current account deficit sustainable?" *Chicago Fed Letter*, June, no.215.

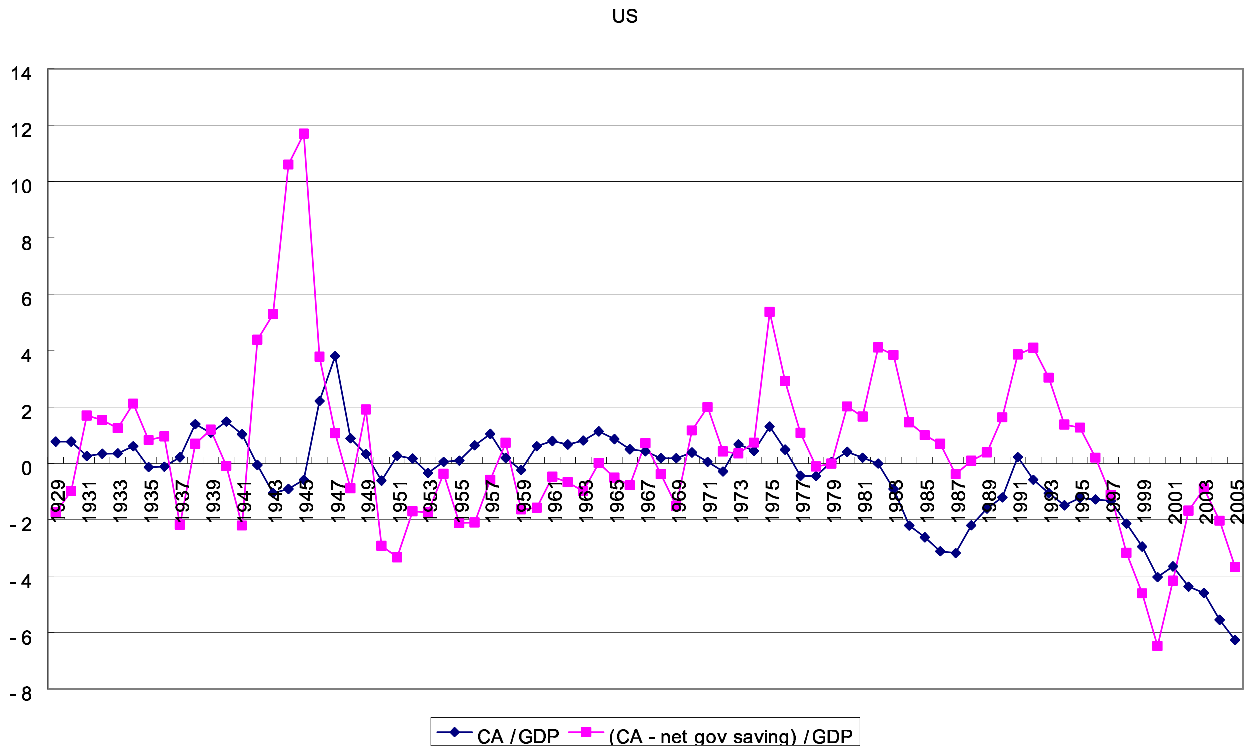
Obstfeld, M., and K. Rogoff (forthcoming), "The unsustainable US current account position revisited," *G7 Current Account Imbalances: Sustainability and Adjustment,* edited by R. Clarida, The University of Chicago Press.

Obstfeld, M., and K. Rogoff (2005), "Global current account imbalances and exchange rate adjustments," Working Paper, UC Berkeley.

Table 1: A simple simulation

λ	α	$\bar{\gamma}/\gamma_t$	The next 25 years
0.65	0.95	1.079	1.057
0.35	0.95	1.146	1.105
0.65	0.98	1.113	1.045
0.35	0.98	1.209	1.083
0.65	0.75	1.060	1.060
0.35	0.75	1.112	1.112

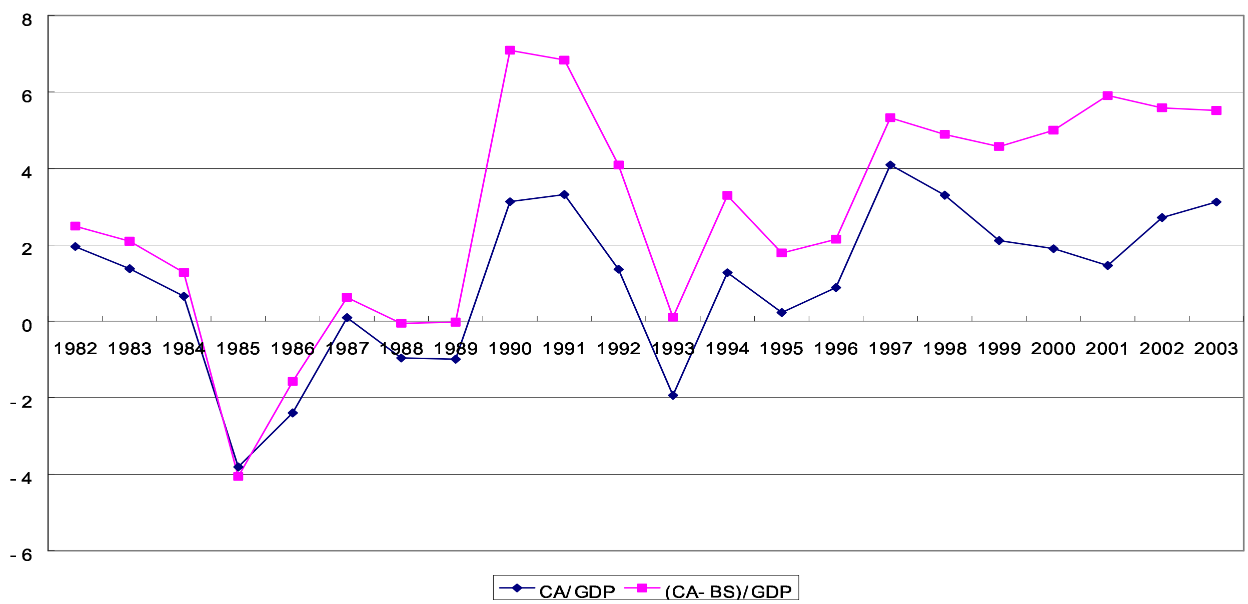
Figure 1:



Source: Bureau of Economic Analysis

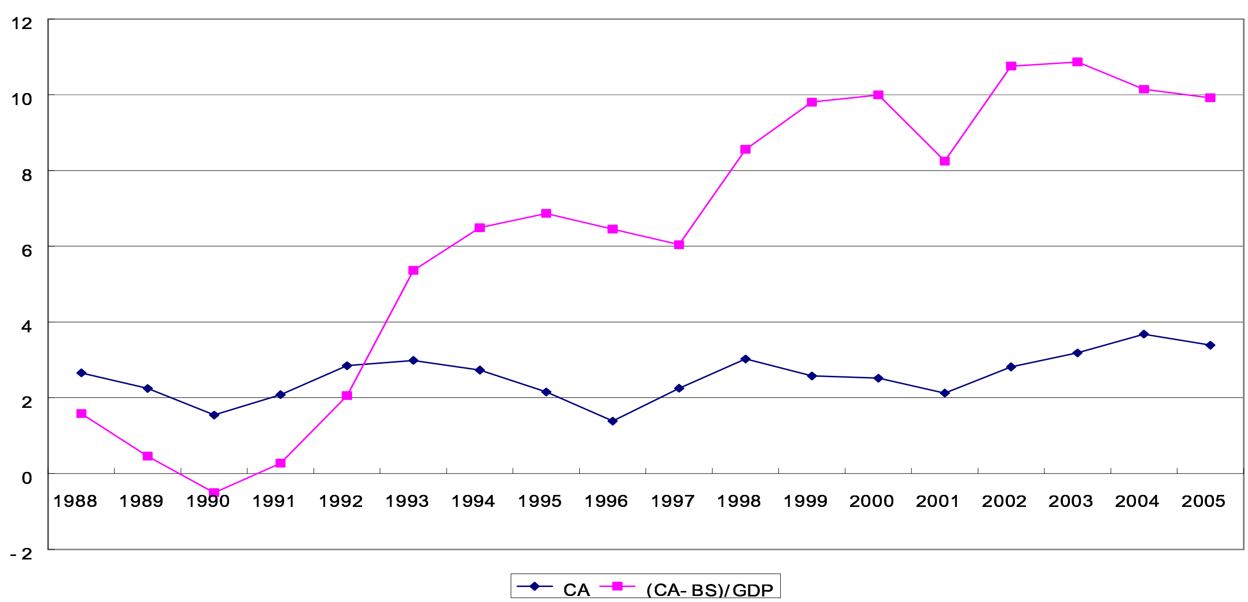
Figure 2:

China

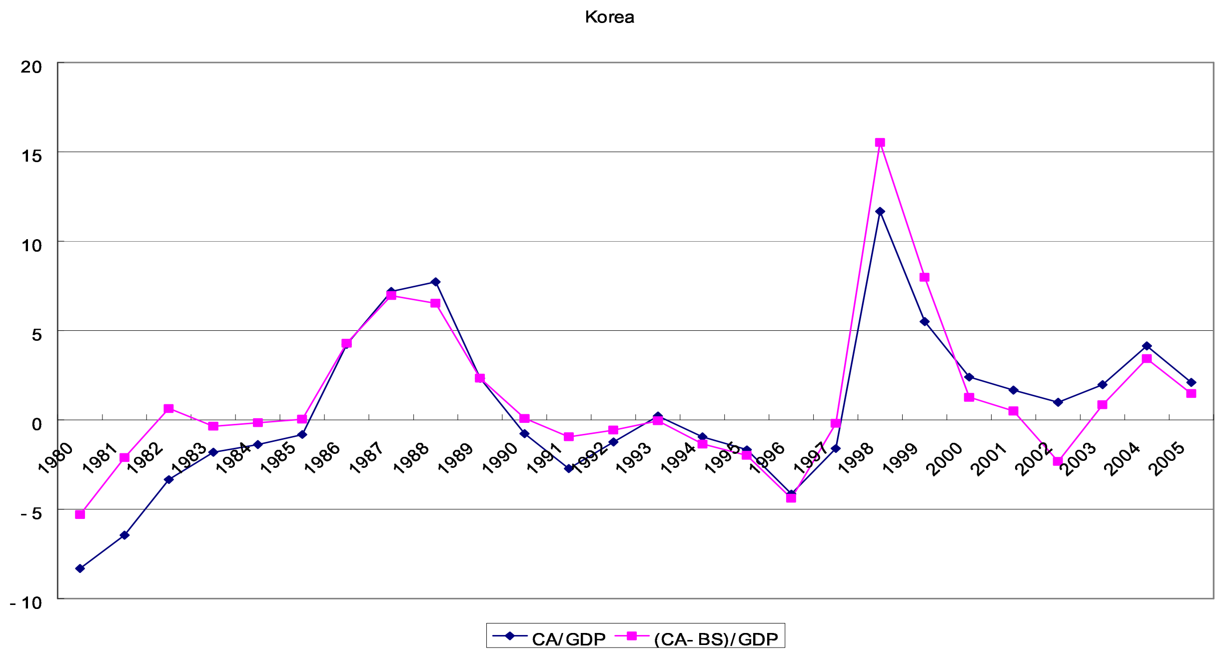


Source: International Financial Statistics

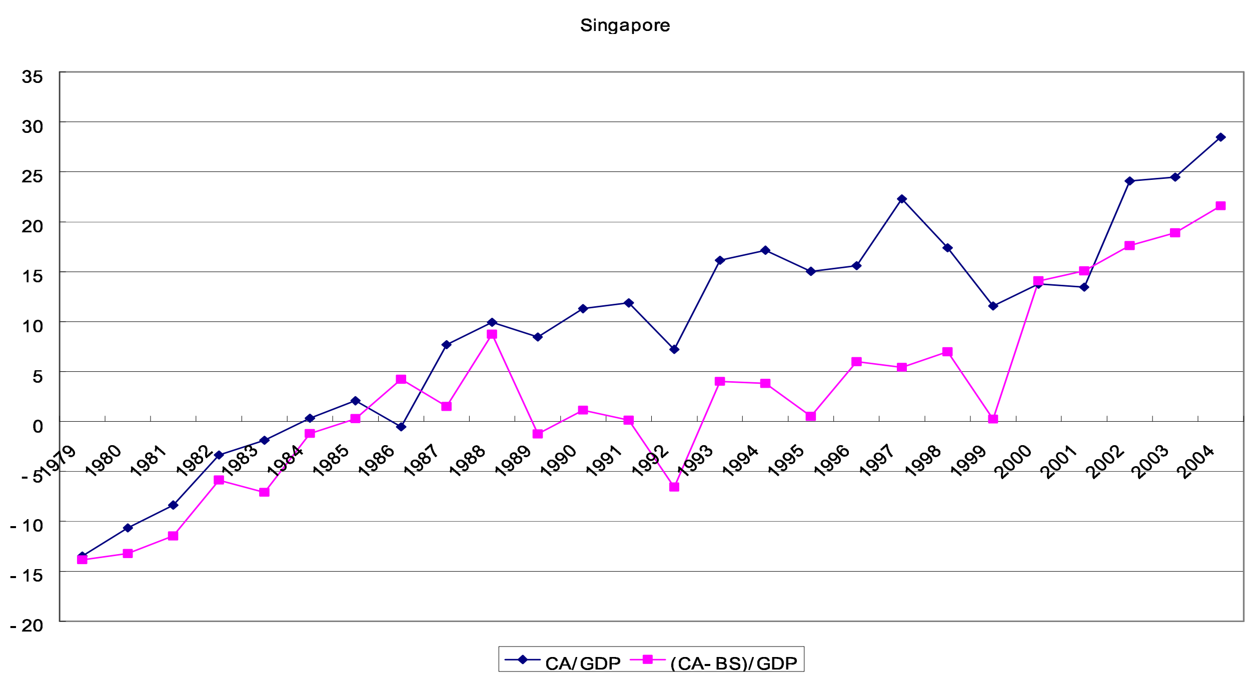
Japan



Source: OECD Economic Outlook



Source: Bank of Korea and Ministry of Finance and Economy



Source: International Financial Statistics and Singapore Department of Statistics