One Country, Two Monetary Systems: An Eclectic Essay

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1. Introduction: nothing new under the sun?

One country, two monetary systems, or multiple monetary systems, is indeed nothing new. China had it during the civil wars of 1930's and 1940s. Even communist occupied areas had their own (temporary) currencies, as these areas were separated by nationalist armies (Wu, 1998). Anyway, the currencies were mostly short-lived, and were later unified by the Renminbi in 1948-49. The foreign exchange certificates (FECs), used "exclusively" by foreigners inside China before they were abolished in the reforms of 1994, could also be regarded as a pseudo-currency despite the fact that it had a parity value with the Renminbi. In the development of the four special economic zones (SEZs) in the 1980s, there were also discussions of setting up an SEZ currency (Chan and Tsang, 1985). I, for one, was supportive of such an idea, along with other SEZ officials and scholars, although nothing emerged at the end of the day.

Mind you, China now actually has "one country, three currencies": the Renminbi, the Hong Kong dollar, and the pataca in Macau (even after it became the second special administrative region (SAR) of China in 1999, after Hong Kong had become the first in 1997). Of course, Macau has been Hong Kong "dollarized" to a marked extent for a long time, despite its history as a Portuguese colony. But you can still use the pataca in Macau today (which is pegged to the Hong Kong dollar at the rate of 1.03). And if Taiwan ever re-unifies with Mainland China, there may be a situation of "one country, four monetary systems"!

It seems that there is nothing new under the sun.

In any case, what seem interesting about the case of Hong Kong and Mainland China are perhaps the circumstances under which the two separate currencies emerged and then develop, and the "asymmetry" between the SAR and the sovereign economies. Hong Kong is an international financial centre that has roughly the fourth highest GDP per capita in the world; while China has undergone a very impressive process of economic reforms, albeit from a very low level of development and having had to deal much socialist institutional rigidity. The gaps between the two economies have been rapidly narrowing in the past two decades. Moreover, the integrative

process between them, in terms of trade and investment, as well as controlled population flows, has generated tremendous impact on both sides, particularly on Hong Kong. The transformation of Hong Kong into a service economy with massive relocation of manufacturing industries to southern China is a case in point. Still, few would recommend a hasty monetary union, even after the Renminbi has achieved full convertibility sometime in the future.

Anyhow, when a monetary union is in order, it would be a very interesting experiment. Hong Kong is practicing a currency board system, with the Hong Kong dollar, a fully convertible hard currency, pegged to the US dollar at the rate of 7.80. The Renminbi is "Article VIII convertible", according to IMF standards, and under a managed float (Tsang, 1997). The convergence process, if deemed feasible and desirable, would pose challenges for monetary and economic management. Of course, one may argue for a long-term coexistence of the two currencies (Barandiaran and Tsang, 1997).

In this paper, I will first look at the facts in section 2 about "one country, two monetary systems". Then the theories about separate currencies and monetary union will be reviewed in the changing circumstances of Hong Kong and China. Some empirical findings are reported in section 4. Section 5 speculates about the scenarios of a future monetary union. Section 6 concludes.

2. One country, two monetary systems: the facts

Officially, the position is clear. Under the framework of "one country, two systems", the Hong Kong special administrative region (SAR) is to decide its own monetary policies in accordance with Articles 110 to 113 of the Basic Law, the SAR's mini-constitution. Post-1997 monetary relations between Mainland China and Hong Kong have come to be officially defined as, in the words of Joseph Yam, Chief Executive of the Hong Kong Monetary Authority (HKMA), the territory's central bank, "one country, two currencies, two monetary systems and two monetary authorities which are mutually independent" (Yam, 1996). Such a characterization has been endorsed by Chen Yuan, a Deputy Governor of the People's Bank of China (PBC), the country's central bank. Chen (1996) emphasized that "(t) he Hong Kong dollar and the Renminbi will circulate as legal tender in Hong Kong and the mainland respectively. The HK dollar will be treated as a foreign currency in the mainland. Likewise, the Renminbi will be treated as a foreign currency in Hong Kong."

That is the theory. Reality has certainly been driven by more practical factors and forces. Before 1978, the beginning of the Chinese economic reform, the existence of the Hong Kong dollar as a convertible currency served China well. As much as one quarter to one third of Chinese foreign exchange earnings was said to have been derived from Hong Kong. Of course, Hong Kong at that time being a British colony, nothing could have been done by China on the Hong Kong dollar anyway.

After the launching of the economic reform and the open policy in the late 1970s, Hong Kong assumed a new role, as an important trading partner and "foreign investor" for the Mainland, as well as a stepping-stone for other foreign traders and investors. After more than two decades, Hong Kong is still now the largest trading partner with China, and is the busiest port re-exporting its goods.

Table 1 Cumulative Investment of Registered Foreign Enterprises in China (by end-1998)

Unit: billions of US$

Hong Kong	410.18 (53.0%)
US	68.76 (8.9%)
Japan	51.50 (6.7%)
Singapore	39.13 (5.1%)
Taiwan	37.50 (4.8%)
UK	20.24 (2.6%)
South Korea	16.96 (2.2%)
Germany	13.80 (1.8%)
Macau	11.92 (1.5%)
France	9.80 (1.3%)

Source: *China Foreign Economic Statistical Yearbook 1999*, China Statistics Press.
Note: The bracketed figures represent the relative percentages in total foreign direct investment in China.

Moreover, as Table 1 shows, the SAR is the country's biggest foreign investor, accounting for over 50% of total foreign capital. The second is the US and the third is the Japan. However, it is widely believed that the second largest investor should be Taiwan, much of whose capital has been channeled to Mainland China through Hong Kong because of the restrictive policies of the Taiwan government.

In a number of ways, China has been benefiting from the continued existence of the Hong Kong dollar, given the fact that the Renminbi is not yet a fully convertible currency. Other than using Hong Kong as a source of foreign exchange earnings, citizens and enterprises, especially those in southern China, have been hoarding Hong Kong dollars for transactions as well as store-of–value purposes. Table A.1 in Appendix A gives a rough estimate of the amount of extra-territorial circulation of the Hong Kong currency in China.

While in the earlier years of reforms, hoarding might be driven by a fear of devaluation of the Renminbi, and therefore can be regarded as a form of "currency substitution", the situation has been rather different in recent years, particularly after the Deng whirlwind of 1992, when paramount leader Deng Xiaoping urged the country to accelerate its reforms and the pace of growth. Embolden by the success in the transformation of some of its state-owned enterprises, China expanded its own stock markets in Shanghai and Shenzhen, and allowed a growing number of enterprises to be listed in Hong Kong. That resulted in an explosion of Chinese stocks traded in Hong Kong. At the present, the company with the largest market capitalization in the Hong Kong stock exchange is China Mobile. Together with two other Chinese stocks, China Unicom and CNOOC, the three account for about 20% of the whole market's capitalization! There are others that are called "red chips" and "H-shares", which take another 6.3% of the share. In short, about one quarter of the market value of Hong Kong's stock exchange belongs to Chinese owned or directly related companies. Ten years ago, this was totally unimaginable.

On the other hand, because the impact of the East Asian financial crisis, Hong Kong plunged into the deepest recession in record. Asset and consumer prices rapidly adjusted, but not deeply enough. Consumer goods, durable or otherwise, and services in southern China have become increasingly attractive and a new trend has emerged that Hong Kong people spend their free time consuming in Shenzhen and the Pearl River Delta. Despite the official position (since 1994) that foreign currencies are not allowed to circulate in China, Hong Kong dollars are still easily accepted in daily transactions, at least in the Pearl River Delta, but with a major difference

from the past. That is, in retails, particularly in Shenzhen, just north of the SAR in Mainland China, Hong Kong dollars are often traded at parity with the Renminbi, implying a devaluation of the SAR currency (which is pegged to the US dollar at the rate of 7.80, while the Renminbi's exchange rate against the US dollar has been hovering around 8.20-8.30 since 1995). In bulk transactions, though, the prevailing exchange rate is still used.

In other words, the situation is less of "currency substitution" than "transaction convenience". While the credibility of the Renminbi has been on the increase all the time, the higher degree of economic integration of Hong Kong and Mainland China means that it would reduce transaction costs for Chinese parties to accept and to store Hong Kong dollars. The other side of the story must also be told: Renminbi is also increasingly accepted for transaction purposes in Hong Kong. Unlike China, of course, Hong Kong allows the circulation of foreign currencies although the Hong Kong dollar is the only legal tender.

One interesting episode is that during the East Asian crisis, Chinese authorities, including no less authoritative than Premier Zhu Rongji, had to declare that Renminbi would not be devalued, in order to ward off speculative pressure against the Hong Kong dollar, as if the fate of the two currencies were intertwined. The problems actually had more to do with Hong Kong's own economic development (Tsang, 1994; 1999c) and the defects in Hong Kong's own currency board system (Tsang, 1996b; 1998a,b,c; 1999a,b). Nevertheless, one can easily be reminded of Gresham's Law. But which is the good money? Which is the bad one? One has to be open-minded about it, particularly in the long run.

3. Theories updated

"One country, two monetary systems" is a unique experience. As Barandiaran and Tsang (1997) argue, supporting the *status quo* amounts to addressing critically the arguments for monetary unification, the alternative to the coexistence of the two currencies. The situation cannot be compared directly with Europe's ongoing economic integration and monetary unification because of the differences in the political systems. In Europe, monetary unification has been advanced as an instrument of political integration. Nor can it be compared with the reunification of Germany, where the two economic systems were hardly related before the collapse of communism in Eastern Europe, and monetary unification was a prerequisite for absorbing East Germany rapidly into the West German economic entity. Furthermore, it is unlike the unification of Germany in the 19th century under Bismarck, when political centralization spearheaded by Prussia over the various German states went ahead of monetary and fiscal union (James, 1997). Hong Kong, under the "one country, two systems" framework, enjoys full autonomy from China except two things: defence and diplomacy. After all, it is an SAR.

What is then the economic rationale for monetary unification? If not, what are the ways in which the two currencies can continue to coexist? Because of the political reality, a system of one currency can only mean the elimination of the Hong Kong dollar. Just before the transition of 1997, we (Barandiaran and Tsang, 1997) found no good economic arguments for this option.

The benefits of unification are related mainly to (a) the transaction costs of currencies and (b) the risk posed by exchange rate variations. In the case of Mainland China and Hong Kong, unification would reduce the transaction costs and the risk of exchange rate variations *only between the Hong Kong dollar and the Renminbi but not between the Renminbi and other currencies*. (The transaction costs and risk between the HK dollar and the other currencies are generally perceived to be relatively small.) For China, the value of these benefits would be determined mainly by the relative importance of trade and capital flows between China and Hong

Kong, which is rather high, but not overwhelming. For Hong Kong, however, their value would depend mainly on the impact on trade and capital flows between Hong Kong and countries other than China which in turn would depend on perceptions about the quality of the Renminbi: *only if the Renminbi were a perfect substitute of the Hong Kong dollar, there would be no impact*. This is unlikely to be the case in the short run.

In conclusion, both the economic benefits and costs of unification are likely to be low in the near terms. Moreover, for Hong Kong, the net benefit could be negative. While there is no good economic justification for unifying the two currencies, the questions are how they may coexist and what the Chinese government should do to facilitate any particular form of coexistence. Three forms of coexistence are distinguished by Barandiaran and Tsang (1997): (1) spontaneous competition, (2) legal competition, and (3) monopoly.

The first two forms imply that both currencies *may* be used by residents of the same geographical areas for their domestic transactions. Spontaneous competition means that only the Renminbi is the legal tender but at least in some areas of China residents use both currencies in some domestic transactions and use the Hong Kong dollar in some transactions with Hong Kong counter-parties (and perhaps with other non-residents), whereas legal competition means that both are legal tender at least in some areas of China (e.g. Shanghai pr Shenzhen). Monopoly assumes the strict enforcement of the prohibition of the Hong Kong dollar (or any foreign currency) to circulate in China.

We characterized the situation in 1996-97 as one of spontaneous competition. As it turns out, of course, the situation now is still that of "spontaneous competition", at least in the Pearl River Delta. But as I said above, the competition is now less related to "currency substitution", than to "transaction convenience".

With hindsight, the failure of options (2) and (3) to prevail should not be surprising. With rising confidence about the Chinese economy and concern about "political correctness", option (2) is really a non-starter, particularly after the transition of 1997. Monopoly is the official position. But given the difficulties of strict implementation and the informal benefits of "transaction convenience", in some localities at least, why bother to crack down on spontaneous competition, a game in which the Renminbi is not losing?

4. Empirics for a Hong Kong-China OCA

Given two neighboring countries or territories, each with its own currency, there are two forces conditioning the extent to which the two currencies are used and demanded in both areas. First, the degree of market integration between the two economies conditions the transaction demand for the currencies (i.e., their demands as means of payment). Second, if the two economies are closely integrated, the differences in the quality of the two currencies as determined by the stability of their values and their convertibility into other foreign currencies condition the asset demand for the currencies.

The degree of economic integration between China and Hong Kong is very high in the Pearl River Delta in the Guangdong Province of south China, but it declines rapidly when one moves further north inside the country. On the surface, the process of economic integration between Hong Kong and southern China has been phenomenal; and one may ask whether the co-existence of two currencies within a highly integrated economy is beneficial. Nevertheless, one needs to look at the micro-structure of integration. In terms of trade, for example, the following table shows some interesting features.

Table 2
The Shares of China and the US in Hong Kong's External Trade
(unit: %)

	1981		2000		2000 (adjusted)	
	China	US	China	US	China	US
Domestic exports	3.6	36.3	29.9	30.1	10.5	38.4
Re-exports (origin)	19.3	11.5	61.4	4.7	27.2	8.8
Re-exports (destination)	30.7	9.7	35.1	22.3	21.4	27.1
Imports	21.3	10.4	43.1	6.8	13.6	10.3

Source: *Hong Kong Monthly Digest of Statistics*, Census and Statistics Department
Note: The adjustments for year 2000 are to net out the portions, as estimated by the Hong Kong Census and Statistics Department, outward processing that Hong Kong performed in China from China's figures and the total of the exports and imports in calculating the relative shares of the market by China and the US.

If one neglects the phenomenon of outward processing, under which Hong Kong manufacturers take advantage of the cheap labour and other production costs in southern China, one would conclude that China has replaced the US as Hong Kong's number one trading partner. However, adjusted for outward processing, Hong Kong's dependence on the US as the largest market for end products has actually increased, not decreased!

Appendix A, on the other hand, gives estimates of the circulation of the Hong Kong currency (notes and coins) in China. The figures for 1998-2000 are subject to the noise of the East Asian financial crisis and the problems of the Y2K, which led to large increases in currency issuance in Hong Kong. Given the rather simplistic methodology that I have adopted, it tends to exaggerate the increase in extra-territorial circulation. Taking into account other anecdotal evidence, it seems safe to conclude that such circulation has stabilized at about 2% of Hong Kong's GDP. In other words, Hong Kong is not winning, and Mainland China is not losing in the process of "spontaneous competition".

Ma and Tsang (1999) have also attempted some more formal tests on whether Hong Kong and China constituted an "optimum currency area" (OCA) (Mundell, 1961). Appendix B highlights the major results. In a nutshell, the answer is "no", not even for Hong Kong and East China.

Hence, the empirical conclusion is quite clear. There is no case for a monetary union any time soon. Since the present situation is not heavily manipulated by government policies, and it reflects to a large extent the interplay of economic forces, "one country, two monetary systems" appears to be the optimal choice.

5. Optimal exit strategy for Hong Kong and future monetary union: a paradox

What if we look further, much further, ahead? A time when the Renminbi becomes a fully convertible, internationally accepted hard currency, and when the economic integration between Hong Kong and the Mainland China turns even more intimate, with a very high degree of factor mobility.

So how can a monetary union be implemented? The major complication is that Hong Kong practices a currency board system with the Hong Kong dollar pegged to the US dollar, while the Renminbi is a floating currency. Politically, reality dictates that the Hong Kong dollar should re-peg and then merge into the Renminbi. How should the process be managed?

The unfolding experience of the East European currency board regimes, e.g. Estonia and Lithuania, which are applying to join the EMU and the Euro-zone, is an interesting reference. "Exit" from the currency board system becomes quite well defined. One may even argue that it is not really an exit (to something uncertain future or to a land of "freedom", e.g. re-pegging or floating) but a "re-tracking", i.e. shifting from one track to another track, to take a railway metaphor (Tsang, 2000a).

One possibility is like what Lithuania is going to do. The initial choice of pegging to the US dollar (rather than the German mark) created some problems. As the intention of joining the European Union and the eventual monetary union was made clear (Bank of Lithuania, 1997), a two-currency basket was proposed as a transitional measure to re-tracking (Niaura, 1998). However, the stability of the exchange rate between the euro and the US dollar, among other factors, led to Bank of Lithuania to announce that instead of the basket transition, the litas will be pegged to the euro in the second half of 2001 (Bank of Lithuania, 1999). Eventually, it has been announced that the re-pegging will take effect on 1 February 2002 (Bank of Lithuania, 2001).

In any case, there are uncertainty and costs associated with the re-tracking process (e.g. Keller, 2000). First of all, exchange rate uncertainty exists even after the unilateral pegging to the euro by aspiring currency board regimes. (In Lithuania's case, it seems to have had the blessing of the European Central Bank (ECB)?) Renegotiation of the central rate against the euro may need to take place to reach an agreement for the eventual joining in the monetary union. Depending on the perceived size of the required rate realignment, which could range from zero to something rather significant, speculative capital movements might emerge. Given that EU and then EMU membership will involve the fulfillment of many criteria, the re-tracking cost, i.e. costs incurred to facilitate the process by potentially painful fiscal, monetary and other economic policies, could also be substantial; and various measures might not be fully consistent with each other. Finally, a currency board regime is a fixed exchange rate system; but the euro floats. There will therefore be other technical and behavioral adjustments that an economy making such an exit (entry) has to go through.

Can Hong Kong go the Lithuanian way, sometime in the future, as an intermediate step to join the Renminbi-zone? Probably yes, and the convergence problems may be easier to handle, if both Hong Kong and China work from a position of strength.

A more troublesome problem for Hong Kong is the transition period towards that future monetary union. Despite the East Asian financial crisis, which led to deep deflation in Hong Kong, the SAR remains very expensive as an operating hub and an international financial centre. Critics are all around who call for the abolition of the peg and the abandonment of the currency board system. They regard devaluation or re-floating as the best way to restore competitiveness for the SAR economy.

This is a vastly controversial subject. I only want to deal with one aspect of it here, taking some hints from what Argentina has pronounced recently. So let me introduce my little "innovation", if only in concept: "Tsang's irrelevant currency paradox".

As shown in Appendix C, one way for a currency board regime to reduce pain arising from a misaligned peg (in the fundamental sense) is to shift to a basket including an "irrelevant currency". The euro fulfils to a certain extent such a requirement for Hong Kong (though not in the case of Argentina: Europe is the country's second largest trading partner, after Brazil). So if necessary, Hong Kong can announce a re-peg to a two-currency basket (the US dollar and the euro) with equal weights (50-50), and hope for a weakening euro to save the day for the domestic economy.

The trouble, though, is that this short-term expedient measure, if it is even viable, is in conflict with Hong Kong's long-term objective: a future monetary union with the Chinese Renminbi. A USD-EURO basket peg would make life rather complicated, should Hong Kong want to shift to a merger with the Renminbi.

6. Conclusions

So the experiment of "one country, two monetary systems" as practiced in Hong Kong under Chinese sovereignty is a rather unique one, given the institutional differences and the developmental asymmetry. However, China is catching up fast, indeed very fast. Therefore, although there are still scant arguments for a monetary union between Hong Kong and China any time soon, one may be tempted to be a futurologist, and would be inclined to observe closely and, if possible, to draw some lessons from the convergence problems for East European currency board regimes in their entry to the Euro-zone. A caveat is of course Hong Kong is no former Soviet colonies. And Hong Kong is not eager to form a monetary union with Mainland China; nor is the latter.

That is why I can only write an eclectic essay on the subject.

Appendix A

Following *Asian Monetary Monitor* (1990), we model the normal pattern of currency-to-GDP (C/GDP) ratio in Hong Kong as the economy matures. Any "above normal" amount of currency in circulation (notes and coins) may then be interpreted as extra-territorial demand, i.e. circulation of HK$ in southern China (and Macau, which we neglect here to simplify our analysis). International experience shows that a currency-to-GDP ratio of about 4% is a norm for a mature economy. We first fitted various equations of the form

$$Y = a + b/X^n$$

where Y is the actual currency-to-GDP ratio over the years, a is constrained to 0.04, and X is a time trend variable (66 representing the year 1966, 67 representing 1967....etc.). As X becomes larger, b/X^n will approach zero. Y will then come close to 0.04. We found that the equation

$$Y = 0.04 + 187364000/X^{5.1}$$

gave the best fit for the period of 1966-1987. The R^2 statistic was 0.9104. The equation was then used to extrapolate the value of Y for 1988-2000. The fitted values of Y in those years represent what the currency-to-GDP ratios should have been in Hong Kong, if there had been no extra-territorial circulation of HK$ currency in (southern) China in those years. The following table summarizes the simulation results.

Table A.1 Estimates of HK$ currency circulating in China

	(1) Actual C/GDP (%)	(2) Fitted C/GDP (%)	(1)-(2) Extra-Hong Kong C/GDP (%)	Estimate (HK$ million)
1988	7.49	6.32	1.18	5437
1989	7.57	6.19	1.38	7246 (35.5%)
1990	7.43	6.07	1.36	7896 (9.0%)
1991	7.36	5.97	1.40	9334 (18.2%)
1992	7.85	5.88	1.99	15518 (66.2%)
1993	8.01	5.80	2.25	20187 (30.1%)
1994	7.72	5.72	2.05	20747 (2.8%)
1995	7.39	5.64	1.80	19947 (-3.9%)
1996	7.31	5.43	1.88	22408(12.3%)
1997	7.00	5.38	1.62	21446(-4.3%)
1998	7.34	5.31	2.03	25564(19.2%)
1999	10.10	5.24	4.86	59664(133.4%)
1999*	8.24	5.24	3.00	36830(44.1%)
2000	8.32	5.18	3.14	39780

The estimated amount of HK$15.5 billion for the year of 1992 is indeed very close to that of HK$15 billion of Yam (1994), which does not specify the exact year to which the estimate applies. The findings for 1992-1993 show evidence that there was an increase in the

extent of currency substitution (of the RMB by the HK dollar) in China, as the quality of the RMB deteriorated. However, the situation was reversed in 1994-1997, when the successful effects of the 1994 reforms surfaced and the Chinese currency achieved "Article VIII convertibility" (Tsang, 1997) in late 1996.

The figures from 1998 onwards are difficult to interpret. First, the Hong Kong dollar was under unprecedented attacks from October 1997, and speculation spread to the stock market in 1998. As a result, the government had to take a historic move to intervene in the stock market in August 1998. In any case, Hong Kong plunged into the deepest recession since reliable statistics were available in the early 1960s, and a serious process of asset as well as deflation set in. Moreover, the "Y2K" problem at the end of 1999, when banks deliberately "overstocked" cash, also clouds any meaningful analysis.

Appendix B

Ma and Tsang (1999) implemented some formal tests on whether Hong Kong and China constituted an optimum currency area (OCA) (Mundell, 1961). Two major empirical tests were used: (1) the variance method, (2) the shocks decomposition method. The following tables just sample two of the major findings that returned a negative answer, as yet.

The first approach focuses on the variance of key variables between Mainland China and Hong Kong, as well as those between major regions in the Mainland and Hong Kong. Most variables such as GDP and investment growth rates can be modelled by conventional analysis. Table B.1 presents the results on real GDP growth.

Table B.1
Annual real GDP growth of 28 regions of mainland China and Hong Kong
over 1978 to 1995

	Standard deviation	%
Beijing	0.049719	(+5.5)
Tianjin	0.064501	(+36.9)
Hebei	0.039888	(-15.4)
Shanxi	0.051596	(+9.5)
Inner Mongolia	0.045992	(-2.4)
Liaoning	0.040040	(-15.0)
Jilin	0.052028	(+10.4)
Heilongjiang	0.046250	(-1.9)
Shanghai	0.036820	(-21.9)
Jiangsu	0.049079	(+4.1)
Zhejiang	0.048911	(+3.8)
Anhui	0.056235	(+19.3)
Fujian	0.052644	(+11.7)
Jiangxi	0.041745	(-11.4)
Shandong	0.039777	(-15.6)
Henan	0.049455	(+4.9)
Hubei	0.043099	(- 8.6)
Hunan	0.036184	(-23.2)
Guangdong	0.046012	(-2.4)
Guangxi	0.051775	(+9.9)
Sichuan	0.040462	(-14.1)
Guizhou	0.045991	(-2.4)
Yunnan	0.043089	(-8.6)
Shaanxi	0.045444	(-3.6)
Gansu	0.053316	(+13.1)
Qinghai	0.059695	(+26.7)
Ningxia	0.046769	(-0.8)
Xinjiang	0.043000	(-8.8)
Hong Kong	0.057156	(+21.3)
Mainland CHINA (excluding HK)	0.047126	

Notes: The period under investigation is 1978-1995. The figure in brackets represents the percentage divergence of the standard deviation from China's national average

(excluding HK). Due to the lack of observations, the principal components analysis cannot be conducted in this table. And because of data unavailability, Hainan and Tibet are not included.

The second analytical technique applies principal component analysis to decompose the common shocks to an economic variable in different regions into symmetric and asymmetric shocks. This is complementary to the von Hagen and Neumann's (1994) individual shock approach. One example of this approach is Caporale (1993). The mainstream view is that if the symmetric contributions outweigh the asymmetric contributions for a particular economy in a region, it would constitute evidence that the economy would derive net benefit by being a member of the region, i.e. the region has the potential to form an OCA. If asymmetric contributions of common shocks predominate, an OCA would then be regarded as undesirable. As shown in Table B.2, where both variance and decomposition results are presented, asymmetric shocks prevailed in Hong Kong, even when compared with the Coastal regions of China, with which it has had the closest economic relationship.

Table B.2
Annual real GDP growth rates of 11 coastal regions of
mainland China and Hong Kong over 1978 to 1995

	Standard deviation	%	Shocks decomposition:		
			symmetric	asymmetric	total
Beijing	0.055146	(+23.1)	100.00	0.000	100.00
Tianjin	0.063840	(+42.5)	74.476	25.524	100.00
Hebei	0.041415	(-7.6)	100.00	0.000	100.00
Liaoning	0.042949	(-4.2)	95.303	4.697	100.00
Shanghai	0.035176	(-21.5)	100.000	0.000	100.00
Jiangsu	0.046599	(+4.0)	100.000	0.000	100.00
Zhejiang	0.042396	(-5.4)	80.207	19.793	100.00
Fujian	0.043754	(-2.4)	81.306	18.694	100.00
Shandong	0.035165	(-21.5)	56.606	43.394	100.00
Guangdong	0.040867	(-8.8)	65.559	34.441	100.00
Guangxi	0.045643	(+1.9)	67.603	32.397	100.00
Hong Kong	0.058990	(+31.6)	29.862	70.138	100.00
Coastal regions of China (excluding HK)	0.044813				

Notes: The figure in brackets represents the percentage divergence of the standard deviation from China's national average. Due to data unavailability, Hainan is not included in this table.

Optimal exit strategy from a currency board through a basket:
The "equivalence condition" and "Tsang's irrelevance paradox"

      First of all, I wish to thank Yue Ma for alerting me to the equivalence issue, which was implicit in my previous studies (Tsang, 1996a; 1999a). We have collaborated in working out the "equivalence condition" presented here. But the "irrelevance paradox" is my own addition and extension.

      Suppose there are two currencies: the domestic one is PESO, the foreign counterpart is USD. Initially, PESO is pegged to USD under a currency board regime. Now to get out of a misaligned peg (i.e. the USD's strength is generating unbearable pain on the domestic economy), a temporary basket peg, even for a currency board, may be an "optimal" strategy. But the other foreign currencies to be introduced to the basket have to be "irrelevant". Moreover, they better be "weak" currencies, tending towards depreciation against the USD. This is the gist of the "Tsang's irrelevance paradox".

      To take an example that has realistic implications (without any intended paradoxical meanings). Let us imagine a shift from a single currency peg (to the USD) to a two-currency peg under a currency board system. The "irrelevant and weak currency" is EURO. In the true spirit of the "AEL model", the model of Argentina, Estonia and Lithuania (Tsang, 1998b; 1999b), can arbitrage hold the basket peg? Why not?

      First let us prove that the shift to the two-currency basket is equivalent to a shift to an implicit index peg only under certain condition. We call that the "equivalence condition".

      What the government needs to do is to assign weights to the two currencies in day one of transition:

(1)   1 PESO = a.USD + b.EURO

where the weights sum up to one: i.e. $a + b = 1$.

      This implies that:

(2) USD/PESO = a + b.USD/EURO

      This is what Argentina has prepared to do, when USD/EURO = 1.0, i.e. parity.

      To look at the matter from an index perspective, if the authority is going to defend the weighted–average index of the two-currency basket (compared with Tsang, 1999a), we have the general formula:

(3) c.PESO/USD + d.PESO/EURO = Io

where c and d are again relative weights $(c + d = 1)$, and Io is the initial index value.

      Multiply (3) by USD/PESO, we have

(4) c + d.USD/EURO = USD/PESO.Io

Hence,

(5) USD/PESO = c/Io + (d/Io).USD/EURO

It is obvious that equation (5) and equation (2) will be identical if a = c/Io and b = d/Io simultaneously. Only then will the PESO/USD exchange rate be the same under either weights assignment and index peg. Now for the sake of political acceptance, the shift better not involve any change in the PESO/USD rate in day one. Given that constraint, this "equivalence condition" will be obtained if the authority starts the shift for the PESO from the single peg to the two-currency basket peg when the exchange rate of EURO/USD equals one. That is what Argentina is going to do. Then Io must be unity and a = b; c = d. If in day one, EURO/USD (or trivially, USD/EURO) is not on parity, equivalence will not hold. If monetary authority wants to stick to equivalence, c and d will have to be changed frequently, assuming that Io is more difficult to be modified.[1] Such changes of index weights may create confusion in the market. This could be one of the reasons why Argentina plans to shift to the basket peg only when parity is achieved.

The merit of having continued equivalence is basically that of simplicity and transparency. In a nutshell, the two arrangements, assigning weights to the two currencies and the defence of an index, are then identical. Pegging the domestic currency to two foreign currencies with assigned weights is equivalent to pegging to their weighted-average index.

This shift may be a viable exit strategy for a currency board regime (Tsang, 2000a) because the effective domestic purchasing power under the convertibility undertaking (from one PESO to one USD to one PESO equal to half USD and half EURO) is guaranteed. The trouble is that the regime has to wait for the arrival of the parity, which is uncertain. (Argentina is using tariffs and subsidies to achieve the *de facto* effect: but that is another story.)

So much for the equivalence condition. The trick for the currency board regime is this: whether the "equivalence condition" holds or not, the PESO/USD exchange rate will "dance to the tune" of that of EURO/USD (c.f. Tsang, 1996a; 1999a), over which it has no control. Assuming that the currency board regime could make the transition politically acceptable through the equivalence condition, the "exit" from the misaligned single peg to an excessively strong USD lies in its expectations about the future EURO/USD exchange rate. After day one, for example, if the EURO depreciates against the USD (i.e. EURO/USD increases in magnitude, or USD/EURO decreases in magnitude), the PESO/USD exchange rate will also depreciate, no matter whether we look at equation (2) or equation (5), and irrespective of their equivalence! The trouble is that the expectations of a weak EURO may not materialize.

In any case, it is also obvious from both equations that the PESO will appreciate against the EURO in both systems. That is exactly why the EURO has to be "irrelevant" (which is actually not the case for Argentina). The reason is that the currency board regime then has no need to worry about the negative effects of the depreciation of the EURO on the domestic economy, for example, undermining competitiveness or importing deflation (or inflation, depending on the economic structures and relationships), etc. In other words, with a weak EURO, the PESO will strengthen against the EURO but weaken against the USD, although the basket index remains the same. But if the domestic country has very little trade and other economic exchanges with the EURO-zone, but a lot with the USD-zone, this basket peg would

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[1] Of course, if the authority wants to ensure equivalence at all costs, it can always change the PESO/USD rate in day one as well. With two unknowns in two equations, equivalence will obviously hold forever for equations (2) and (5). However, changing the PESO/USD exchange rate immediately is a rather dramatic "exit", further undermining the image of the continuation of the currency board. Here we start from the premise that the original single peg rate is not changed in day one. This is equal to introducing a third equation (a constraint) that PESO/USD = k, k being the original peg rate.

represent a *de facto* devaluation against USD!

One crucial question is the loss of immediacy and transparency in a basket peg. So far, no currency boards have pegged to more than a single currency; and regimes that peg to a basket usually do not announce the weights and the formula---and they are not very different from crawling pegs or dirty float, from the perspective of foreign exchange market participants.

Modern analysis of currency board regimes (particularly the so called "AEL model", the model of Argentina, Estonia and Lithuania) has emphasized the use of market forces (instead of government intervention) to hold the spot exchange rate, just like under the old gold standard (Tsang, 1996a,b; 1998b; 1999b). Even Hong Kong, with very deep pockets in terms of foreign exchange reserves, had to partially adopt the model in the "seven technical measures" of September 1998 by providing a firm, albeit one way convertibility undertaking, so that market arbitrage could be done (Tsang, 1998c; 2000b). Can arbitrage efficiency be strong enough to hold a basket peg under a currency board regime? In normal times, theoretical three-way arbitrage could do the job, and there should not be serious problems. In crises, it may be a challenge (see e.g. Taylor (1989) for a general treatise of arbitrage).

Moreover, if the EURO is irrelevant to the economy, it may also be irrelevant to different sectors and citizens to various degrees. How would they respond to the basket shift and how should they hedge against the risk in the changes of the EURO/USD exchange rate? These are open questions that I do not want to venture into here.

In any case, my "paradox", largely pedagogical in nature, is just an intuition about a possible way to exit from a currency board: choose a weak, and IRRELEVANT currency to be incorporated into the basket when you have been "wrongly" pegged to a single strong one. You may with some justifications say that you are sticking to a currency board, particularly as you still defend the effective purchasing power of the convertibility undertaking, although in effect you are half-exiting from the peg to that irritating USD!

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