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Deflation in Hong Kong SAR

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Abstract

This paper examines the causes of persistent deflation in Hong Kong SAR. The econometric analysis focuses on the price dynamics between Hong Kong SAR and Shenzhen. It finds cyclical factors as powerful determinants of deflation, whereas price equalization pressures associated with greater integration with Mainland China have played an only minor role. An examination of the potential channels of price equalization (in the product, labor, and property markets) lends further support to the econometric results. The paper also finds that the persistence of deflation may be explained by the fact that the Hong Kong economy was hit by successive shocks, and by the role of balance-sheet and wealth effects in amplifying these shocks.

Keywords: deflation, price equalization, persistence

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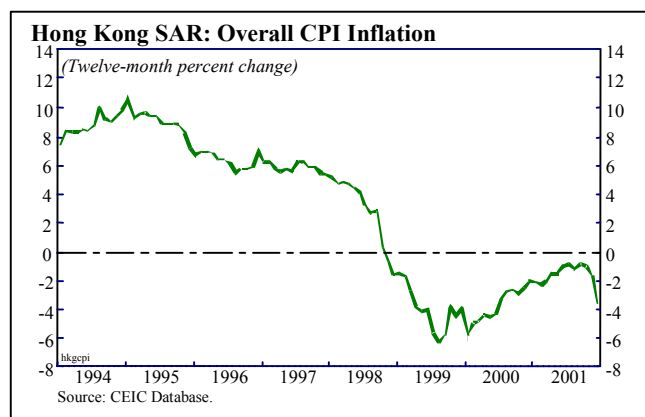
A. Introduction

1. **Protracted deflation in Hong Kong SAR has raised several questions.** In particular, what have been the causes of deflation, and why has it been so persistent?
2. **Both cyclical and structural factors have been cited as possible causes of deflation.** According to the cyclical view, prices have had to decline in response to shocks, to restore competitiveness under the linked exchange rate system. The structural view sees deflation mainly as a process of narrowing price differentials between Hong Kong SAR and the Mainland of China, due to growing economic integration. Persistence of inflation could be due to its structural nature, or reflect a drawn-out cyclical adjustment process.
3. **This paper examines whether deflation has been caused mainly by cyclical or structural factors, and why it has persisted for so long.** The main findings are:
 - **Although structural factors have played a role, deflation has been mainly the result of a process of cyclical adjustment to shocks.** The analysis attributes most of the inflationary/deflationary process in Hong Kong SAR to cyclical factors, and only a small part to price equalization as a result of growing economic integration with the Mainland of China.
 - **The persistence of deflation reflects the way deflation has propagated itself into the real economy, and the fact that the economy has been hit by successive shocks.** Price adjustment has been amplified and protracted by the importance of balance-sheet and wealth effects and the fact that the Hong Kong economy has suffered two subsequent cyclical downturns.
4. **The plan of this paper is as follows.** Section B reviews recent price developments. Section C examines whether the cause of deflation is primarily cyclical or structural. Section D addresses the question of why deflation has persisted for so long. Section E summarizes and discusses any policy implications. Econometric evidence and technical details are presented in an Annex.

B. Price Developments

5. **Deflation in Hong Kong SAR has lasted for more than three years.** Between September 1998 and January 2002, the Hong Kong price level has fallen by a cumulative 12 percent, bringing consumer prices back to their level of late 1995.

6. **Deflation has mainly reflected a sharp fall in housing costs after the property price bubble of the mid-1990s collapsed (Table 1 and Chart 1).**



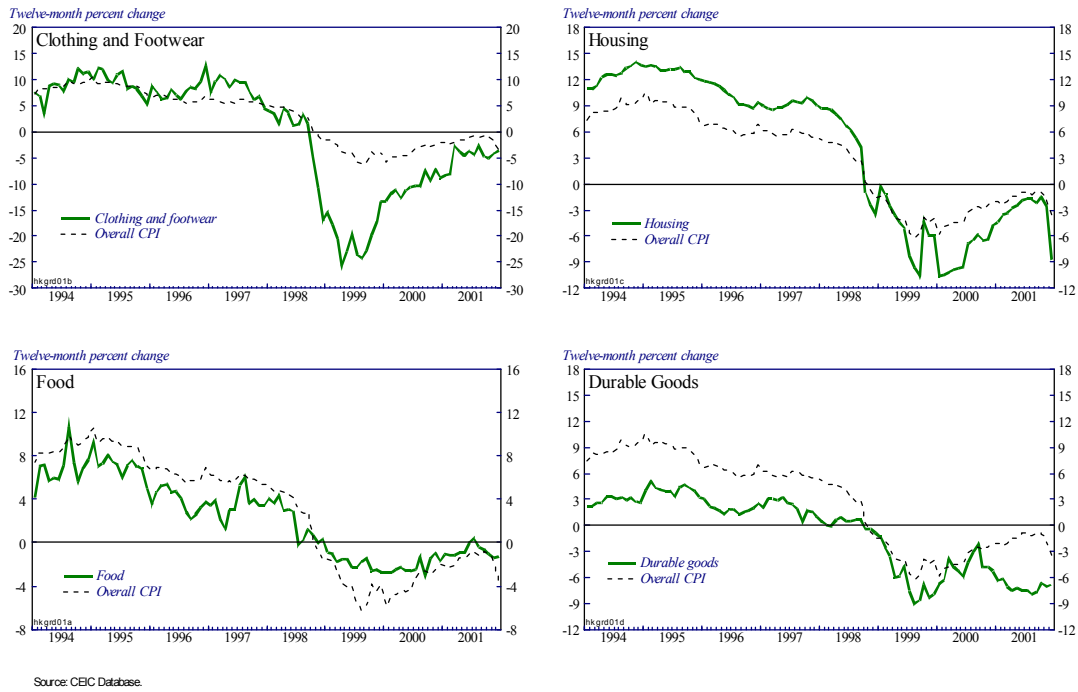
The bubble had been driven by rapid productivity and wage growth in the tradable sector that spilled over into the non-tradable sector, a process that was exacerbated by speculative motives (Kalra and others, 2000). After a sharp initial correction, property prices have continued to fall, albeit on a slowing pace, resulting in a cumulative decline of about 55 percent since the peak in late 1997. The consequent decline in rentals – about 20 percent since the mid-1998 peak – has been responsible for half of the deflation in the overall CPI. Other components of the CPI that have declined were food, clothing and footwear, and durable goods, together accounting for about one-third of deflation.

Table 1. Major Contributors to Deflation

	Cumulative change Sep 1998-Jan 2002 (percent)	Weight in overall CPI (percent)	Contribution to overall deflation (percentage pts)	Contribution to overall deflation (share)
<i>Five most important contributors:</i>				
Housing	-20.3	29.9	-6.1	50.5
Food	-6.1	26.7	-1.6	13.7
Clothing and Footwear	-32.9	4.1	-1.4	11.3
Durable Goods	-20.1	6.2	-1.3	10.5
Miscellaneous Services	-3.6	14.4	-0.5	4.3
<i>Memorandum Item:</i>				
All Items	-12.0	100.0	-12.0	100.0

Source: Composite CPI data from CEIC

Chart 1. Components of CPI Inflation

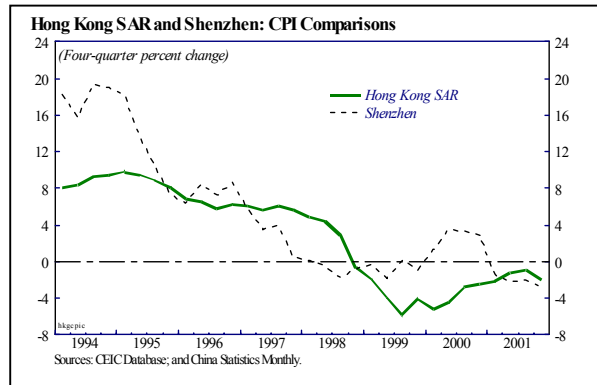


C. Cyclical or Structural?

7. **This section examines the relative importance of cyclical and structural factors.** It first summarizes econometric evidence on the determinants of deflation in Hong Kong SAR, followed by a (qualitative) review of the potential channels of price equalization.

Econometric Evidence²

8. **Price data for Hong SAR and neighboring Shenzhen are examined for evidence of price equalization pressures and their impact on deflation in Hong Kong SAR.³** The main findings are as follows:



² A detailed description of the methodology and regression results is presented in the Annex.

³ In measuring the effect of price equalization pressure on the Hong Kong price level, Shenzhen is chosen because of its close proximity.

- **There has been some degree of price equalization pressure.** To measure price equalization pressure, an equation is estimated that relates the gap between Hong Kong and Shenzhen prices to the gap of the previous period. Price equalization pressure is indicated by the extent to which the size of the gap is associated with a future narrowing of the gap. The estimation results suggest that:
 - *The price levels of Hong Kong SAR and Shenzhen have been converging as a result of price equalization pressure.*
 - *The major part of such pressure appears to have occurred before the collapse of the property price bubble.*

- **However, price equalization pressures explain only a minor part of deflation in Hong Kong SAR, with the major part attributable to cyclical and other factors.** An equation is estimated that relates CPI inflation in Hong Kong SAR to unemployment, the nominal effective exchange rate, credit growth (controlling for the business cycle, imported inflation, and property market developments) as well as the gap between Hong Kong and Shenzhen prices (the structural variable). The same equations are estimated for various subcomponents of the CPI. The results are as follows:
 - *Cyclical and other factors explain the major part of deflation, while the structural element appears to play only a minor role. Variations in unemployment, credit growth, and the nominal effective exchange rate contribute 36 percent, 14 percent, and 5 percent, respectively, to the explanatory power of the equation. In contrast, the price level gap contributes only 2 percent. Similar patterns hold for the determinants of deflation in the CPI subcomponents.*
 - *Structural forces do not seem to have become more prevalent in recent years.*

Channels of Price Equalization

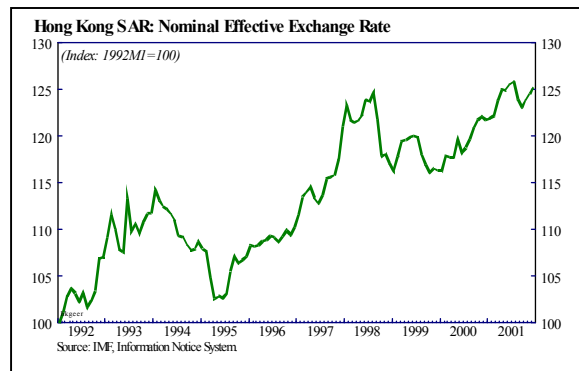
9. **To shed further light on the relative importance of structural and cyclical factors, the potential channels of price equalization are examined.** Specifically, price determination in the product, labor, and property markets are analyzed to gauge the potential role of price equalization pressures.

Product Market

10. **While growing integration with the Mainland of China facilitates price equalization in the product market, deflation in product prices could also be the result of strong pro-cyclicality of certain products.** Cheaper food imports from the Mainland of

China and the increased practice of cross-border shopping among Hong Kong residents may have led to some downward pressure on product prices. However, it should also be noted that:

- **The demand for certain products, such as clothing and durable goods, is highly sensitive to the business cycle.** Other economies suffering a cyclical downturn but not sharing Hong Kong SAR's integration challenges (such as Singapore) have experienced a similar pattern of deflation in the prices of clothing and durable goods.
- **The current prevalence of price cuts and discounts can be explained by the strong pro-cyclicality of mark-up margins.** Competition among retailers typically intensifies during a cyclical downturn. Since mark-up margins tend to be strongly pro-cyclical, a large cyclical price response is to be expected.
- **Weak price developments in major trading partners together with the nominal effective appreciation of the Hong Kong dollar have also contributed to the weakness in product prices.** Deflation in Japan as well as the weakness of the Yen have likely had a particularly dampening effect.



Labor Market

11. **Deflation has also been attributed to price equalization pressure in the labor market.** With the demand for non-skilled labor falling as low-skilled activities migrate across the border, rising unemployment among low-skilled workers may create deflationary pressure. However:

- **While mismatch in labor skills is an important problem that needs to be addressed, it is not a convincing explanation for persistent deflation.** Downward pressure on the wages of low-skilled labor is to be expected as businesses in Hong Kong SAR continue to upgrade along the value-added chain. However, given the shortage of skilled labor, the impact on average wage costs of falling low-skilled wages may be more than offset by upward pressure on wages of high-skilled labor.
- **A similar fallacy would attribute deflation to a structural displacement of services jobs to the Mainland.** A large part of the Hong Kong services sector supports the export-oriented manufacturing base located in Guangdong, controlled by businesses registered in the Hong Kong SAR. With manufacturing in Guangdong hit hard by the global cyclical downturn, it is not surprising that the services industries in Hong Kong SAR were affected too.

Property Market

12. **While the “structural view” attributes the retrenchment of property prices to the availability of cheaper real estate across the border, this factor is likely to have played only a limited role.** The sharp decline of property prices after 1997 reflects the puncturing of the real estate bubble, prolonged by a renewed economic downturn last year. In contrast, price equalization forces appear to have played only a minor role so far:

- **Various factors seem to limit price equalization in the residential property market.** These include, among others, commuting costs⁴ and differences in terms of legal systems, and the quality and cost of education and medical services. Survey evidence suggests that cost considerations have played only a minor role for Hong Kong residents who have decided to relocate.⁵ To the extent that there has been

⁴ Travelling costs (nearly \$30 per round-trip from Futian in Shenzhen to the center of Hong Kong SAR) and time (about 95 minutes) make commuting to Hong Kong SAR relatively unattractive (CLSA Emerging Markets, 2001).

⁵ A 2001 Census and Statistics Department survey indicated that, among over 41,000 persons who had taken up residence in the Mainland, only some 700 had done so because of “lower cost of living in the Mainland”.

increased demand from Hong Kong residents for property in the Mainland, it is mostly for second homes (demand creation) rather than relocation (demand displacement). A significant gap between residential property prices in Hong Kong SAR and the neighboring area is therefore likely to remain.⁶

- **The decline of rentals in the commercial property market is unlikely to have resulted from price equalization pressure.** Although Hong Kong SAR has repeatedly listed among the most expensive cities in the world, the Hong Kong location commands a premium related to its function as an international hub. Furthermore, commercial rental costs are reportedly only a minor factor in the location decision of firms.

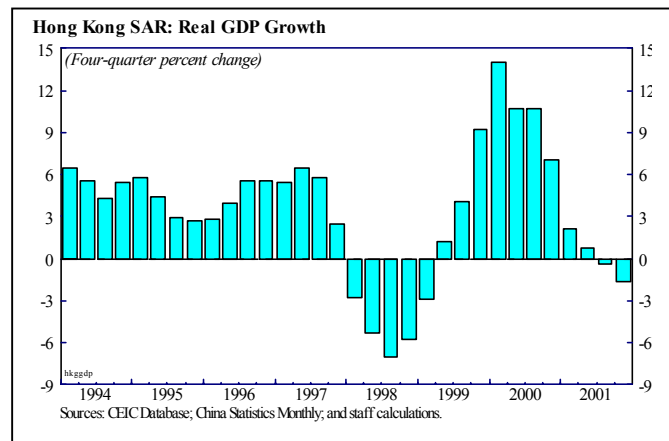
⁶ UBS Warburg (2001) report that the price differential between comparable real estate in Hong Kong SAR and Shenzhen is about 30 percent, and likely to remain as long as the differences noted above remain.

D. Persistence of Deflation

13. **Even if deflation is largely cyclical, its persistence for over three years raises the question of why adjustment has taken so long.** The persistence of deflation may be explained by the fact that Hong Kong SAR suffered two successive shocks, and by the way deflation has propagated and amplified itself into the real economy.

Successive Shocks

14. **Deflation has spanned a period during which the Hong Kong economy was hit by two external shocks, causing large swings in output.** As a result of the Asian crisis, Hong Kong SAR suffered a sharp decline in output in 1998. This was followed by a strong – but brief – recovery in 1999-00, during which deflation also started to decelerate. The renewed external downturn reduced growth to almost zero in 2001, with deflation re-accelerating as well.



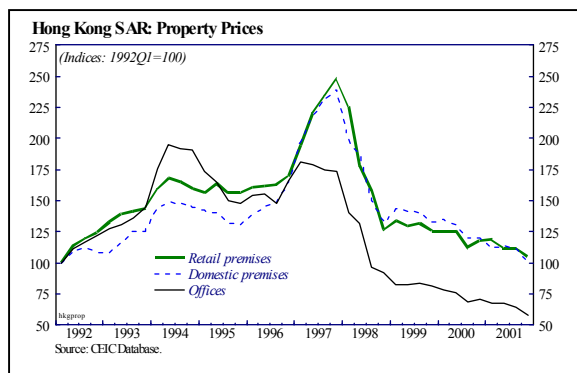
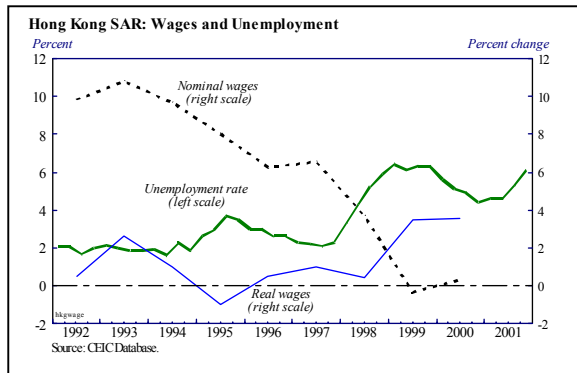
Propagation and Amplification

15. **The two external demand shocks of recent years have propagated themselves into the real economy through a drawn-out adjustment process in product and factor markets.** Given the linked exchange rate system, the shocks had to be absorbed through price adjustment in product and factor markets.

- **In product markets, price adjustment has been relatively fast.** As noted earlier, various components of the CPI underwent large and rapid adjustment (see Table 1).⁷

⁷ Zitzewitz (2000) shows that, compared to OECD economies, price adjustment has historically been much faster in Hong Kong SAR. Mark-up margins are significantly more pro-cyclical in services, while only slightly more counter-cyclical in manufacturing. The shift to a service-based economy has therefore made economy-wide margins more pro-cyclical, contributing to a rate of price adjustment that is faster than in the OECD.

- **In labor markets, nominal wages have adjusted more slowly than prices.** Despite increased unemployment and drops in productivity, real wages have continued to grow.⁸
- **In asset markets, the shocks entailed large movements in property and stock prices.** The property market saw a large correction, with residential property prices falling by 45 percent between October 1997 and October 1998. Property prices continued to fall subsequently, albeit at a lower pace, with rentals lagging behind. The stock market suffered a correction of about 43 percent between July 1997 and January 1998, with continued volatility thereafter.



16. **Deflation in Hong Kong SAR appears to have been amplified through large balance-sheet and wealth effects of falling property and stock prices.** Balance-sheet and wealth effects are particularly relevant in Hong Kong SAR because a large amount of wealth is held in property and stocks, and bank lending is mostly secured against real estate.

- **Private consumption expenditure has slowed as a result of asset price deflation.** Peng, Cheung and Leung (2001) report that more than half of the decline in private consumption expenditure in 1998 can be explained by balance-sheet effects. Between 1997 and 2000, net housing equity in the private residential sector has dropped by more than 50 percent.

⁸ The incomplete adjustment of real wages, which has been associated with greater unemployment, is not necessarily the result of inefficiency. For example, lack of adjustment in nominal wages may be explained by the reluctance of employers to lower nominal wages because of efficiency wage arguments: as wage declines may lead to productivity declines, employers may rationally prefer to lay off employees rather than to lower wages. Also, sole consideration of wage data distorts the degree of labor market flexibility since non-wage compensation items, such as bonuses, have reportedly also declined significantly.

- **With deteriorating balance sheets limiting the capacity and willingness of firms to take on additional debt, private investment has also declined.** As banks became increasingly reluctant to provide credit under falling asset values, small- and medium-sized enterprises (SMEs), which play an important role in the Hong Kong economy, have particularly suffered (HKMA, 2000).⁹ This may reflect the fact that SMEs typically depend on collateral in securing credit. Although subdued demand became the main factor restraining loan growth in recent years (Chiu and Lai, 2001), banks have continued to remain cautious in lending to SMEs.

Other amplifiers have contributed too.

- **Precautionary savings effects have dampened consumption and investment.** Due to increased unemployment risk and the uncertain business outlook, precautionary savings effects have amplified the slowdown in consumer durable goods purchases and fixed investment. By increasing the rate of unemployment, downward nominal wage rigidity may have exacerbated this effect.
- **High real interest rates have likely delayed spending plans.** With deflationary expectations settling in, high ex-ante real interest rates have likely been a factor in the decision of households and firms to postpone consumption and investment outlays.

17. **The slowdown in spending generated through these amplifiers is likely to have made deflation more persistent.** Kiyotaki and Moore (1997) show that a one-off shock may cause a persistent decline in credit through the interaction with an amplified asset price response. Along these lines, asset price deflation (which implies overall deflation in Hong Kong SAR, given the importance of rentals in the CPI) may well last for a protracted period of time even if there is no persistence in the shock.

⁹ Survey data indicate that SMEs (defined as having less than 100 employees) contribute 43 percent of value-added in the manufacturing sector, 59 percent in the construction sector, 78 percent in the distributive and catering trades, 32 percent in the transport, storage, and communication sector, and 66 percent in the financing, insurance, real estate, and business services sector.

E. Summary and Policy Implications

18. **The long duration of deflation in Hong Kong SAR raises the question whether it reflects a prolonged process of cyclical adjustment or whether more longer-term structural forces are at work.**

19. **The staff's analysis suggests that, although structural factors have played a role, deflation has been mainly the result of a process of adjustment to cyclical shocks.** A price equation for Hong Kong SAR finds unemployment, nominal credit, and the nominal effective exchange rate as powerful determinants of deflation, while the gap between prices in Hong Kong SAR and neighboring Shenzhen has only small explanatory power. To the extent that there has been price equalization, most of it seems to have come through greater inflation in the neighboring region rather than through deflation in Hong Kong SAR.

20. **The persistence of deflation can be explained by the fact that the economy was hit by two subsequent shocks, and by the role of balance-sheet and wealth effects in amplifying these shocks.** Large balance-sheet and wealth effects from the fall of property and equity prices fed back into demand, and thus amplified and prolonged the deflationary shock. Persistence was compounded by the fact that the economy was hit by a second shock before the adjustment to the first one had been completed.

21. **What can be done to reduce the length and amplitude of future price adjustment cycles?** Given the openness of Hong Kong SAR's economy and its rules-based approach to economic policy, the scope for counter-cyclical demand management is limited. However, certain structural features can be improved upon to facilitate adjustment:

- **Given the importance of the property sector, land and housing policies play an important role in the adjustment process.** Much of the feedback into the real economy through balance-sheet and wealth effects arises from volatility in the property market. Reducing such volatility is thus important, and although monetary policy is constrained by the linked exchange rate, other available policy options (including prudential safeguards) should be used to avoid speculative bubbles. Recent changes in land policy that enhance the elasticity of land supply should also help de-amplify price volatility in the property market. Finally, the policy of providing public housing at a fixed discount (which is currently under review) may also amplify downward price pressures.
- **Asset price cycles may be moderated by a more balanced reliance on collateral-based lending.** In a purely collateral-based system, with the value of collateral highly susceptible to cyclical swings, credit is also bound to be highly volatile. On the other hand, in a pure risk assessment-based system, banks, if faced with an economic downturn, may also become overcautious in providing credit. The point is therefore

to find the right balance between strong risk assessment methods and reasonable collateral requirements.¹⁰ Such a regime will provide room for banks to supply credit to SMEs during a downturn, which may help de-amplify the cycle.¹¹ To strengthen risk assessment capabilities, the establishment of a credit reference agency for SMEs may be useful.

- **Safeguarding and, where possible, promoting nominal wage flexibility may help dampen the feedback through unemployment and consumer demand.** Faster adjustment in prices than in nominal wages has been associated with rising unemployment, which in turn has contributed to uncertainty, precautionary savings, and further deflationary pressure. Since there is no government interference in private sector wage formation, the policy implication here is mainly to refrain from measures that would introduce rigidities.

¹⁰ Manove, Padilla, and Pagano (2001) show that over-reliance on collateral may lead to market equilibria in which the provision of cheap credit is inappropriately emphasized over project screening.

¹¹ Schellekens (2000) shows that, while collateralization alleviates informational asymmetries, over-reliance on collateral may inefficiently restrict the provision of credit to SMEs because of aggregate asset price volatility and costly collateral liquidation.

Annex

22. **This Annex presents econometric evidence on the relative role of cyclical and structural factors in causing deflation in Hong Kong SAR.** First, price equalization pressures between Hong Kong SAR and the neighboring city of Shenzhen are examined. Second, the determinants of deflation in Hong Kong SAR are studied. Third, the question is asked whether the importance of price equalization pressure in causing deflation has increased recently.

23. **The structural factor is proxied by the price level gap between Hong Kong SAR and Shenzhen.** The price level gap is constructed by taking log differences between the seasonally adjusted consumer price indices of Hong Kong SAR and Shenzhen, respectively.¹² The resulting percentage gap is then mean-standardized. Since the gap is based on two indices, the analysis focuses on the evolution of the gap.¹³

Price Equalization Pressure

24. **Annex Table 1 examines whether the price level gap between Hong Kong SAR and Shenzhen has narrowed as a result of price equalization pressure.** The sample consists of monthly data covering the period of January 1993 to December 2001. The dependent variable is the change in the price level gap between Hong Kong SAR and Shenzhen (that is, the difference between the respective inflation rates). Price equalization pressure would manifest itself if a large gap were responsible for narrowing the gap in the next period (through higher inflation in Shenzhen than in Hong Kong SAR). The independent variables included in the regressions are the lagged level of the mean-standardized gap (to measure the speed of price equalization pressure) and two interaction terms (to measure whether such pressure has intensified in recent years).¹⁴ The first

¹² All price level and inflation rate variables in this paper have been seasonally adjusted with the U.S. Bureau of Census X11.2 procedure. The price level gap is defined as $\log(P_t^{HKG}) - \log(P_t^{SHE})$, where P_t^{HKG} and P_t^{SHE} are the seasonally-adjusted composite CPI price levels of Hong Kong SAR and Shenzhen at date t. The year-on-year change in the price level gap equals $\log(P_t^{HKG}) - \log(P_t^{SHE}) - (\log(P_{t-12}^{HKG}) - \log(P_{t-12}^{SHE}))$. This is equivalent to $(\log(P_t^{HKG}) - \log(P_{t-12}^{HKG})) - (\log(P_t^{SHE}) - \log(P_{t-12}^{SHE}))$, which is the difference between the year-on-year inflation rates of Hong Kong SAR and Shenzhen. Therefore, in order to have price level equalization (leading to a narrowing of the gap), Shenzhen inflation needs to exceed that of Hong Kong SAR.

¹³ CLSA (2001) suggest that the percentage gap is quite large in absolute terms. A basket of nondurable consumer goods is about 40 percent cheaper in Shenzhen.

¹⁴ All lags in this paper refer to twelve-month lags.

interaction term includes a dummy variable which equals one after November 1997 (when the property market started its collapse); the second interaction term includes a dummy which is set to one after October 1998 (when deflation was first recorded in Hong Kong SAR).

The results are as follows:

- **The data indicate the presence of some degree of price equalization pressure during the period under review.** This is reflected by the significantly negative coefficients on the lagged levels of the gap. Large price differentials have generally caused the gap to close by more than small ones.¹⁵
- **Most of such pressure occurred prior to the collapse of the property market and the onset of deflation (1997/1998).** This is reflected by the two interaction terms which offset the negativity of the convergence parameter—the exception being regression (5).

Determinants of Deflation

25. **Annex Table 2 presents evidence on whether the price level gap has led to deflationary pressure in Hong Kong SAR.** Price equalization may be consistent with (i) an unchanged price in Hong Kong SAR in combination with higher inflation in Shenzhen, or (ii) an unchanged price path in Shenzhen in combination with deflation in Hong Kong SAR. Therefore, the finding of some price equalization pressure is not sufficient to conclude that this has caused deflation in Hong Kong SAR. Also, deflation may be due to other factors that need to be controlled for. The regressions presented in Annex Table 2 analyze the link between deflation in Hong Kong SAR and price equalization pressure, while controlling for other factors.

¹⁵ The speed of convergence is meant to capture the extent of integration between markets or the efficiency with which price differentials between spatially separate locations are arbitrated away. See Obstfeld and Taylor (1997), and Ejrnaes and Persson (2000) for extensions.

26. **The methodology adopted is as follows.** The rate of overall CPI inflation in Hong Kong SAR is taken as the independent variable. In addition to overall CPI inflation, a number of components of the CPI index are also examined, including clothing, food, health, durables, housing, services, and transportation.¹⁶ The sample consists of quarterly data from the first quarter of 1995 until the last quarter of 2001.¹⁷ Independent variables include the rate of unemployment (controlling for the business cycle), the nominal effective exchange rate (controlling for imported inflation), lagged credit growth (controlling for the dynamics of the asset price bubble and its lagged effect on rentals),¹⁸ and the structural variable (proxied by the percentage gap between the Hong Kong and Shenzhen price levels). Again, the price level gap has been mean-standardized and lagged by four quarters.¹⁹ The data on the relative inflation rates and the price level gaps is presented in Annex Charts 1 and 2.

¹⁶ Due to differences in CPI aggregation between Shenzhen and Hong Kong SAR, inevitable problems arise when constructing comparable subcomponent CPI indices. For this reason, the Shenzhen subcomponent of “recreational, educational, and cultural articles” has been left out. As to the remaining components, a sufficiently close match has been achieved, although some differences remain: (1) the Shenzhen food index includes alcoholic drinks and tobacco; (2) the Shenzhen durable goods index excludes durable goods for recreational use; (3) the Shenzhen transportation index includes communication (4) the Shenzhen housing index includes gas, water, and electric; and (5) the services index has been left out for 2001 as the Shenzhen definition was changed that year.

¹⁷ The sample period is smaller than for the previous regressions due to limited data availability. The choice of quarterly frequency is motivated by the need to control for the cyclical component.

¹⁸ In line with Peng, Cheung and Fan (2001), who find that most of the variation in unemployment in Hong Kong SAR has reflected cyclical conditions, unemployment has been selected as a proxy for the business cycle. Lagged nominal credit growth has been included to capture the build-up and subsequent collapse of the asset price, and its lagged effect on the housing component of the CPI. See Samiei and Schinasi (1994), and Collyns and Senhadji (2002) on the relevance of credit growth for asset price bubbles.

¹⁹ To check for robustness, alternative specifications were examined. These featured a lagged dependent variable, various lags for the independent variables, and alternative proxies for the asset price bubble. Several specifications were examined with alternative proxies for the business cycle, including measures of the output gap. See Ha and Leung (2001), and Gerlach and Yiu (2002) for measures of the Hong Kong output gap using, respectively, unobservable-component estimation and the production function approach.

The results can be summarized as follows:

- **The rate of change in Hong Kong SAR's price level is explained well by the regressions.** The overall explanatory power is relatively high; most coefficients are significant at the one-percent level; and almost all coefficients have the predicted sign.
- **Cyclical and other factors explain most of the deflation, whereas structural factors play only a marginal role.** Variations in unemployment, credit growth, and the nominal effective exchange rate contribute 36 percent, 14 percent, and 5 percent, respectively, to the explanatory power of the deflation equation. In contrast, the price level gap contributes only 2 percent.²⁰
- **The same pattern holds for the determinants of deflation in the CPI subcomponents.** Except for clothing and transportation, the price level gap does not add much to overall explanatory power. Variations in unemployment, credit growth and nominal effective exchange rate explain most of the deflation.

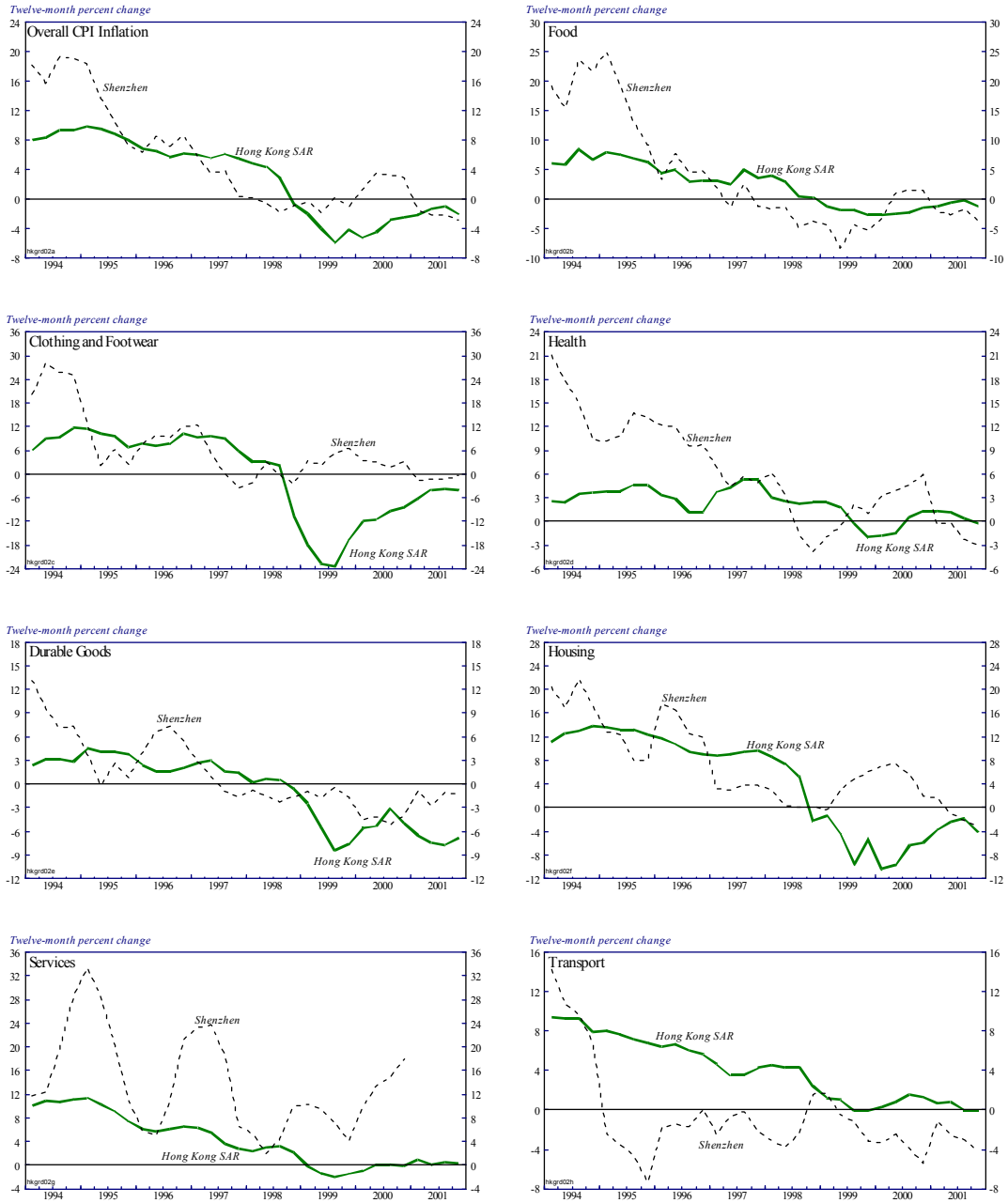
Intensification of Price Equalization Pressure

27. **Annex Table 3 shows that the relative importance of structural forces has not increased in recent years.** Two periods are examined: the period right after the collapse of the property market in 1997, and the period commencing with the start of deflation in 1998. The data set consists of the same quarterly data used in the previous regressions. Focusing on overall CPI inflation, two interaction terms are included to allow for a differential impact of the price level gap after the two events in 1997 and 1998.

28. **Deflationary pressures arising from price convergence forces have not increased significantly after the collapse of the property market in 1997, nor after the onset of deflation in 1998.** As the regression results indicate, the dummy interaction terms are not significant at the 10-percent level.

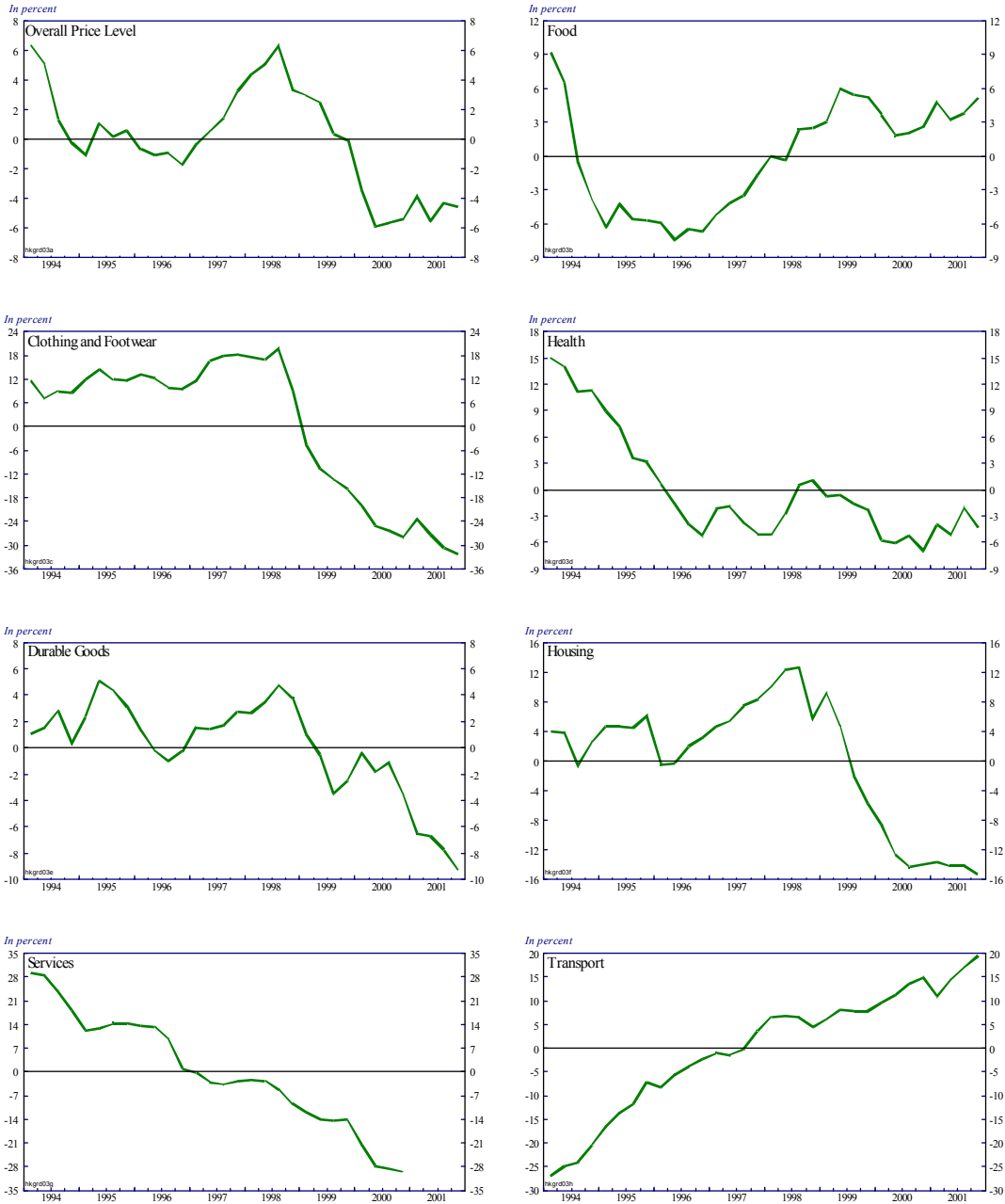
²⁰ The formula for calculating the contributions is $(1 - \tilde{R}^2)\hat{r}^2$, where \tilde{R}^2 is the multiple coefficient of determination of the restricted regression that excludes the independent variable in question, and \hat{r}^2 is the partial coefficient of determination between the dependent variable and the considered independent variable in the unrestricted regression.

Annex Chart 1. Comparison of CPI of Hong Kong SAR and Shenzhen by Components



Sources: CEIC Database; and China Statistics Monthly.

Annex Chart 2. Standardized Price Level Gaps



Sources: CEIC Database; China Statistics Monthly; and staff calculations

Annex Table 1. Price Equalization Pressure between Hong Kong SAR and Shenzhen

Independent variables	Dependent variable: change in the price level gap					
	without constant			with constant		
	(1)	(2)	(3)	(4)	(5)	(6)
constant	..	..	..	-0.02	-0.02	-0.02
	..	..	..	(-8.15)*	(-6.56)*	(-6.42)*
price level gap (lagged)	-0.52	-0.61	-0.62	-0.48	-0.50	-0.54
	(-10.55)*	(-12.01)*	(-12.81)*	(-12.39)*	(-11.01)*	(-12.49)*
price level gap (lagged)	..	0.50	..	..	0.09	..
* dummy_property	..	(4.12)*	..	..	(0.78)	..
price level gap (lagged)	..	..	0.62	..	..	0.30
* dummy_deflation	..	..	(5.12)*	..	..	(2.66)*
Adjusted R ²	0.33	0.42	0.46	0.58	0.58	0.61
N	108	108	108	108	108	108

Note to table: Monthly data from 1993:01 to 2001:12; t-statistics are between parentheses; *, **, and *** indicate statistical significance at the 1, 5, and 10 percent levels; the change in price level gap is defined as the year-on-year difference in the gap.

Annex Table 2. Determinants of Deflation in Hong Kong SAR

		Dependent variable: inflation in component i							
where i =	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	all items	clothing	food	health	durables	housing	services	transport	
Independent variables									
constant	0.11 (11.65)*	0.21 (8.61)*	0.07 (9.07)*	0.05 (4.92)*	0.05 (4.65)*	0.15 (8.18)*	0.06 (2.94)*	0.03 (4.09)*	
unemployment rate	-2.49 (-12.79)*	-6.22 (-12.42)*	-1.73 (-9.66)*	-1.00 (-4.35)*	-1.92 (-8.61)*	-3.71 (-9.70)*	-0.95 (-1.95)***	-0.10 (-0.66)	
neer appreciation	-0.42 (-4.71)*	-0.24 (-1.34)	-0.24 (-3.55)*	-0.17 (-1.89)***	-0.32 (-4.10)*	-0.41 (-3.00)*	-0.16 (-1.02)	0.11 (2.37)**	
credit growth (lagged)	0.21 (7.92)*	0.39 (4.54)*	0.13 (5.44)*	0.09 (4.30)*	0.19 (6.42)*	0.37 (6.98)*	0.05 (1.30)	0.03 (2.18)**	
price level gap in i (lagged)	-0.24 (-2.28)**	-0.22 (-3.66)*	0.08 (1.17)	-0.09 (-1.55)	0.00 (-0.03)	-0.10 (-1.26)	0.15 (2.39)**	-0.20 (-8.94)*	
R ²	0.94	0.90	0.88	0.74	0.90	0.91	0.91	0.95	
N	28	28	28	28	28	28	24	28	

Note to table: Quarterly data from 1995:01 to 2001:4 (for services to 2000:4); t-statistics are between parentheses; *, **, and *** indicate statistical significance at the 1, 5, and 10 percent levels.

Annex Table 3. Determinants of Deflation in Hong Kong SAR

Independent variables	Dependent variable: inflation		
	(1)	(2)	(3)
constant	0.11 (11.65)*	0.10 (10.23)*	0.10 (10.69)*
unemployment rate	-2.49 (-12.79)*	-2.40 (-11.48)*	-2.39 (-11.99)*
neer appreciation	-0.42 (-4.71)*	-0.37 (3.73)*	-0.35 (-3.58)*
credit growth (lagged)	0.21 (7.92)*	0.20 (7.79)*	0.20 (7.86)*
price level gap (lagged)	-0.24 (-2.28)**	-0.03 (-0.14)	0.02 (0.10)
price level gap (lagged) * dummy_property	.. ..	-0.23 (-1.16)	.. ..
price level gap (lagged) * dummy_deflation	.. ..	.. ..	-0.28 (-1.52)
Adjusted R ²	0.94	0.94	0.95
N	28	28	28

Note to table: Quarterly data from 1995:01 to 2001:4; t-statistics are between parentheses; *, **, and *** denote statistical significance at 1, 5, and 10 percent;

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