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PEOPLE'S REPUBLIC OF CHINA—HONG KONG
SPECIAL ADMINSTRATION REGION

Selected Issues

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Approved by the Asia and Pacific Department

January 9, 2006

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I. The Residential Property Market in Hong Kong SAR[1]

A. Introduction

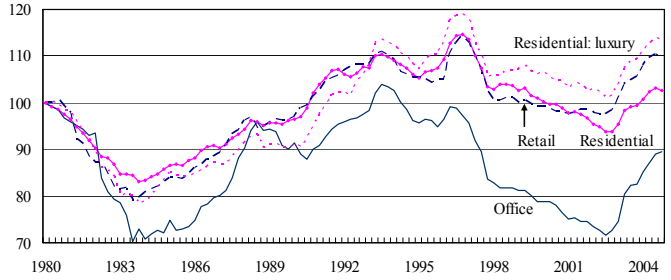
1. **After declining for a number of years following the Asian crisis, property prices rebounded sharply from mid-2003 to early 2005 and then stabilized.** As elsewhere, developments in property prices have an important influence on building construction, household consumption, business costs and consumer price inflation. The fiscal sector impact of price fluctuations is also very important in Hong Kong SAR with land sales and stamp duties providing an important source of government revenue (see Chapter III). Over the past two years, real residential prices have increased by 52 percent; office, retail and flatted factory property prices have increased by even more.

2. **This recovery in property prices has been broadly in line with developments in fundamentals.** While demand side factors, such as high housing affordability, low interest rates, and solid GDP growth have been important, supply-side variables, such as below-average public housing completions and land sales may have also had an influence on property prices. In the period ahead, solid housing affordability and a continuation of the economic expansion should help to attenuate the impact of further interest rate rises, although much depends on the uncertain external environment.

B. Recent Developments in the Property Market

3. **Real residential property prices have rebounded sharply over the past two years after having experienced a sustained price decline** (Figure I.1). Following the Asian crisis, real prices of dwellings halved over a five-year period, pushing one-in-five mortgagees into a negative equity position. Then, in September 2003, prices and transaction volumes began to rebound sharply, with prices rising, off a much lower base, by 52 percent in two years. While only about 2 percent of mortgagees still have negative equity, prices remain 44 percent below their peak level in 1997. In recent months, prices have fallen slightly and transaction volumes have stabilized, most likely reflecting the 2 percentage point rise in mortgage interest rates over the first three quarters of 2005.

Figure I.1. Real Property Price Indices
(Log index: 1980Q4=100)



Sources: CEIC and Staff calculations.

4. **Property prices across type of residential property and across sectors have evolved similarly although the magnitudes vary, with luxury housing and office prices leading the way.** Within the residential sector, price increases have been most dramatic at

[1] Prepared by Brenton Goldsworthy (X-36943).

the luxury-end of the market, reflecting significant 'trading up' and investor activity. This pattern is consistent with past cycles – during booms the price of luxury housing tends to rise by more than the average, however, when the property market is weak, the price of luxury housing falls by a commensurate amount. Prices of offices, retail and flatted factory properties have followed a similar pattern to residential prices although the extent of the price swings has varied – real office prices have risen by a phenomenal 126 percent over the past two years. While the sharp turnaround in prices is notable, it does not look out of place when viewed in the context of earlier property price changes (Table I.1).

Table I.1. Real Residential Property Price Cycles
(year-on-year growth)

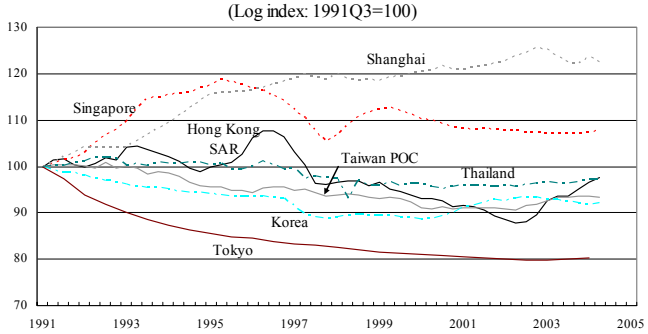
	81-85	85-93	94-95	96-97	98-03	03-05
Average	-16.3	13.7	-10.4	27.1	-13.8	20.1
Max	-2.8	47.4	-2.0	41.1	0.5	28.8
Low	-25.0	-2.4	-16.1	7.3	-39.9	0.5

Sources: CEIC and Staff calculations.

C. How Do Property Market Cycles Compare With Those In The Region?

5. **Property price cycles in Hong Kong SAR tend to be more pronounced and frequent than elsewhere** (Figure I.2).[2] A cross-country comparison of property price cycles indicates that the scale and, in particular, the frequency of property price swings in Hong Kong SAR is greater than that experienced elsewhere. For instance, over the period 1986-2003 changes in Hong Kong SAR's property prices were around 3 times more volatile than in other industrial countries. Relative to the rest of Asia, Singapore is the only country whose property price volatility is comparable, which perhaps is not all that surprising given the similarities between the two economies: limited supply of land; small and extremely open economies vulnerable to similar types of external shocks; and large government involvement in the provision of public housing.

Figure I.2. Real Property Price Indices in Asia
(Log index: 1991Q3=100)



Note: Prices of all markets are indexed to the same starting point for comparing the growth in property prices relative to their own levels in 1991. The chart does not compare the dollar value of prices across economies.

Sources: CEIC and Staff calculations.

[2] Cross-country comparisons of property price cycles should be interpreted with caution as the data are not always comparable due to definitional and measurement differences.

6. **Over the past couple of years, property prices in Hong Kong SAR have risen by substantially more than in comparator economies.** Many industrial countries are experiencing a well-documented prolonged property price boom. In stark contrast, real property prices are currently lower than their 1991 levels in Hong Kong SAR, Taiwan Province of China, Thailand, Korea and Tokyo. Outside of Tokyo, prices appear to have bottomed out, although the speed and scale of the pick up in Hong Kong SAR stands out. That said, there have been rapid price increases in parts of Seoul, which prompted the government to announce in August 2005 a drastic real estate reform package aimed at keeping housing affordable.[3]

D. Explaining the Current Property Price Cycle

7. **Demand, supply and speculative factors are all likely contributors to the sharp turnaround in property prices and the high level of observed volatility**. In considering the possible drivers behind the current (and earlier) property price cycle the following features of the property market are relevant. First, the supply of housing is very slow to adjust, as the number of completions is small relative to the existing stock, and there is a long delay from the decision to build to additional supply being available. This means that shocks to demand for housing – such as that caused by changes in household income – are borne by price changes in the short run. Second, the government has historically played an active role in the housing market with policy changes likely to have affected prices. While the government has taken significant steps to withdraw itself from the market, it still maintains a strong presence through the provision of public rental housing and land sales.

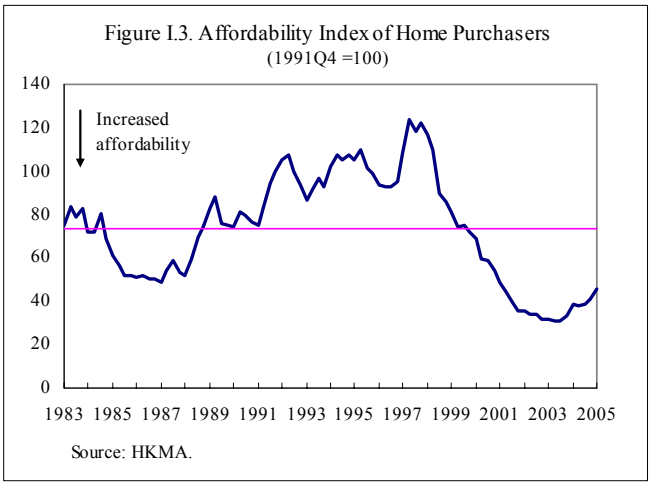
Demand factors

8. **A greatly improved macroeconomic environment over the past few years has supported the turn around in prices.** After suffering from the effects of the Asian crisis, the IT downturn in 2001 and SARS in 2003, economic growth has now been sustained for nine consecutive quarters. Accompanying the expansion has been a significant decline in the unemployment rate from a historical high, low real interest rates, and confidence effects from the Closer Economic Partnership Arrangement and rapid growth in Mainland China. Over the longer term, the trend increase in the demand for housing has been underpinned by demographic effects, including population growth (although the share of the population in the main household formation group (aged 25-44) has been falling) and a decline in average household size.

9. **Relatedly, property prices are likely to have been boosted by historically high housing affordability and pent-up demand from potential buyers who stayed out of the market during the sustained price decline.** The scale of the property price decline, together

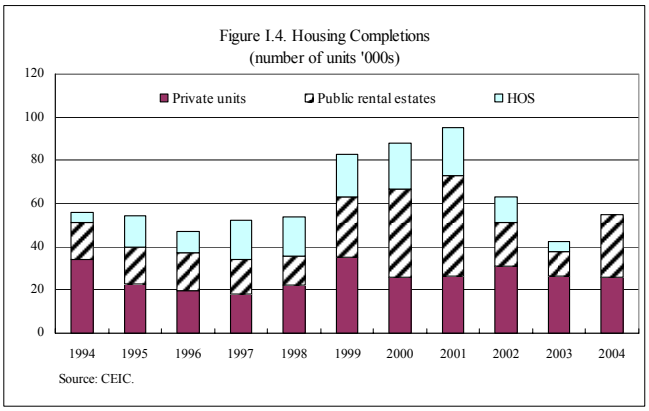
[3] The real estate reform package included measures such as: increasing financial support to those without home ownership; expanding public rental housing construction; and increasing the capital gains and ownership tax to discourage speculative purchases.

with low interest rates, lifted housing affordability to an all-time high by late 2003.[4] It is also quite possible that as property prices kept on falling, young people delayed purchasing their first home (and existing home-owners delayed upgrading to a new home) until the market showed signs of turning around, and once it did the large pent-up demand pushed prices up quite quickly.



Supply factors

10. **The government operates a still-extensive public housing program that was scaled back substantially in 2002.** Hong Kong SAR has one of the largest public housing sectors in the capitalist world, with almost half of the population living in various forms of public housing. The main elements of the program for a long time were public rental units and subsidized home ownership schemes. However, in November 2002 the government announced that it would discontinue the construction and sale of flats under the Home Ownership Scheme (HOS) from 2003 onwards, citing a desire to rely more heavily on the market economy.[5] As the government put up an average of almost 13,800 HOS units per year in the last 10 years of the program (which is over half of private unit completions), removing them from the market is likely to have had led to a rise in the demand for private housing to the extent that they are substitutes (Figure I.4)[6] The provision of public rental housing continues with the number of completions guided by the goal of maintaining an average waiting time of 3 years for applicants.



[4] The index is derived by dividing a typical monthly mortgage repayment (assuming a 20-year mortgage on 70 percent of the purchase price for a 50m2 flat) by the median household income.

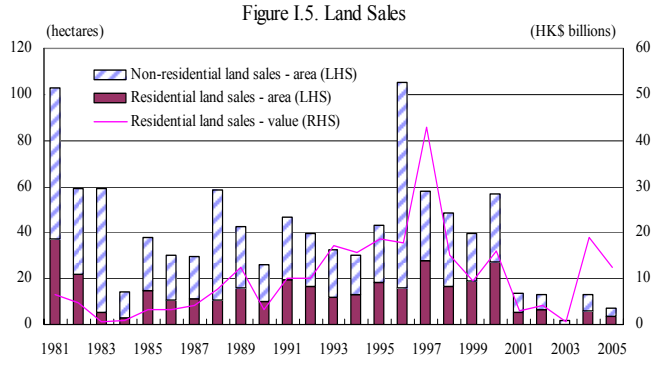
[5] Prior to the November 2002 announcement, the government had a stated goal of achieving a 70 percent home ownership rate by end 2007 (the rate is currently around 57 percent).

[6] There are still 16,595 units waiting to be disposed of under the HOS. To mitigate the impact these sales may have on the private market, the Housing Authority will announce the timing, number and pricing of the sales one year in advance (the intention is to sell about 6,000 units a year from the beginning of 2007).

11. **The government's ownership of the land and the means of which it sells control of it to developers also plays a critical role in the property market.**[7] During 1985-1995, an annual limit of 50 hectares was imposed on land sales, as provided under the Sino-British Joint Declaration. The limit was relaxed from 1994 and lifted entirely following the transfer of sovereignty on July 1, 1997. At this time, the government announced its first five-year land disposal program, with the intention of reducing uncertainty over land supply in the medium term. However, the sharp decline in property prices following the Asian crisis prompted the government to suspend land sales in June 1998 for nine months. It is often argued that the restricted supply of land may have helped to reinforce the property boom in the mid 1990s, and that the additional supply that came online around the time of the Asian crisis contributed to the subsequent sustained price decline.

12. **In recent years, both the area and value of land sold has been well below historical levels** (Figure I.5). In November 2002, it was announced that starting in 2004 land sales would only be triggered through the Application List system first introduced in 1999. Under this system, the government provides developers with a list of lots that will be available in the coming financial year. An interested developer submits to the government an application together with a guaranteed bid price for a particular site. If the guaranteed bid price matches or exceeds the government's (undisclosed) reserve price the site is then auctioned or tendered publicly to the highest bidder. After a period where no bids successfully triggered an auction, the government announced in June that a bid of at least 80 percent of its (still undisclosed) reserve price would be enough to trigger an auction.[8] Still, the site will not be sold unless the highest bid meets or exceeds 100 percent of government's reserve price. Since then bids successfully triggered auctions for three sites on September 27, 2005.

Figure I.5. Land Sales



Source: CEIC.

13. **The scaling back of public housing completions and limited land sales may have supported property prices.** Peng and Wheaton (1994) find that over the period 1965 to 1990 there is a strong negative correlation between land sales and house price growth with a one-year lag. However, they only find a very weak relationship between land sales and housing completions. The interpretation is that reduced land sales are perceived to cause a

[7] Strictly speaking, the government does not sell the land but instead leases it with terms of 50 years or more. The buyer does, however, take full control over the land and can generally transfer the lease to another buyer.

[8] Earlier in the year, the government also took steps to reduce the length of time it takes from the initial bid to the auction from 10 weeks to 7 weeks, simplify the deposit payment requirement, and publish on a monthly basis the number of unsuccessful applications.

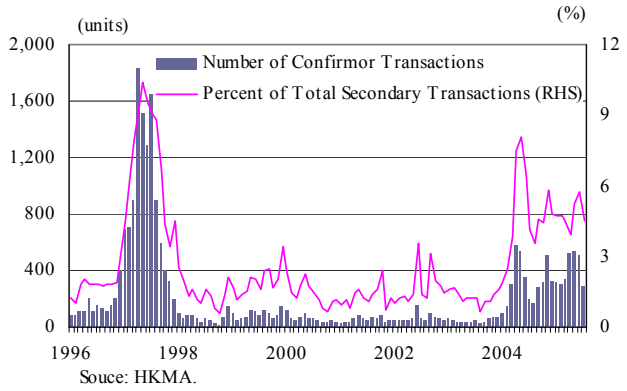
smaller long-run supply of land, which eventually will raise rents for housing and land, and in a rational market, these anticipated higher rents are capitalized into higher current housing prices. In contrast, Tse (1998) uses Granger causality tests to show that there is no causal relationship between land supply and house prices. Using annual data from 1975 to 2004, we find that the *level* of land sales does in fact Granger cause *changes* in house prices (see Table I.A1 in ANNEX I.1).[9]

Speculative Activity

14. **Excess movements in property prices that cannot be explained by fundamentals are sometimes attributed to speculative activity.** The nature of any speculative activity that exacerbates property prices is likely to be different to that commonly seen in financial markets because of high transaction costs and the large share of owner-occupiers whose property decisions are not purely driven by profit motives. However, some authors such as Levin and Wright (1997) argue that these factors can exacerbate speculative behavior. Owner-occupiers are unlikely to be deterred by transaction costs, and as for most households whose home is typically their largest asset, there is a large implicit cost of not entering the market or trading up when property prices are rising. This, together with households' tendency to base expected future capital gains on recent price movements, suggests a strong desire for "not missing out" builds additional momentum into prices, particularly during a period of rising prices.[10]

15. **Indicators of speculative activity have remained at a consistently high level but are well below the levels reached in the mid-1990s when a bubble is widely thought to have developed.** Econometric studies (Kalra et. al. (2000) and Peng (2002)) find support for the notion that a bubble in property prices built up in the period before the Asian financial crisis and then subsequently burst. One direct measure of speculative activity is the number of confirmor transactions - investors who buy a property and resell it before transfer takes place on the initial transaction. This indicator has increased and remained at quite a high level, although it is still below the peak reached in 1997.

Figure I.6. Number of Confirmor Transactions



Souce: HKMA.

[9] Tse (1998) analyses the relationship between land sales and property prices in (a) levels and (b) in first differences to induce stationarity. However, unit root tests suggest that the level of land sales may in fact be stationary.

[10] Case and Shiller (2003) present survey evidence that US homebuyers' expectations of future capital gains are substantially affected by recent experience.

E. Some Econometric Results

16. **An empirical model was estimated to assess how the growth rate of real house prices are related to relevant demand and supply side factors.**[11] This model is similar to that used in the IMF (2003) and the variables considered were:

- *Past growth rates of real house prices*. If house price growth is persistent, perhaps due to wealth effects or adaptive expectations on behalf of owner-occupiers and investors, then the current growth rate will be positively correlated with past growth.

- *Past housing affordability ratio*. If house price growth shows long-run reversion to fundamentals, this implies that prices would tend to decrease when affordability is low.

- *Demand fundamentals.* House price growth is expected to be positively affected by real per capita GDP growth, real rental rates,[12] and population growth; and negatively affected by real interest rates.[13] The real effective exchange rate (given the economy's openness and its significance in an earlier study)[14] and stock prices (has both an income and substitution effect) were also considered. Real credit growth is another variable that is often used; however, Gerlach and Peng (2005) show that in Hong Kong SAR causation runs from prices to credit and not the other way around.

- *Supply fundamentals*. House price growth is expected to be negatively affected by public housing completions, residential land sales and construction costs. Causation may also run in the other direction, particularly in regards to private housing completions.

17. **The estimated model performs reasonably well in explaining variations in property price changes, including the recent increases** (Table I.A3 and Figure I.A1 in

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[11] Quarterly data for the period 1983-2005 were used in the analysis. To obtain real values the nominal values were deflated by the Composite Consumer Price Index excluding the rental component. Most data are readily available from CEIC. The only exceptions are housing affordability, which was provided by the HKMA, and the construction cost index, which is available in the EMED database. The best lending rate was used as a proxy for the mortgage interest rate, although the spread of mortgage interest rate over the best lending rate has changed in recent years. Seasonality and unit root properties of the data series were examined (Table A2 in Annex I.1). For the series that exhibited stable seasonality, the seasonally adjusted series were used in the analysis.

[12] Rental rates in Hong Kong SAR are typically fixed for a two-year period which means that causation cannot run in the other direction from property prices to rental rates (at least not on a contemporaneous basis).

[13] Most mortgages in Hong Kong SAR are based on flexible rates.

[14] A real exchange rate appreciation that reflects an increase in productivity may lead to an increase in expected future household income. Real exchange rate changes may also affect property prices through their impact on business competitiveness and a firm's decision on where to locate.

ANNEX I.2). Over the estimation period as a whole, the independent variables explain about 70 percent of the variation in property price movements, and the diagnostic and instability tests are broadly satisfactory. The model performs least well during very rapid price changes, such as that during the 1990s price boom, but picks up much of the recent sharp price increase.

18. **The model suggests that real house prices display persistence and only a weak long-run reversion to fundamentals.** Real property price growth is quite persistent, suggesting that households may use observed changes in house prices as an indicator of future price changes, which raises the risk that prices could deviate from fundamentals for a period of time. Consistent with this, when prices become out of line with income and interest rates, as measured by housing affordability, there is only a very gradual tendency for this misalignment to be corrected.

19. **Property prices were found to depend on per capita GDP, real interest rates, rental prices, population, and the real effective exchange rate.** All of the demand fundamentals have the expected sign and, with the exception of real stock prices, were statistically significant. The long-run impact of a change in the demand variables is quite significant. For instance, a permanent reduction in interest rates of 1 percentage point would imply over time an increase of 0.4 percent in real house price growth.[15] While there are problems associated with comparing parameter estimates across studies, these results suggest that property prices in Hong Kong SAR display less persistence, are less sensitive to interest rates, but more sensitive to some of the other explanatory variables than what property prices in industrial countries are (IMF (2003)).

20. **Supply variables were statistically insignificant determinants of property prices, although this may reflect the difficulty in modeling such relationships.** In the long run, the level of property prices should be determined by both supply and demand factors, while short-term volatility of property prices tends to be demand driven. Given the model specification, only the short-term price movements could be explored. Thus, while the results confirm the importance of demand-side factors in explaining short-term property price growth, it does not address the conjecture that housing completions and residential land sales may be important determinants of the level of property prices. Another explanation for the statistical insignificance of the supply variables is that the relationship may be too complex to pick up econometrically. For example, prices may respond to the announcement of future land sales in addition to the housing supply when it eventually becomes available; and the method of selling land has changed a number of times through the sample, which may have affected the nature of the relationship between land sales and prices.[16]

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[15] Since the beginning of 2005 mortgage interest rates have risen by 2 percentage points. The model suggests that such a rise would reduce property price growth by 0.8 percent. However, over this period, property prices have fallen by much more, indicating that other factors are at play, or that prices this time around are more sensitive than they have historically been.

[16] See Peng (2002) for an example of a study which finds housing supply to be a significant variable in modeling price movements.

ANNEX I.1

Table I.A1. Granger Causality Tests			
Sample: 1975 2004 Lags: 2			
Null Hypothesis	Obs	F-Statistic	Probability
Real property price growth does not Granger Cause land supply	27	0.201	0.819
Land supply does not Granger Cause real property price growth		5.973	0.008

Table I.A2. Augmented Dickey-Fuller Unit Root Tests		
	Levels	First differences
Real house prices	-2.19	-4.58*
Residential land sales	-8.77*	--
Affordability ratio	-4.17*	--
Real rental index	-2.19	-4.58*
Real GDP per capita	-2.21	-8.74*
Real interest rates	-3.24*	--
Real effective exchange rate	-1.26	-6.71*
Population	-1.22	-4.54*
Hang Seng index	-1.81	-9.98*
Residential land disposal	-8.80*	--
Public housing completions	-6.83*	--
Private housing completions	-2.36	-2.58
Note: * denotes significance at the 5% level.		

Figure I.A1. Actual and Fitted Property Price Growth

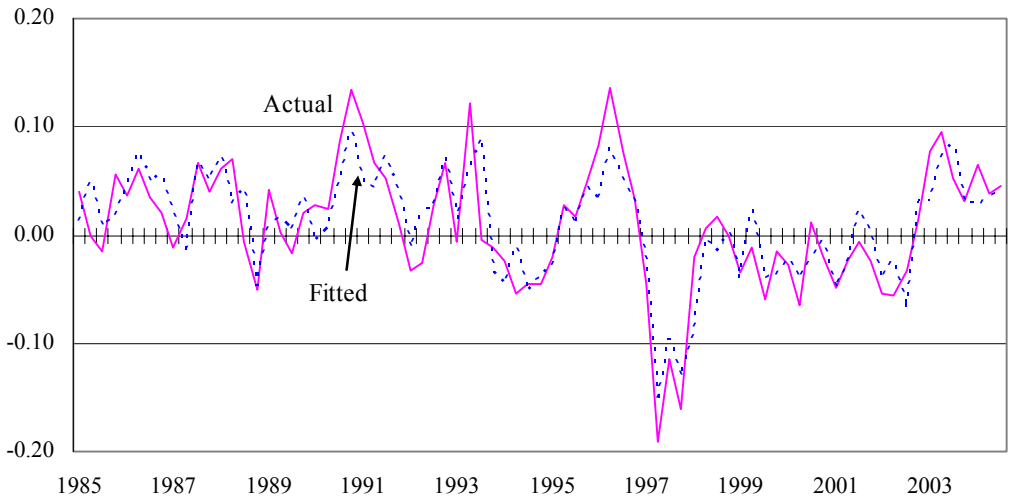

Table I.A3. A Model of Real Residential Property Price Growth

Sample Period: 1985:4 to 2005:2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.127	0.047	2.691	0.009
Lagged dependent variable				
Lagged real house price growth	0.420	0.123	3.413	0.001
Reversion				
Lagged housing affordability ratio	-0.031	0.011	-2.768	0.007
Fundamentals				
Real per capita GDP (growth)	0.821	0.293	2.801	0.007
Real interest rate (percent)	-0.220	0.001	-2.326	0.023
Real rental index (growth)	0.711	0.289	2.458	0.017
Real rental index (growth, lagged)	-0.552	0.206	-2.676	0.009
Population (growth, lagged twice)	2.824	0.958	2.949	0.004
Real effective exchange rate (growth, lagged)	0.536	0.168	3.186	0.002
Real stock price (growth, lagged)	0.066	0.044	1.500	0.138
Adjusted R-Squared	0.69			
Durbin-Watson	205.00			
Breusch-Godfrey Serial Correlation LM Test	0.09			
ARCH LM Test	1.73			
White Heteroscedasticity Test	2.42*			
Jarque-Bera Normality Test	0.02			
Ramsey RESET Test	1.56			
Chow Test (Break 1994:1)	1.83			
Chow Test (Break 1998:1)	0.78			

Notes: Reported standard errors are White Heteroskedasticity-Consistent.

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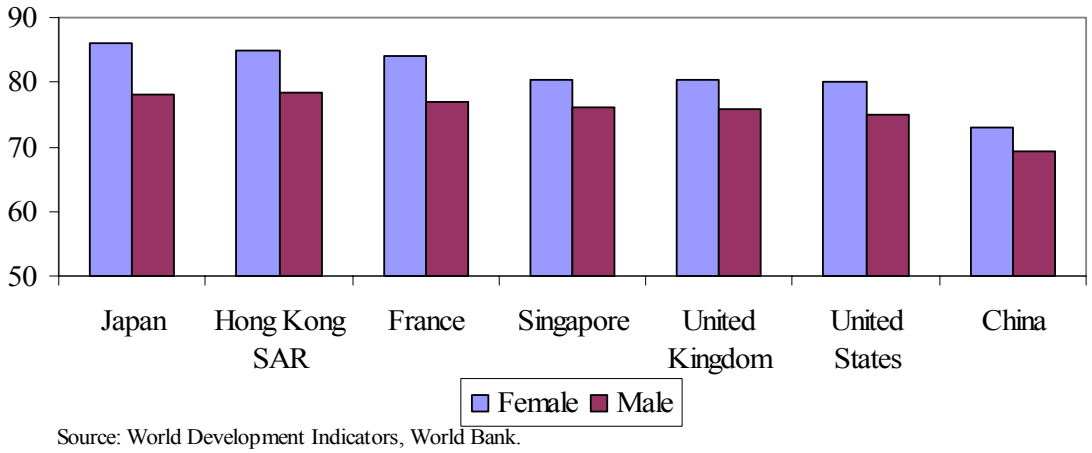
II. The Implications of an Aging Population for Hong Kong SAR [1]

A. Introduction

1. **Hong Kong SAR's population is aging rapidly.**[2] While Hong Kong SAR's current old-age dependency ratio of about 16 percent is low compared to comparator economies, it is projected to double by 2030 and exceed those of other Asian countries (including Japan) by 2060 (Figure II.1b).

2. **The chapter discusses the macroeconomic effects of an aging population for Hong Kong SAR.** The analysis is based on a small-open-economy model, sharing many of the features found in the Fund's global macroeconomic simulation model, MULTIMOD, but extended to incorporate demographic projections and life-cycle dynamics (Faruqee 2002). The chapter concludes that aging is likely to slow economic growth in Hong Kong SAR and put pressure on the public finances. The demographic effects will start setting in about 2015 when the labor force support ratio is projected to peak. Thus, an integrated and an early response is needed to use the window of opportunity during the next decade to design polices which could mitigate the impact of aging on Hong Kong SAR.

Figure II.1a. Life Expectancy at birth (years of life)-2004



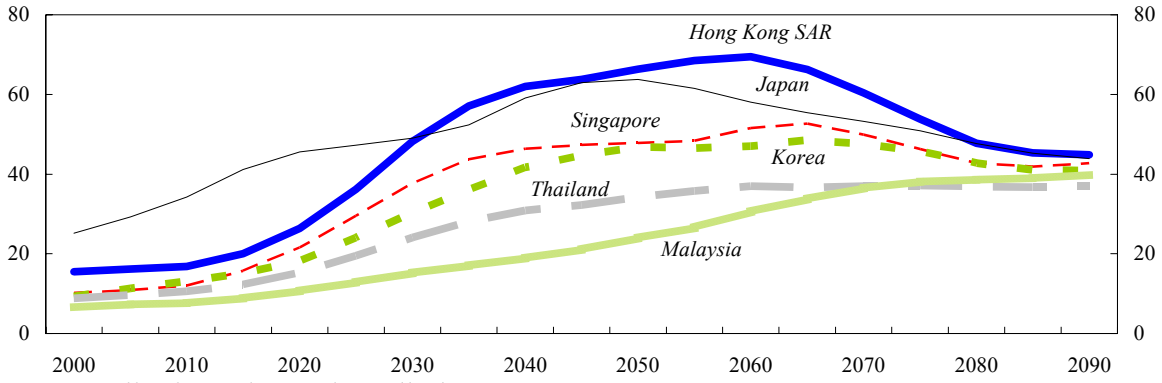
Source: World Development Indicators, World Bank.

[1] Prepared by Lamin Y.M. Leigh (X-36518).

[2] Since the 1970s Hong Kong SAR's population has exhibited trends toward aging. In particular, the fertility rate dropped to 0.9 in 2004 (from about 3.5 in the early 1970s) which is well below the replacement rate of 2.1. At the same time, life expectancy which remains high in Hong Kong SAR (Figure II.1b), is projected to reach 82 for men and 88 for women by 2031.

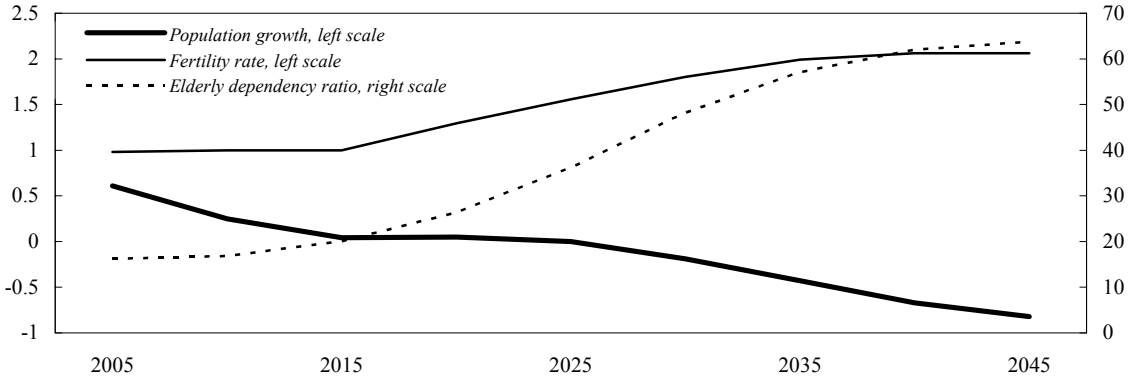
Figure II.1b. Population Aging in Hong Kong SAR
(relative to comparator and other adavanced economies)

Old-Age Dependency Ratio 1/ (In percent)

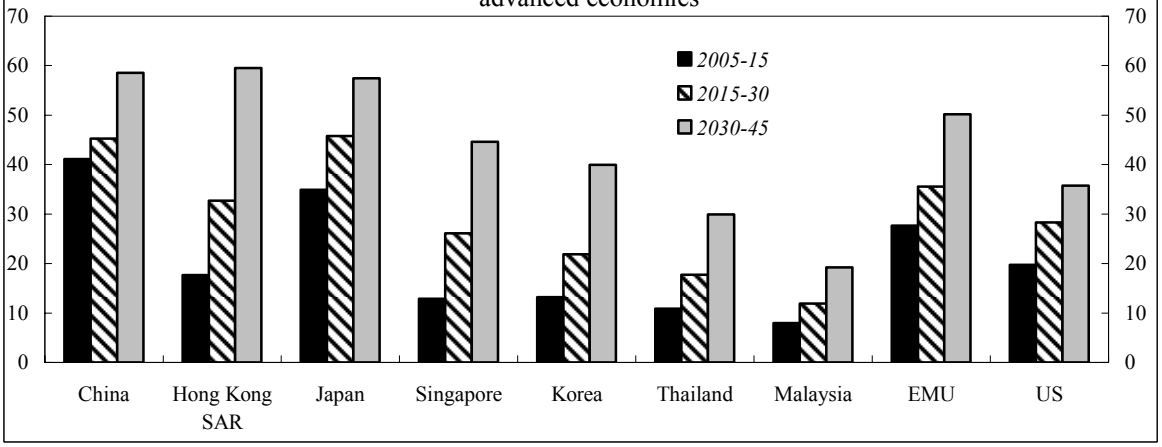


Source: *World Development Indicators Database* , World Bank.
1/ Defined as ratio of old-age dependents to working-age population.

Hong Kong SAR's Demographic Projections, 2005-2045
(In percent,in terms of the adult population)



Hong Kong SAR's old-age dependency ratio is projected to outpace those of other advanced economies



Source: World Development Indicators, World Bank. Dependency ratio levels (in percent) and defined as old-age dependents to working-age population.

B. Macroeconomic Effects of Aging

3. **The key channel through with which population aging affects the economy in the model used in this chapter is through its effects on the life cycle profiles of individuals' earnings.** These profiles typically have a hump-shaped pattern: earnings rise, as young individuals enter the labor force and start gaining work experience, peak in middle age, and decline as individuals move into retirement. On the supply side, age-earnings profiles reflect changes in relative productivity and labor supply over an individual's working life. Changes in the age structure of the population affect aggregate labor supply through differences in relative productivity and individual labor supply. On the demand side, individuals are assumed to adjust their savings and smooth consumption based on their anticipated path of life-cycle income. Young individuals are net borrowers, because their current income is below their permanent income. Mature agents, at the peak of their income potential, save in anticipation of retirement. The elderly also save in this model, given the uncertainty about their lifetime.

4. **Population aging could affect the economy and public finances in several ways:**

- Potential growth could decline unless there are large and sustained productivity gains;

- Growth in revenue from income-based taxes could slow down in line with GDP and shrinkage in the number of labor force participants. Absent tax increases or hikes in social security contribution rates, this will result in lower revenues;[3]

- There would be pressures for health expenditures to continue to rise owing to aging and the resulting rising demand for health services. As the average age of the population increases, spending on pensions, health care, and long-term care will rise.[4] Also, the increased longevity will in itself increase the demand for health care as health diminishes with age, giving rise to a "double-aging" problem. Delivering health care services to the population is primarily a public task in Hong Kong SAR (with the public's share of in patient care currently about 95 percent);

- As a predominantly service-based economy, additional budgetary pressures could also arise from the need to upgrade the education system and quality of its workforce to remain competitive. As a higher proportion of budgetary resources are spent on the elderly, fewer resources could be devoted to productive investment.

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[3] Although pensions are taxable, these will be insufficient to counter the reduction in revenues resulting from a lower number of working people.

[4] More than 600,000 persons aged 60 and above in Hong Kong SAR received financial assistance either through the Comprehensive Social Security Assistance (CSSA) or the Old Age Allowance (OAA). Total financial assistance to elders (excluding healthcare related expenditure for old age) is estimated to be about HK$11.7 billion (about 0.9 percent of GDP) in 2004/05. The CSSA and OAA are funded entirely from the General Revenue and are non-contributory. Should the rate of payment and eligibility for the OAA remained unchanged, it is estimated that by 2030 total payments for OAA alone could double.

5. **On the external accounts, as per the life-cycle hypothesis, during the initial phase of aging the current account position tends to improve and then dissipates as savings fall with increasing number of retirees.** The life-cycle model entails dissaving when young, low saving early in adult life, high saving at the middle end of the working life and then low or negative saving in retirement. Hence, as countries go through early stages of a demographic transition, they are expected to experience current account surpluses. As the demographic transition toward older population continues, there are declining current account surpluses, although if the old age leave bequests this may in fact become ambiguous. Thus, these ongoing demographic changes in Hong Kong SAR could have significant impact on saving, investment, and current account balances in the years ahead.

C. Simulations

6. **The simulations are based on a dynamic general equilibrium system with forward-looking behavior and rational expectations.** Consumption-saving behavior is based on Blanchard's (1985) model, where agents are assumed to have finite planning horizons.[5] The production function is of the Cobb-Douglas form with capital and labor. Investment behavior is based on Tobin's q theory, whereby the desired rate of investment exceeds the steady-state rate as long as the expected marginal product of capital is greater than its replacement cost. On the external side, import volumes depend on the main components of aggregate demand and exports reflect the foreign import demand functions. Exchange rates and interest rates are linked to the interest parity condition. The real exchange rate equilibrates the goods markets and ensures consistency between flow relationships and consumers' desired rates of asset accumulation. Economic agents can borrow and lend freely in international capital market at the prevailing world interest rate.

7. **Demographic projections are based on the World Bank's data**. The main factor underlying population aging trends is the decline in fertility rates over the last half of a century: from 3.5 children per woman in early 1970s to about 0.93 children in 2000-05. The demographic projections assume that the fertility rate will stabilize around 2015 and then rise gradually to the replacement rate, leading to a stationary population by 2100. Under these projections, the elderly dependency ratio will peak in about 2055, gradually decline after that and stabilize by 2090. The assumption that the elderly dependency ratio will stabilize at some point in the future is essential for ensuring the stability of the model.[6] The demographic projection data in the baseline assume zero net migration on average through 2050. This assumption is relaxed later in the sensitivity analysis (see paragraph 11).

8. **The macroeconomic baseline is calibrated to reflect the features of the Hong Kong SAR economy in a long-run steady state**. Given the model's assumptions about

[5] The framework for the simulations follows that of Faruqee (2002).

[6] From the policy point of view, however, the choice of the demographic projections is less relevant, since the analysis in this chapter focuses on the period to 2050, and for this period the World Bank projections are broadly similar to those of the United Nations.

population structure and underlying productivity growth, the baseline long run growth averages about 2½ percent per annum which broadly corresponds to the long-run growth projected for the world economy. The population is assumed to remain stationary in the baseline, and hence the long-run per capita GDP growth averages roughly about 2½ percent. Consumption is assumed to be inelastic with respect to the interest rate (namely the intertemporal elasticity of substitution is small (½)), while the rate of time preference is taken to be 2½ percent. The long-run world interest rate is assumed to be about 4 percent. Non-interest fiscal revenues are projected to grow in line with GDP, whereas expenditures are projected to respond both to output growth and the age structure of the population. In particular, recurrent outlays are assumed to rise in proportion to GDP (with a buoyancy of unity). In addition, outlays on the elderly are assumed to have a unitary buoyancy with respect to the dependency ratio. [7] The investment return on fiscal reserves is assumed to be 5 percent, broadly in line with historical performance which has reflected a conservative investment policy oriented toward low credit risk and high liquidity. The initial level of government debt is set to about 1½ percent of GDP.[8]

9. **Scenario analysis:** The first scenario incorporates the increase the elderly dependency ratio but assumes that no policies are taken to mitigate the impact of aging on the economy. By 2050, the elderly dependency ratio increases by about four-fold. This increase reflects a gradual decline in the fertility rate and a rise in longevity (a decline in the mortality rate). In the second scenario, higher labor productivity is assumed which leads to faster growth than that in the baseline.[9] Under both the above scenarios, it is assumed that net immigration flows into Hong Kong SAR remain broadly unchanged through 2050. As part of a sensitivity analysis, the impact of positive net migration flows and the effects of increasing the retirement age from 65 to 70 years are also studied.[10]

10. **Population aging is estimated to reduce GDP growth in the long run compared to the baseline scenario of stationary population (Table II.1).** The transmission dynamics of a population aging shock are characterized by a two-stage process. Initially, until 2015, the effect of rising longevity outweighs that of lower fertility, and the adult population and the effective labor supply increase. As the population aging shock continues to unfold, the effect of lower fertility rates starts to dominate. Thus, from 2015, the effective labor supply

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[7] Note that the model does take into account likely reduction in government expenditure on children and youth-related items in the long run.

[8] This debt consists of the global bond and notes that the government issued in July 2004 which will be fully repaid in 2019.

[9] Under this scenario, labor productivity growth is assumed to be on average about 20 percent higher than in the original baseline.

[10] The migration shock assumes net migration rises such that it offsets about 50 percent of the decline in the working population's support ratio by 2050. The support ratio is defined as the size of the working population as a ratio of the total population.

starts to decline. By 2050, the level of real GDP is projected to decline by about 20 percent (relative to the baseline without demographic change). With the composition of the labor force shifting toward a larger share of the elderly, the productivity-adjusted labor supply falls by more than the number of workers. As a result, real GDP per capita also declines in the long run relative to the baseline, albeit to a lesser extent (by 10 percent relative to the baseline by 2050). The current account surplus starts to rise until about 2030, as investment falls. Thereafter, the trend reverses as the decline in savings due the aging effect starts to outpace the decline in investment.

Table II. 1. Hong Kong SAR: Macroeconomic Effects of Population Aging
(Deviations from stationary-population baseline levels)

	2015	2020	2025	2030	2035	2040	2045	2050
I. Unchanged policies 1/								
Real GDP (percent change)	1.46	0.92	0.16	-0.62	-1.40	-6.49	-14.51	-20.99
Real GDP per capita (percent change)	0.18	0.26	-0.01	-0.37	-0.73	-2.90	-7.76	-10.05
Current Account Balance (percent of GDP)	1.68	2.56	3.44	2.91	2.38	1.86	0.83	-0.20
Savings (percent of GDP)	0.66	0.38	0.10	-0.18	-0.47	-0.75	-1.03	-1.26
II. Increasing labor productivity								
Real GDP (percent change)	1.72	1.34	0.52	-0.49	-0.78	-3.60	-8.06	-11.66
Real GDP per capita (percent change)	0.30	0.41	0.12	-0.26	-0.58	-1.84	-3.65	-4.82
Current Account Balance (percent of GDP)	1.96	2.75	3.55	3.83	4.17	3.41	2.84	2.05
Savings (percent of GDP)	0.87	0.63	0.74	0.94	1.26	0.99	0.85	0.62
Memorandum items								
Real GDP (percent change) 2/	1.94	1.64	1.03	0.71	0.82	-1.40	-4.49	-6.02
Real GDP (percent change) 3/	1.79	1.41	0.83	0.39	0.21	-2.40	-6.93	-9.57

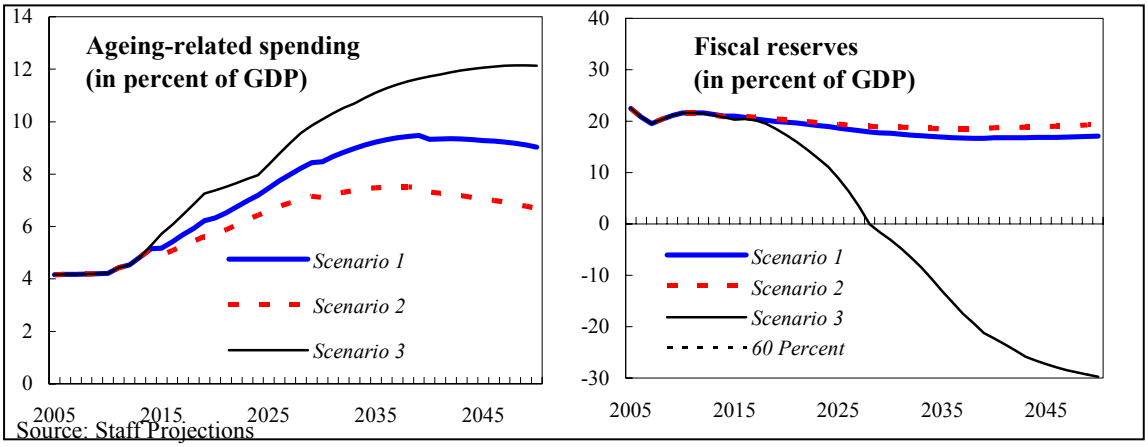
Sources: Staff calculations.
1/. Assumes no policies are taken to mitigate the impact of aging on the economy.
Also assumes zero change in net immigration flows into Hong Kong SAR.
2/. Increased labor productivity combined with immigration flows of younger skilled labor into Hong Kong SAR.
3/. Increased labor productivity combined with raising the retirement age from 65 years to 70 years.

11. **While alternative assumptions on labor productivity and immigration flows would partly neutralize the welfare impact of aging on Hong Kong, together these factors do not offset it fully.** The results are sensitive to alternative demographic projections, with growth and fiscal effects being proportional to the increase in the elderly dependency ratio. Under alternative assumptions of increased labor productivity, the estimated impact of population aging on growth would be smaller (almost halved). Thus the increase in labor productivity would partly neutralize the welfare implications of the increase in the elderly dependency ratio. If increased labor productivity is combined with a greater immigration flows which allows Hong Kong SAR to import younger skilled workers, the welfare implications of aging reduces significantly albeit not offset fully.[11] In contrast, the

[11] Robert Holzmann (2005) also show that migration levels would have to reach enormously unrealistic levels to begin to make a dent on the dependency ratio.

simulation results also show that the impact of increasing the retirement age by 5 years is limited and does not change significantly the dynamic impact of aging on Hong Kong SAR.

12. **Aging would also put pressure on Hong Kong SAR's public finances**. Although the impact on public pensions is likely to be limited, health care spending would rise as these services are largely government supplied.[12] Due to the relative decline in the working population salary income-based tax revenues could fall. Our simulations indicate that even if productivity growth were to remain unchanged from its present levels and some policy measures are taken to mitigate its impact on public finances for example through greater private sector participation in the heath care financing, the overall impact on public finances could be significantly higher than under a scenario of stationary population. As an additional sensitivity test, our results also show that that under an extreme scenario of significantly lower productivity growth, combined with the government bearing a large part of aging-related spending, the impact on fiscal reserves would be significant.



Source: Staff Projections

Scenario 1 assumes that current labor market productivity growth is maintained, the private sector shares part of the aging-related health cost and the Mandatory Provident Fund (MPF) becomes the growing source of financing retirement income by 2030.

Scenario 2 explores similar assumptions in scenario 1 but with higher labor productivity growth.

Scenario 3 is the extreme scenario. It assumes a significantly lower productivity growth than in scenarios 1 and 2 combined with the unchanged policies scenario where the government would have to bear a large part of the aging-related cost. Negative fiscal reserves after 2030 denote accumulation of government debt.

13. **Thus, an integrated and early response is needed to address the impact of population aging.** As the demographic effects will start setting in about 2015 when the labor force support ratio is projected to peak, this leaves a window of opportunity during the next ten years to design specific countervailing policies which could mitigate the impact of aging.

[12] Publicly provided pension is very limited unlike in many other countries in a similar situation. The Mandatory Provident Fund (MPF) which was established in 2000 is the main pension vehicle, it is fully funded and privately managed, and will also provide a growing source of retirement income by 2030.

- Given the likely stress on the public finances, specific measures could be taken to mitigate the impact of the likely rise in health and long-term care spending for the public finances. Strengthening the fiscal position could be brought about through a mix of expenditure restraint, especially in nonage sensitive areas, continuation of the ongoing reforms in health care provision (including introducing private health insurance system and raising user fees—with safeguards for the needy) and welfare reforms and revenue-enhancing measures.

- Other measures could also be taken to shift the associated health care costs of aging to the private sector which could include the introduction of a Medicare-type levy on employees to be administered by the Mandatory Provident Fund. The Hong Kong SAR authorities are already considering some of these measures (Box II.1). These combined with continued efforts at fiscal consolidation would go a long way in mitigating the impact on the public finances of a rapidly aging population.

Box II.1: Initiatives taken by the Hong Kong SAR Authorities to address Population Aging

Over the last few years, Hong Kong SAR has devoted resources to assessing both current and future trends in its demographic structure and has considered some policy measures to mitigate its impact. In July 2002, following the Chief Executive's announcement, the Chief Secretary for Administration set up a task force on population policy. The immediate task of the Task Force was to identify the major challenges to Hong Kong SAR arising from its demographic trends and characteristics, setting the objective of a population policy and recommending a set of coherent policy objectives which the government can explore in both the short and medium term.

The authorities are developing various policies to mitigate the impact of an aging population some of which were outlined in the report by the Task Force on Population study.

- The Hong Kong SAR government operates various schemes to allow for importation of skilled workers, including those from the Mainland. The Supplementary Labor Scheme (SLS), which commenced operation in February 1996, operates on the basis of the following twin cardinal principles: local workers must be given priority in filling any job vacancies available in the job market; and employers who are genuinely unable to recruit local workers to fill their job vacancies should be allowed to bring in imported workers for such vacancies. Since its inception, most of the workers imported through the SLS have come from the Mainland. However, this scheme could be expanded to import more younger-skilled workers in the Mainland and abroad. However, Hong Kong SAR faces stiff competition in its quest for talent abroad as other major cities in the region have taken similar moves to attract such talent.
- The government is taking steps to better control health care costs to the budget. The government is reviewing the fees and charges of public hospital services with a view to exploring the scope for adjusting the subsidy level to contain rising health care costs and to instill a sense of value on users. The authorities also plan to encourage the provision of health care by the private sector
- In addition, the authorities have initiated other novel measures such as facilitating the emigration of elderly recipients of the CSSA to Guangdong and Fujian provinces. Such portable schemes are expected to enable retirees to emigrate to the Mainland while allowing them to maintain some access to their retiree benefits in Hong Kong SAR. However, so far the take-up rate of this portable CSSA scheme has been low.
- The Mandatory Provident Fund (MPF) which was established in December 2000, allows the citizens to select their investment plans from a large number of private investment funds. Civil Service Provident Fund Scheme is a defined-benefit pension scheme, but in addition they are obliged to participate in the MPF which is based on defined-contributions. The MPF is expected to become a growing source of retirement income over time.

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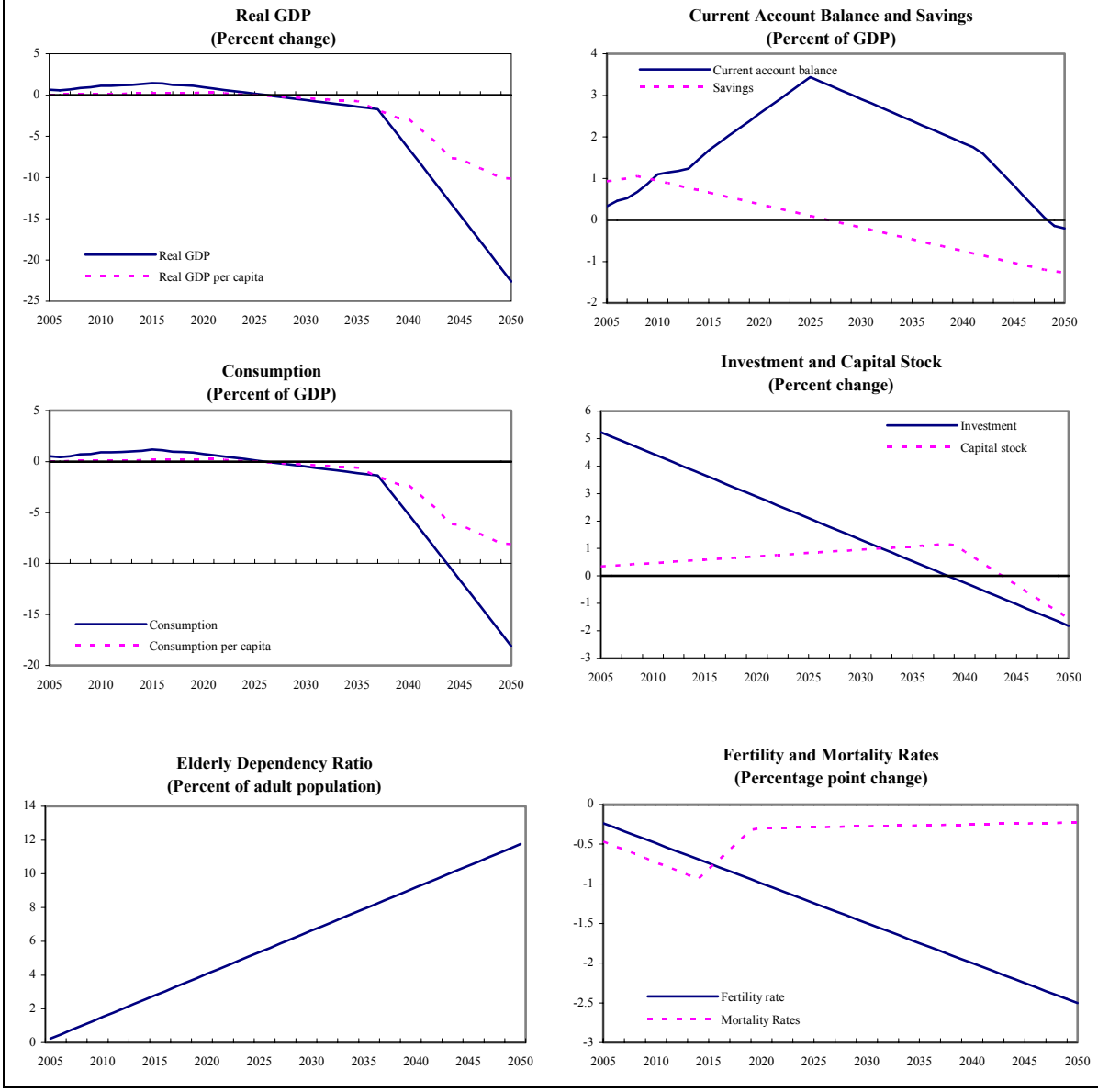
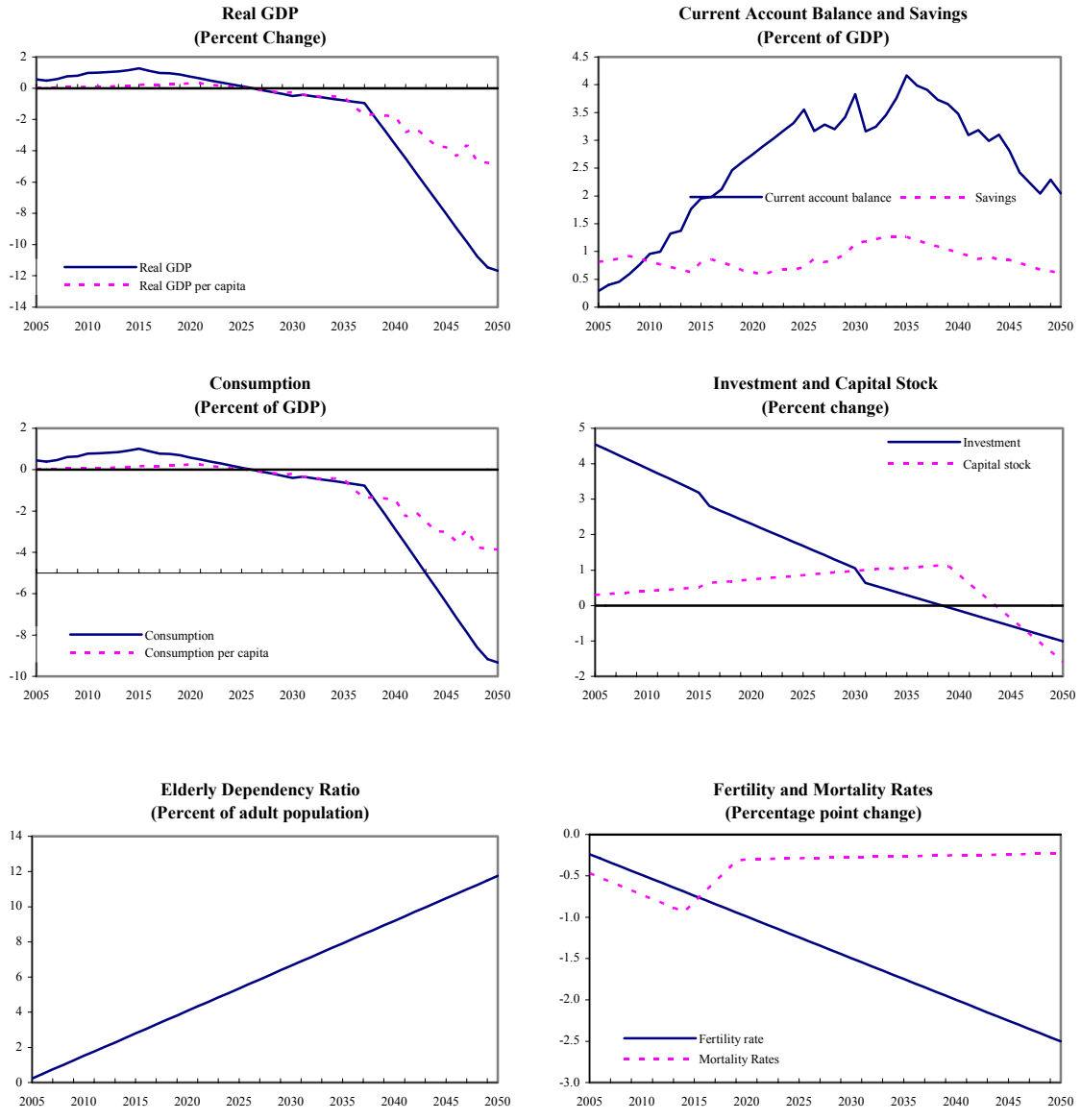
Figure II.2. Demographic Shock Impact under Unchanged Policies
(Deviations from Stationary-Population Baseline Levels)



Source: Staff calculations.

Figure II.3. Demographic Shock Impact with Increased Labor Productivity Growth
(Deviations from Stationary-Population Baseline Levels)



Source: Staff calculations.

DETAILED ANALYSIS OF THE IMPACT OF AGING ON PUBLIC SPENDING

The Basic Model: In addition to demographics, developments in employment and the generosity of the pension benefit system for the elderly—both with respect to eligibility and to the benefit level—will have some impact on the public finances. Thus, the increase in pension spending will depend on the development of four factors (see below):[1]

- the relative number of elderly (*aging effect*);
- the share of working-age people in employment (*employment effect*);
- the share of elderly receiving pensions (*eligibility effect*);
- the pension level of old-age recipients (*benefit effect)*.

The evolution of pension spending as a share of GDP depends on the development in the age structure of the population, old-age generosity and eligibility, and the productivity of the employed. Thus, the pension share to GDP can be written as follows:

(1)

$$\frac{Pension\ \ Spending}{GDP} = \left(\frac{Number\ \ of\ \ Pension\ \ Re cipients}{Employment}\right) * \left(\frac{Average\ \ Pension\ \ Benefit}{Average\ \ Pr oductivity}\right)$$

The ratio of pensioners to the employed can be decomposed further into the product of three ratios: (i) the dependency ratio; (ii) the inverse of the employment ratio; and (iii) the eligibility ratio (Dang, Antolin, and Oxley, 2001). This gives:

(2)

$$\frac{Pensio\ \ \ Spending}{GDP} = \underbrace{\left(\frac{Populatio\ \ \ge 65}{15 \le Populatio\ \ \le 64}\right)}_{1} * \underbrace{\left(\frac{15 \le Populatio\ \ \le 64}{Employment}\right)}_{2} * \underbrace{\left(\frac{Re cipients}{Populatio\ \ \ge 65}\right)}_{3} * \underbrace{\left(\frac{Average\ \ \ Pensio\ \ \ Benefit}{Average\ \ \ Pr oductivity}\right)}_{4}$$

The first three ratios on the right-hand side are the dependency, inverse employment, and eligibility ratios, respectively. This shows that pension spending as a share of GDP increases

[1] Although pension reform in Asia is still relatively at a nascent stage, with many countries in the region still relying on national provident funds, Hong Kong SAR seems be the exception and it has a very good mandatory provident fund scheme. Publicly provided pension is very limited in Hong Kong SAR, unlike in many other countries in a similar situation. The Mandatory Provident Fund (MPF) which was established in 2000 is the main pension vehicle, it is fully funded and privately managed. The MPF ordinance stipulates a retirement age of 65. However, members can claim their accrued benefits at age 60. Under the new civil servants pension scheme the normal retirement age was raised from 55 to 60 thus narrowing eligibility and strengthening disincentives to early retirement.

with the dependency and eligibility ratios and with the generosity of old-ages to average productivity, and decreases with the employment ratio.

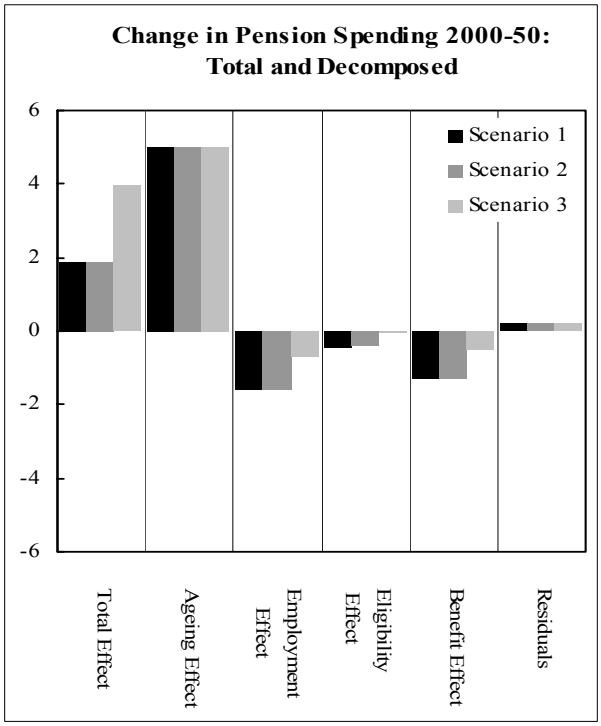
The contribution of each of these four ratios to the change in the overall share of pension spending to GDP can be approximated by the log linear decomposition:

(3)

$$\frac{\partial\left(\frac{Pension\quad Spending}{GDP}\right)}{\partial t} \cong \left(\frac{\partial\quad log(1)}{\partial t} * ps_{t=0} + \frac{\partial\quad log(2)}{\partial t} * ps_{t=0} + \frac{\partial\quad log(3)}{\partial t} * ps_{t=0} + \frac{\partial\quad log(4)}{\partial t} * ps_{t=0}\right) + \varepsilon$$

where pst=0 is current old-age spending as a share of GDP and ε is the residual from the log linearization. To minimize the significant residuals normally following from a linearization of a nonlinear function with large changes over long periods, one can calculate (3) for shorter sub periods and add them. We followed this procedure when calculating the results presented below.

Long-term projections of age-related spending and its effect on general government finances are very sensitive to the underlying assumptions. Thus, assumptions about demographic changes and about the impact of labor market policies have large effects on the path of age-related spending. The sensitivity of age-related spending and thus public finances to the economic outlook and to the effect of structural reforms is illustrated in a number of different scenarios. The scenarios are divided into three groups that explore the outlook for age-related spending and the public finances in a "high case" of solid growth and very successful outcomes of policies to mitigate the impact of aging and a "low case" of lower growth and less success of policies to mitigate the impact of aging.



- *Scenario 1:* Assuming that labor market productivity growth are maintained at current levels combined with some private sector participation in the financing aging-related health care cost, the growth of spending on old-age related spending will be contained through a higher employment ratio (*employment effect)*, tighter eligibility (*eligibility effect*), and potentially an increase in productivity growth to above average old-age benefit growth (*benefit effect*). However, this will be insufficient to counter the impact of the rise in the dependency ratio (*aging effect*), and pension spending (as a share of GDP) is still projected to rise by about 2 percentage points from 2000-2050. Together with a projected rise of 2 percentage points in spending on health

and long-term care, total age-related spending will put some increasing demands on budgetary resources. Absent compensating measures, this would lead to decline in the fiscal reserves-to-GDP ratio.

- *Scenario 2:* This scenario explores the impact of higher labor productivity than in scenario 1, which leads to a higher real GDP growth during 2008-2050. However, this increase in productivity would also lead to higher wage growth and thus adjustments in the average pension level, leaving the *benefit effect* broadly unchanged from scenario 1. Overall age related spending as a share of GDP falls, as pension spending is projected to reach around the same level as in scenario 1, while health and long-term care spending is lower due to the higher GDP level. This has positive dynamic effects on public finances, and consequently, the fiscal reserves-to-GDP ratio is projected to decline slightly less than in scenario 1.

- *Scenario 3:* The scenario explores the outlook under the significantly lower labor productivity growth than both scenarios 1 and 2 combined with lack of success in the authorities' efforts to mitigate the impact of aging on the public finances through greater private sector participation in financing health care cost. This assumption makes a considerable difference. Pension related spending increases as employment develops more negatively (*employment effect*), people retire earlier (*eligibility effect*), and average pensions develop more in line with the slower growing GDP (*benefit effect*). Health and long-term care spending increase by around 6 percentage points due to lower GDP growth, raising total age-related spending as a share of GDP by about 8 percentage points.

III. Sustainability of Volatile Fiscal Revenue Items [1]

A. Introduction

1. **Hong Kong SAR's revenue flows are characterized by relatively volatile non-tax items**. Foremost among these are investment income from the government's accumulated fiscal surpluses and the land premium on the sales and conversions of government-owned land. Over the past two decades these items have contributed, on average, about one-half of non-tax revenue and one-fifth of total revenue, although their volatility has been markedly higher than for tax revenue.

2. **The extent to which these items are incorporated into various fiscal balance measures has important implications for assessing the fiscal position.** The motivation for this note is to provide input into an *underlying fiscal balance* measure that seeks to gauge medium- to long-term sustainability. This concept should be distinguished from the *structural fiscal balance* approach used, for example, in recent staff documents on Hong Kong SAR, which strives to measure the effect of fiscal policy on aggregate demand. The latter approach has typically excluded the so-called volatile revenue items. It should be underscored that these two fiscal balance approaches are complementary.

3. **This note concludes that Hong Kong SAR's volatile non-tax revenue items have made a stable contribution to revenue of about 3½ percent of GDP**. Investment income (covered in Section B) contributes about 1 percentage point to this finding, while the land premium (covered in Section C) contributes about 2½ percentage points. The results are based on a simple trend analysis framework using data since the early 1980s. The conclusions are shown to be robust across a number of alternative metrics.[2]

B. Investment Income

4. **Reflecting a tradition of budgetary prudence, Hong Kong SAR has built-up a considerable stock of fiscal reserves over the years, which gives rise to sizeable public investment income**. Under current policies, fiscal reserves are placed with the Exchange Fund managed by the HKMA. (Fiscal deficits in the last few years were largely financed by drawing down existing reserves.) Investment income is the return the government receives at the end of each fiscal year and is linked to the return achieved by the Exchange Fund.[3] Moreover, the presence of sizeable fiscal reserves in the Exchange Fund provides additional confidence for the currency board arrangement as the foreign currency equivalent of the surpluses provides potential backing to banking system liabilities beyond the monetary base.

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[1] Prepared by Paul F. Gruenwald, Resident Representative, Hong Kong SAR.

[2] Future research in this area could focus on more fully specified models, including the effects of various policy changes, particularly as regards land policy.

[3] Prior to April 1, 1998, the government's fiscal reserves were treated akin to a time deposit, and the Exchange Fund paid the government market-based interest rates.

5. **Investment income represents an important, though volatile, non-tax revenue component** (Table III.1 and Charts). The government's accumulated fiscal reserves rose from 10 percent of GDP in the mid-1980s to reach 35 percent of GDP in 1999/2000 before falling back to 22 percent at present owing to sizeable deficits in the early 2000s.[4] Since 1983/84, the contribution of investment income to non-tax revenue has averaged 15 percent, but has ranged from 2 percent in 2001/02 to 39 percent in 1998/99. In terms of GDP, investment income has ranged from zero percent to 3½ percent. This volatility, particularly at the high end, reflects the performance of the relatively small equity component of the Exchange Fund. The correlation of investment income with GDP has been erratic, owing to the volatility of the investment markets.

6. **Despite the volatility of the investment income to GDP ratio, its trend has been stable**. A simple trend regression shows that this ratio rose by a statistically significant 0.07 percent of GDP per annum over the sample period. However, owing to serial correlation in the error terms, the test statistics for this simple regression are not valid. Correcting for this error persistence by quasi-differencing the data—see the Annex III.1 for details—shows that there is no statistically significant trend in the investment income to GDP ratio.[5]

7. **Two alternatives to using a simple long-term average to assess the sustainability of the investment income to GDP ratio are the trimmed mean and "synthetic" returns using a constant real interest rate**.

- Given a number of spikes in the series since the late 1990s—reflecting in part returns from equities following the stock market intervention by the Exchange Fund in August 1998—a case can be made for constructing a trimmed mean to extract the extreme observed values. Omitting the highest and lowest 10 percent of the observations does not materially change the results. The ratio of investment income to GDP falls by 15 basis points (to 1.05 percent); similarly, the ratio of investment income to non-tax revenue falls by 1 percentage point (to 17.4 percent).

- Some of the volatility in the investment income to GDP series also derives from swings in nominal and real U.S. interest rates, which are exogenous to Hong Kong. Over the sample period, the yield on the 1-year U.S. Treasury bill (which is used as a proxy in the present exercise[6]) averaged 2.6 percent, but moved in a range from around minus 1 percent in

[4] The Land Fund was added to the fiscal reserves in July 1, 1997; however, for consistency this note uses the sum of the fiscal reserves and the Land Fund balance for the entire sample period.

[5] A more generous approach suggested by some commentators (Latter, 2003) would score all of the returns on the Exchange Fund as investment income. Using a nominal rate of return imputed by a constant real rate (see below) raises the average investment income to GDP ratio over the past two decades to above 2½ percent.

[6] A more rigorous approach would include a composite short-term instrument with the weights corresponding to the currency and asset composition of the Exchange Fund.

recent years to over 6 percent early in the sample period. Using the long-term average constant real yield on U.S. paper to impute a nominal rate of return on Exchange Fund assets also has minimal effect on the results, as it lowers the investment income to GDP ratio by 15 basis points to 1 percent.

8. **Given the change in policy in 1998 regarding the interest rate paid on fiscal reserves in the Exchange Fund , examining a shorter time series has merit**. Looking at the truncated series for the investment income to GDP ratio yields a slightly higher mean of 1.4 percent of GDP, with a statistically insignificant coefficient on the trend variable (with no serial correlation in the error term). This again suggests a stable investment income to GDP ratio.

C. Land Premium

9. **The land premium is defined as the sum of land "sales" and fees paid to the government for the conversion of agricultural land to commercial use**. Virtually all land in Hong Kong SAR is publicly owned. Firms and individuals can acquired the rights to use and/or develop land through an auction system whereby control—but not ownership—of the asset is conferred upon the highest bidder (in the case of land sales) or applicant (in the case of modification premium), usually for a period of up to 50 years.

10. **The rationale for treating the land premium as revenue—and not a financing item—stems from the fact the underlying contracts are, in fact, leases**. After the expiration of the lease period for both sales and conversions, control of the land reverts back to the government. Reflecting this fact, in Hong Kong SAR's government accounts the land premium has traditionally been included above the line as a capital revenue item. [7]

11. **Like investment income, the land premium has been a volatile non-tax revenue source over the past two decades (**Table 1 and Charts**).** While the land premium has averaged 2.4 percent of GDP, it has varied from a low of 0.4 percent of GDP in 2003/04 to 5.2. percent of GDP in 1997/98. The low reflect the government's suspension of land sales following the over-supply created in the late 1990s while the high reflects the property market boom of the mid-1990s. The correlation with GDP has averaged about a 0.7 over the period, although on a rolling basis this has fluctuated sharply.

12. **Despite numerous changes in land supply policy and the volatility of the series, the land premium as a percentage of GDP shows no statistically significant time trend**. Using the same approach as above, the time coefficient for the land premium as a percentage of GDP is only .003; moreover, this coefficient is not statistically significant. However, as with investment income, there is serial correlation in the error term and quasi-differencing is

[7] One analogy is the auction of 3G spectrum licenses in the late 1990s and early 2000s in a number of countries where the proceeds were amortized over the duration of the lease and scored as non-tax revenue.

adopted to correct for this (see Annex III.1). In the modified regression, the coefficient of the time variable becomes fractionally negative, but remains statistically insignificant.

13. **Finally, on a related issue, the land premium has also been stable over the longer term in relation to capital expenditure**. At issue is the extent to which the land premium should form a sizeable and stable counterpart for capital expenditure, which arguably should not be financed in large part from current revenues. The data show a long-run average land premium to capital expenditure ratio of 65 percent, with a somewhat higher ratio since 1997. Moreover, a simple regression shows that this ratio has been rising by about ¼ percent of GDP per annum, although the time coefficient is statistically insignificant.

Table III.1: Hong Kong SAR: Volatile Revenue Items, Descriptive Statistics

	1983/84 - 2004/05					1996/97 - 2004/05				
	Average	Maximum	Minimum	Trimmed Mean 1/	Std. Dev.	Average	Maximum	Minimum	Trimmed Mean 1/	Std. Dev.
Investment Income										
As percentage of non-tax revenue	18.3	41.7	5.1	17.3	9.8	24.5	41.7	5.1	24.8	12.0
As percentage of total revenue	7.0	19.5	1.5	6.3	4.9	10.4	19.5	1.5	10.4	6.1
As percentage of GDP	1.2	3.5	0.2	1.0	0.9	1.8	3.5	0.2	1.8	1.1
Implied investment income A 2/										
As percentage of GDP	1.0	2.0	0.5	1.0	0.4	1.4	2.0	0.8	1.4	0.4
Less actual investment income (as % of GDP)	-0.2	1.4	-1.9	-0.1	0.7	-0.4	1.4	-1.9	-0.5	1.0
Implied investment income B 3/										
As percentage of GDP	2.6	4.7	1.3	2.5	1.0	3.5	4.7	2.3	3.6	0.9
Less actual investment income (as % of GDP)	1.6	3.2	0.7	1.5	0.7	2.2	3.2	0.7	2.2	0.8
Land premium										
As percentage of non-tax revenue	40.6	84.6	6.8	39.0	22.5	32.6	84.6	6.8	28.9	24.0
As percentage of total revenue	14.3	27.8	2.6	14.0	7.2	13.0	27.8	2.6	12.4	8.6
As percentage of GDP	2.4	5.2	0.4	2.3	1.3	2.3	5.2	0.4	2.2	1.7
Land sales as a percentage of land premium	56.9	100.0	36.6				83.5	41.2		
As percentage of capital expenditure	65.4	211.2	12.2	59.6	43.8	70.7	211.2	12.2	59.0	62.6
Memorandum items:										
Tax revenue (as a percentage of total revenue)	63.5	71.9	47.9	64.1	6.4	59.5	71.2	47.9	59.4	7.2
Tax revenue (as a percentage of GDP)	10.4	12.3	8.5	10.4	1.1	10.1	11.7	8.8	10.1	1.2
Fiscal reserves (as percentage of GDP)	18.6	35.1	9.3	17.9	8.8	27.4	35.1	14.1	28.2	7.1
Actual rate of return on fiscal reserves	6.2	10.1	0.7	6.3	2.5	6.5	9.9	0.7	6.9	3.0
Real yield on 1-year US Treasury bill	2.6	6.3	-1.0	2.6	1.9	1.6	3.4	-1.0	1.6	1.7
US 1-year yield using LT average real yield	5.8	8.1	4.2	5.7	1.0	5.1	6.0	4.2	5.0	0.6

Source: CEIC, Hong Kong SAR Government; and author's calculations.

1/ The trimmed mean excludes the lowest and highest 10 percent of the observations.
2/ Principle equals accumulated fiscal surpluses. The nominal yield uses the average real yield of the 1-year U.S. Treasury bill.
3/ Principle equals Exchange Fund balance. The nominal yield uses the average real yield of the 1-year U.S. Treasury bill.

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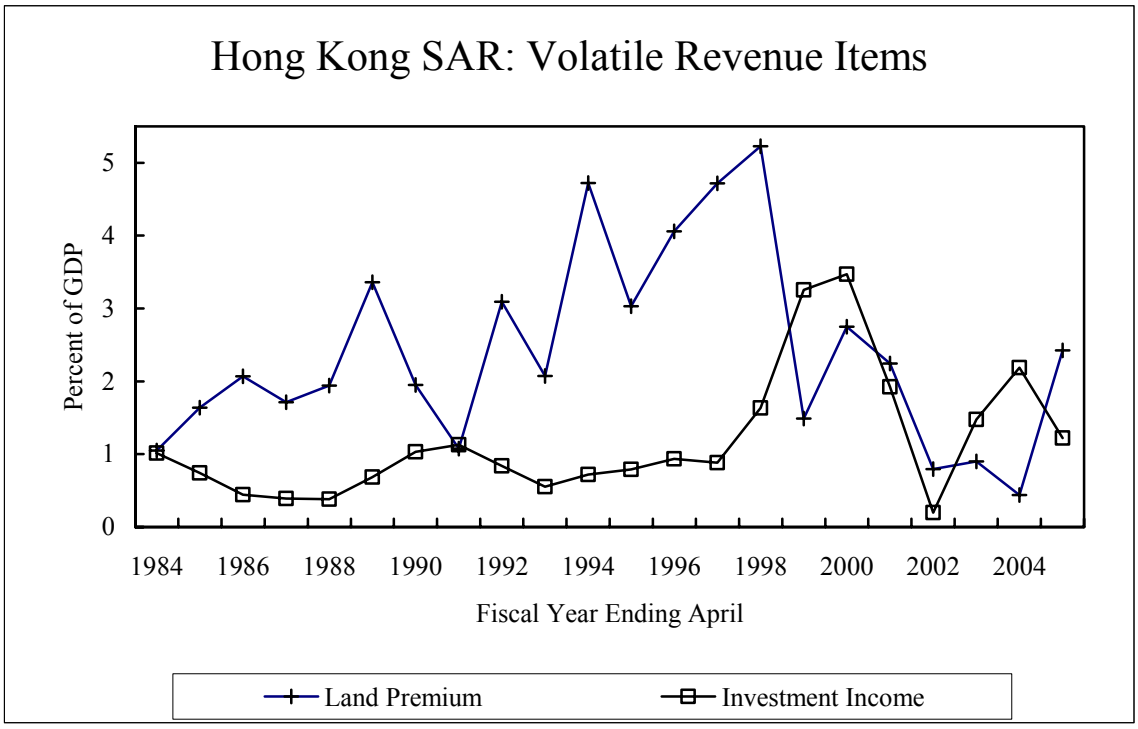
Correcting for Serial Correlation

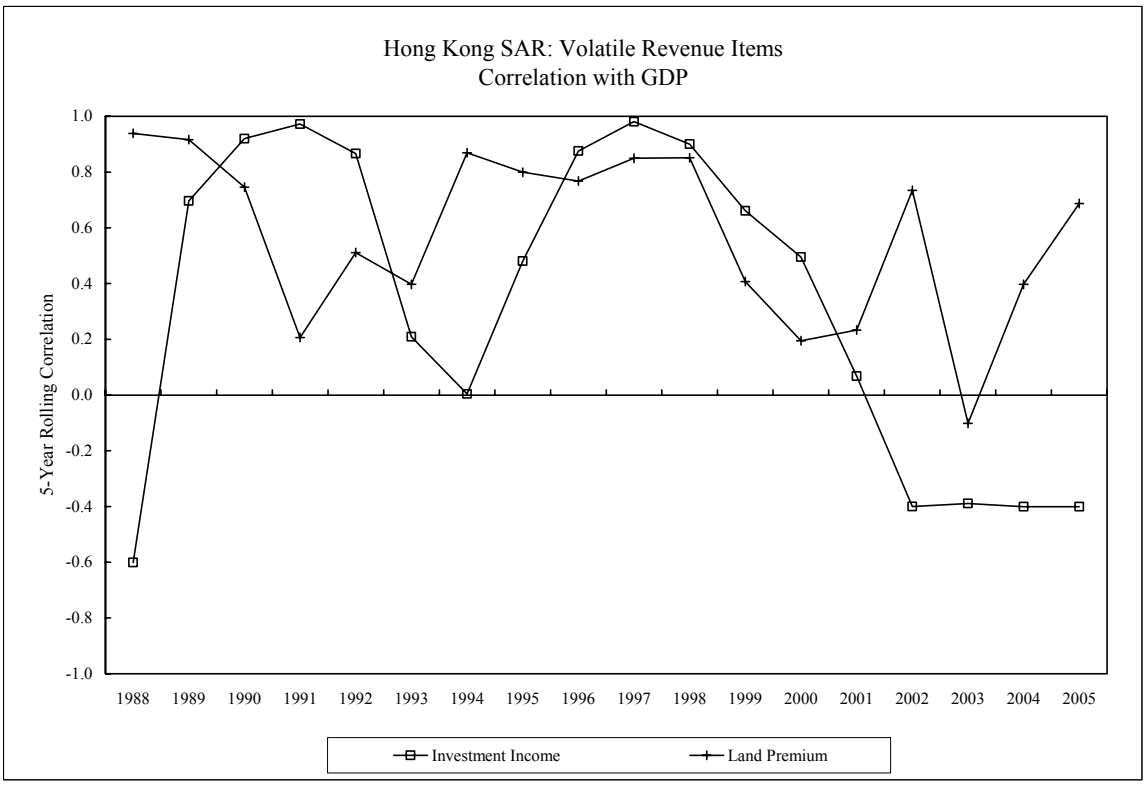
As noted in the main text, the simple regressions for both investment income and the land premium exhibit serial correlation in the error terms. As a result, the usual OLS standard errors and test statistics are not valid. Tests for AR(1) serial correlation—regressing the residuals at period t on the residuals at period (t-1) and the independent variable—showed statistically significant (at the 10 percent level) co-efficient on lagged residuals of 0.44 and 0.40 for the land premium and investment income, respectively. This result held only for the 22-year regressions only; there was no evidence of serial correlation in either 9-year regression. Serial correlation was corrected by quasi-differencing the data using the Prais-Winston estimation (Woolridge, 2003). As can be seen from the text table below, using the quasi-differenced data produced the following:

- a marginally statistically insignificant coefficient in the 22-year investment income equation—in contrast to the significant coefficient in the original estimation—since the positive serial correlation led to an underestimation of the standard error and over-estimation of the t-statistic (the coefficient itself was little changed).

- a sign change in the coefficient in the 22-year land premium regression, but maintaining the numerically low t-statistic.

Investment Income (1984-2005)					Land Premium (1984-2005)				
original	coeff.	std error	t	P > | t |	original	coeff.	std error	t	P > | t |
time	0.070	0.026	2.74	0.013	time	0.003	0.046	0.07	0.948
constant	0.365	0.337	1.08	0.292	constant	2.356	0.611	3.86	0.001
residuals (t)	coeff.	std error	t	P > | t |	residuals (t)	coeff.	std error	t	P > | t |
residuals (t-1)	0.442	0.214	2.06	0.054	residuals (t-1)	0.403	0.208	1.93	0.069
time	0.004	0.026	0.14	0.891	time	-0.020	0.046	-0.42	0.679
constant	-0.085	0.345	-0.25	0.809	constant	0.299	0.624	0.48	0.638
Prais-Winsten	coeff.	std error	t	P > | t |	Prais-Winsten	coeff.	std error	t	P > | t |
time	0.077	0.045	1.71	0.103	time	-0.030	0.076	-0.39	0.699
constant	0.208	0.634	0.33	0.747	constant	2.878	1.062	2.71	0.014
Investment Income (1997-2005)					Land Premium (1997-2005)				
original	coeff.	std error	t	P > | t |	original	coeff.	std error	t	P > | t |
time	-0.065	0.146	-0.45	0.669	time	-0.445	0.161	-2.76	0.028
constant	2.136	0.820	2.61	0.035	constant	4.536	0.908	5.00	0.002
residuals (t)	coeff.	std error	t	P > | t |	residuals (t)	coeff.	std error	t	P > | t |
residuals (t-1)	0.259	0.375	0.69	0.521	residuals (t-1)	-0.243	0.614	-0.40	0.709
time	-0.135	0.172	-0.79	0.466	time	0.017	0.251	0.07	0.950
constant	0.879	1.020	0.86	0.428	constant	-0.224	1.406	-0.16	0.880


Hong Kong SAR: Volatile Revenue Items
Percent of GDP
0
1
2
3
4
5
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
Fiscal Year Ending April
Land Premium
Investment Income


Hong Kong SAR: Volatile Revenue Items
Correlation with GDP
5-Year Rolling Correlation
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Investment Income
Land Premium

IV. Rapid Growth of Equity and Derivatives Markets in Hong Kong SAR [1] [2]

A. Introduction

1. **Hong Kong SAR's equity and equity-based derivatives markets have experienced very fast growth of late measured by market capitalization, turnover and issuance.** These developments reflect: (i) the recovery of the local economy, including the property sector and bank balance sheets; (ii) the ongoing strong regional growth story and its positive impact on Hong Kong as a financial center; and (iii) the proliferation of increasingly sophisticated derivative products, including those effects stemming from regulatory changes. Hong Kong SAR currently has the second largest equity market in the region (behind Japan) ranked by capitalization and is the most active derivative warrants market in the world.

2. **Much, though not all, of this increase in activity has been driven by deepening financial integration with the Mainland**. Hong Kong SAR's equity and derivatives markets are becoming increasingly dominated by claims related to Mainland enterprises. An important element of this trend is IPOs, including from major state banks. This pattern looks set to continue as the Mainland gradually opens its capital account and as Mainland firms seek funding, ownership and expertise from abroad. Hong Kong's financial markets are, in turn, increasingly dependent on the Mainland—funds raised through the issuance of H shares (Mainland companies incorporated in the Mainland) and red chips (Mainland affiliated companies incorporated outside the Mainland) amounted to more than half of the total funds raised in the local market during the past decade.

3. **The ongoing rapid development of local financial markets and increasing financial linkages to the Mainland highlight a number of policy issues**. Foremost among these is the need to maintain Hong Kong's status as a regional financial center—in particular to intermediate between Mainland firms and overseas investors—by ensuring orderly and efficient markets, and by preserving its cutting edge supervisory capabilities. These should be seen against the backdrop of competition from existing and aspiring financial centers in the region. Given the relatively high retail participation in the Hong Kong market, investor education and information dissemination also play important roles in ensuring market integrity. The authorities remain well aware of all of these challenges.

4. **This paper provides an overview of the recent growth of Hong Kong's equity and equity-related derivatives markets: what has happened, to what extent the Mainland has been the driver of change, and what are the main policy implications**. Given the breadth of the topic, the coverage is necessarily broad brush and selective; developments in other financial asset classes are left for future research. The remainder of the paper is as follows: Section B looks at recent developments in the markets for equities,

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[1] Prepared by Paul Gruenwald (Resident Representative) and Cynthia Leung (Economist) of the Hong Kong SAR sub-office.

[2] The relatively narrow focus of this paper reflects the recent rapid growth in the relevant instruments, the authorities' high level of interest in the topic, and space constraints.

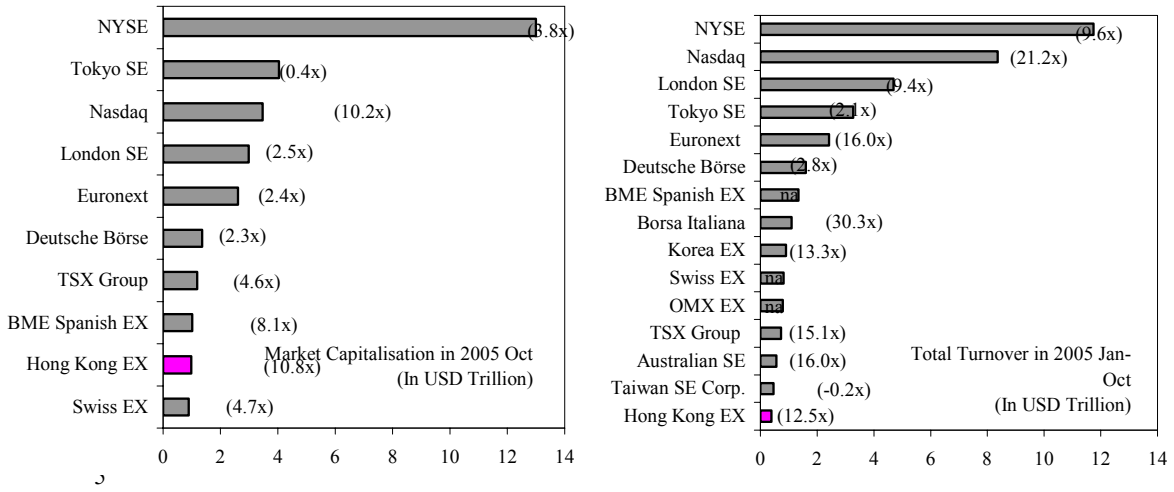
futures and options, and derivative warrants and structured notes; Section C discusses the influence of the Mainland on Hong Kong financial markets; and Section D concludes.

B. Recent Market Developments

Equity Markets

5. **Hong Kong's market capitalization, which is approaching $1 trillion, is now the second largest in Asia behind Japan**. Compared with the major U.S. exchanges, however, Hong Kong's capitalization remains modest at only one-fourteenth the level of the NYSE and one-fourth the level of the NASDAQ. That said, compared with the top ten markets, Hong Kong's capitalization has grown the fastest in the past 15 years. Ranked by turnover, Hong Kong falls to fifth in the Asia region behind Japan, Korea, Australia and Taiwan POC. Since the recent lows of early 2003, market capitalization has risen by 122 percent and daily turnover by 196 percent.

Figure IV. 1. Hong Kong SAR: Equity Markets in an International Context



Note : Figures in the brackets refer to expansion from 1990.
Source : World Federation Exchanges.

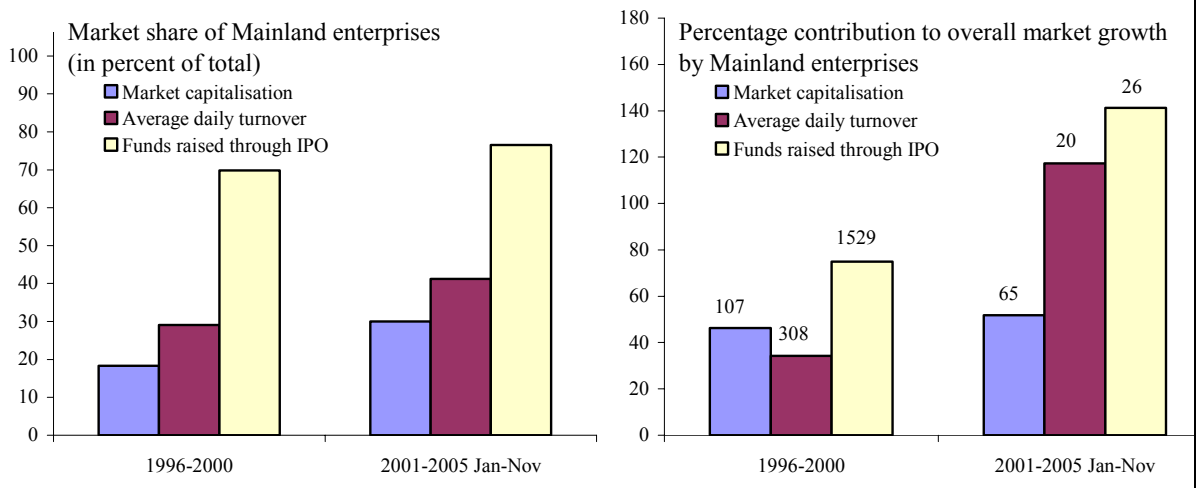
6. **Hong Kong equity markets feature a "main board" and a NASDAQ-style Growth Enterprise Market (GEM)**. The GEM was launched in November 1999 to provide venture companies, in particular those involved in the technology sector, with access to equity market financing. Many GEM-listed companies do not fulfill the profitability and track record requirements to list on the main board. The main board has 915 listed companies as of end-October 2005 (202 for the GEM); market capitalization of $972 billion ($9 billion for the GEM) daily turnover of 2.3 billion shares (11.6 million for the GEM).

7. **Hong Kong's equity market is one of the world's major fundraising centers.** In 2004, IPOs launched in the Hong Kong market raised $12 billion, while total fundraising in

the equity market was $36 billion, fourth globally behind the NYSE, Euronext and Spain.[3] One-third of total new issuance was related to Mainland enterprises. In the first ten months of 2005, this percentage jumped to over 60 percent, and for IPOs only was nearly 90 percent in light of China Construction Bank's record $9 ¼ billion issued in October 2005.

8. **Mainland enterprises have become increasingly important in Hong Kong's equity market in terms of market share as well as contribution to growth.**[4]

Figure IV. 2. Importance of Mainland Enterprise Shares



Note : Figures in the chart refer to the overall market growth rate during the period.
Source : HKEx.

- *Market shares*. The share of Mainland enterprises in total market capitalization, daily turnover and IPOs, has risen sharply so far this decade compared with the late 1990s. Comparing 2001 – November 2005 with the previous five years, the share of Mainland enterprises has risen from about 20 to 30 percent of market capitalization, 30 to 40 percent of average daily turnover, and 70 to 77 percent of IPOs.

- Developments in the *percentage contribution to overall market growth of Mainland enterprises* have been even more pronounced than for market shares. Comparing the same five-year periods, the percentage contribution to overall market growth rose from: 46 to 52 percent for market capitalization, 34 to 115 percent for average daily turnover and 75 to 141 percent for IPOs. The higher-than-100-percent contribution suggests a contraction of non-Mainland listed companies in terms of turnover and IPOs.

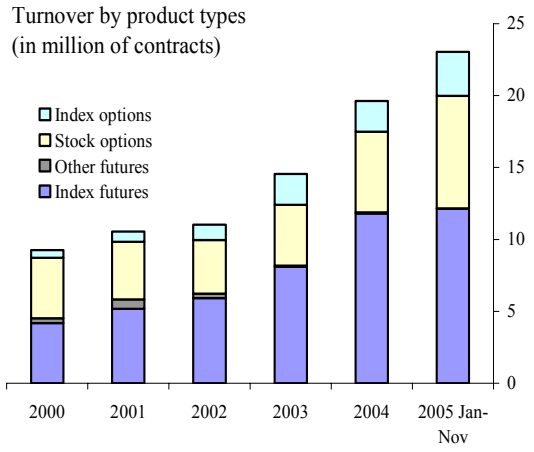
[3] Non-IPO activity includes rights issues, warrants exercised, share options, placing activities and consideration issues.

[4] Hong Kong reportedly accounts for about 70 percent of Mainland-based companies' share turnover outside of the Mainland; New York and London account for most of the rest.

Exchange Traded Futures and Options[5]

9. **The number of exchange-traded contracts for equity derivatives has also risen sharply in recent years**, although amounts remain well below key international and regional markets. The Hong Kong Exchange (HKEx) offers futures and options contracts on various indices as well as on individual stocks; these tend to be traded by professionals using specialized accounts with exchange participants. The number of contracts rose to 20 million in 2004, an increase of 35 percent,[6] and has doubled since the Asian financial crisis. Futures comprised 60 percent of the 2004 total. Most futures contracts were index-based (with Hang Seng futures accounting for three-fourths of the total), while over 70 percent of options were based on individual stocks. Fast growth continued into 2005 as the total number of contracts traded in 2004 had been matched as of mid-October.

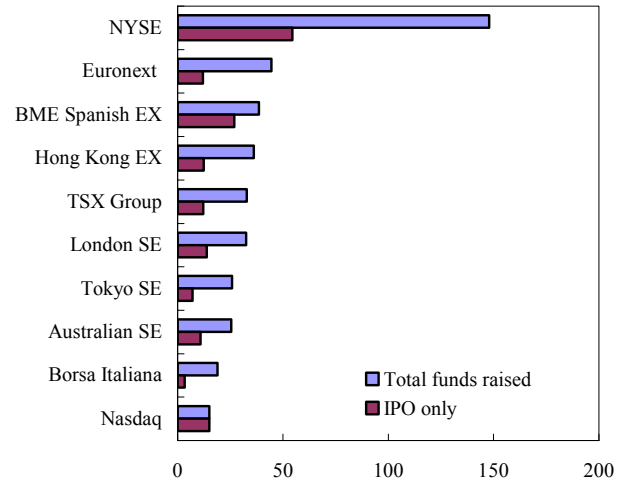
Figure IV. 3. Recent Developments in Exchange-Trade Futures and Options



Source : HKEx.

10. **Pure trading remains the most common reason for transacting futures and options in Hong Kong**. Surveys by the HKEx (2005) show that about one-half of all equity derivative transactions were for pure trading, one-third were for hedging and the remainder were for arbitrage, although these vary considerably by product. For example, over one-half of futures contracts were reportedly for pure trading purposes, while only one-third of options were for pure trading and almost one-half were for hedging. The sum of

Figure IV. 4. Top Ten Fundraising Markets (2004)



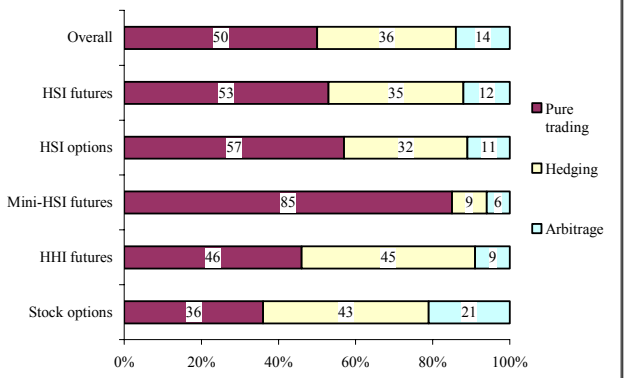
Source : World Federation Exchanges.

[5] This section is based on Hong Kong Exchanges and Clearing Limited (2005). The survey covers transactions during July 2004 – June 2005 in the main futures and options products, which represents 99 percent of the turnover volume in the HKEx derivatives market.

[6] This amount includes all exchange-traded contacts, of which 0.3 percent were HIBOR futures and a miniscule amount were Exchange Fund note futures.

pure trading and hedging as a percentage of the total has been broadly stable (although data on the composition are limited).

Figure IV. 5. Transaction Purposes by Products



Source : HKEx.

11. **Hong Kong's derivatives market has a relatively diverse investor base with a strong local retail presence** (Chart 2c). The bulk of trading is divided between three main groups: exchange participants, including their proprietary trades (35 percent); local retail investors (26 percent); and overseas institutional investors (26 percent).[7] Over the past five years, the percentage contribution of overseas institutional investors has doubled and has been offset largely by a decline in the contribution of exchange participants. Contributions of these groups by product vary widely: exchange participants account for over three-fourths of stock option volume, while overseas investors account for nearly one-half of index futures volume. The participation of local retail investors is also skewed towards futures trading.

Table IV.1. Derivative Warrants by Types (In percent of total)

	2000	2001	2002	2003	2005 Jul-Nov
Number of Newly Issued					
Equity Call	84	81	65	41	73
Equity Put	9	14	20	12	9
Index	6	3	9	20	16
Exotic	0.0	0.0	4	25	0.2
Others	1	2	3	2	2
Transaction Value					
Equity Call			56	37	53
Equity Put			20	8	4
Index			21	36	43
Exotic			2	19	0.2
Others			0.4	0.2	0.1

Source : SFC.

Derivative Warrants and Structured Notes [8]

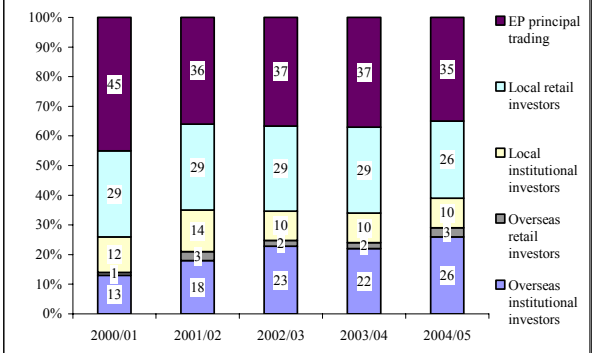
12. **Following regulatory reforms in the derivatives warrants market in late 2001 and early 2002, the issuance and trading of derivative warrants in Hong Kong has**

[7] In 2004/05, UK, US and non-UK European investors (institutional and retail combined) each accounted for roughly one-quarter of the overseas total.

[8] Box 1 describes in detail some of the derivative products with a particular focus on warrants and structured notes both which have grown in trading volumes in recent years. Warrants are stock option-like derivatives that are issued by individual investment banks, securities houses or their afiliates to attract retail investors, who are interested in taking leveraged bets, through lower transactions costs. Like a warrant, a structured note is backed by stocks. But unlike warrants, the holder receives at maturity either the principal amount in cash or the underlying stock if the price of that stock falls below the predetermined price. This requires the issuer to hedge by selling the underlying stock when the price increases (and the chance of delivering the underlying stock decreases) and buying when the price falls (when the issuer is more likely to deliver the stock). Indeed, banks find it attractive to issue both warrants and structured notes to "automatically" hedge against stock price changes.

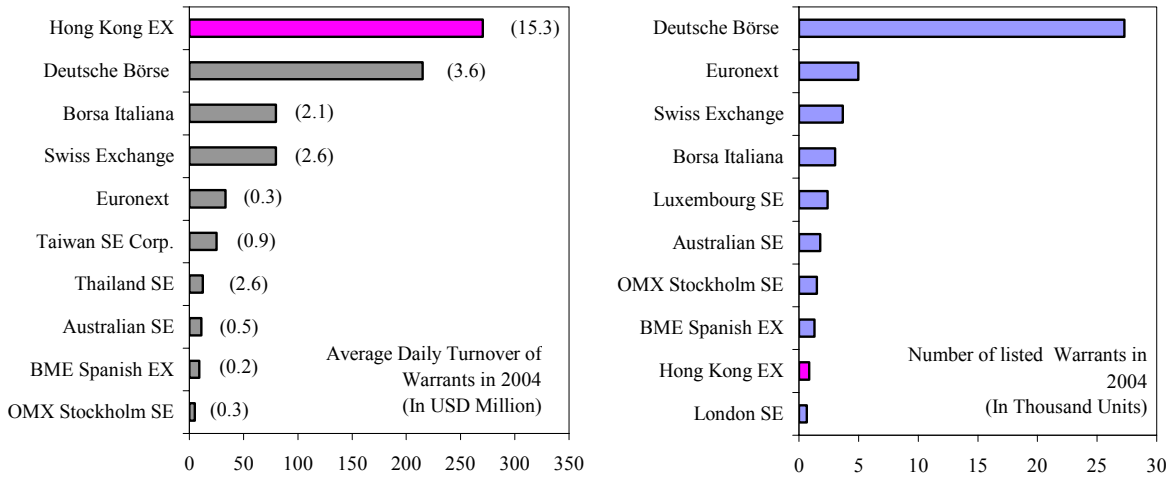
exploded and the market is currently the most active in the world. [9] [10] Daily turnover jumped from under $100 million in 2002 to $424 million in the first nine months of 2005, equal to the sum of the German and Italian markets combined (the second and third most active exchanges in the world). This in spite of Hong Kong having only the 9th most number of derivative warrants listed—there are now over 1,000, more than the total number of companies listed on the main board and GEM. Derivative warrants' share of total market turnover rose from 6 percent in 2002 to 17 percent in the first half of 2005, and now exceeds the share of red chips.

Figure IV. 6. Distribution of Trading by Investor Types



Source : HKEx.

Figure IV. 7. International Comparison of Warrants Markets in 2004



Note : Figures in the brackets refer to the percentage to total shares turnover.
Source : World Federation Exchanges.

13. **Equity call warrants continue to be the most common type of instrument issued, although the share of index warrants have been rising rapidly**. Whereas five years ago plain vanilla (put and call) derivative warrants based on individual stocks comprised over

[9] These changes removed the placement requirement to issue derivative warrants before a listing, and introduced a requirement for warrant issuers to appoint a liquidity provider (Lee, 2004a). The dramatic rise in turnover is less well understood and is a topic for future research.

[10] In contrast to stock options, derivative warrants are pitched to retail investors (contract sizes are small) and can be traded like regular stocks using normal investment accounts. Derivatives warrants are also attractive due to their lack of position limits.

90 percent of issuance, index warrants currently comprise about one-fifth of the total. Calls continue to outnumber puts, and the gap has been rising since 2003.

14. **The equities underlying the derivative warrants are fairly concentrated, and contain a sizeable Mainland component**. Derivative warrants are typically issued on large capitalization and high turnover stocks, as well as the main indices. The top 10 underlyings (which include two indices) account for 73 percent of issue size during the first eleven months of 2005. Five of the top ten underlyings represent exposure to Mainland entities. The issuers of derivative warrants were even more concentrated, with the top three banks accounting for nearly one-half of the total amount and the top ten 90 percent.

Table IV. 2a. Top Ten Underlyings of Derivative Warrants
(January - November 2005)

	Aggregate Issue Size		New Issues	
	HK$ mn	% of Total	Number	% of Total
Hang Seng Index	23,822	17.0	211	14.3
HSBC	18,091	12.9	147	10.0
Hutchison	11,344	8.1	111	7.5
PetroChina	9,424	6.7	96	6.5
Cheung Kong Holdings	8,904	6.3	91	6.2
China Mobile	8,285	5.9	106	7.2
Sun Hung Kai Properties	7,602	5.4	83	5.6
China Life	6,282	4.5	65	4.4
Hang Seng China Enterprise Index	5,506	3.9	66	4.5
Sinopec	3,459	2.5	44	3.0
Top 10 Sub-total	102,718	73.2	1,020	69.2
Total	140,363		1,475	

Sources: HKEx, SFC Research

15. **The rapid growth of the equity-linked retail structured note market has been an important complement to the equity derivatives market, again with a strong Mainland component.** These structured notes,[11] many of which are not listed (and for which data is less plentiful), are yield-enhancing fixed income products that pay out in some underlying stock rather than in currency if the underlying stock price falls below a certain threshold. Structured notes became popular in the period of historically low yields, and tend to be lightly traded instruments with longer tenors than equity derivatives. As with equity derivatives, Mainland stocks are popular underlying assets, comprising three of the top ten. It

[11] According to the SFC's survey, equity-linked notes account for about 60 percent of total retail structural note issues.

should be noted that, as in other markets, volatility has been falling in Hong Kong reflecting in part that market forces stemming from hedging activities of structured note issuers have offset the impact on volatility associated with derivative warrants (see Box IV.1).

Table IV. 2b. Hong Kong SAR: Top Ten Issuers of Derivative Warrants
(January - November 2005)

Issuer	Aggregate Issue Size		New Issues	
	HK$ mn	% of Total	Number	% of Total
Macquarie Bank Ltd.	23,393	16.7	262	17.8
SGA Societe Generale	22,824	16.3	221	15.0
KBC Financial Products Int'l Ltd	18,351	13.1	173	11.7
Deutsche Bank AG	13,437	9.6	149	10.1
Calyon Financial Products	13,162	9.4	75	5.1
BNP Paribas	10,493	7.5	94	6.4
Credit Suisse First Boston	10,404	7.4	111	7.5
J P Morgan	5,998	4.3	60	4.1
ABN AMRO Bank	4,757	3.4	98	6.6
CC Rabobank	3,305	2.4	35	2.4
Top 10 Sub-total	126,123	89.9	1,278	86.6
Total	140,363		1,475	

Sources: HKEx, SFC Research.

C. The Role of the Mainland in Hong Kong's Recent Financial Market Developments

16. **Hong Kong continues to be the main foreign fund raising center for the Mainland.** This has been facilitated by geographic, demographic and cultural factors. Fundraising has taken place across a wide spectrum of channels, including foreign direct investment, equity financing, and bank lending. The most important market for intermediation in Hong Kong SAR is the stock market—although, as we have seen, derivatives markets have grown quite rapidly in recent years—which has operated efficiently and has long provided a low-cost source of funds for Mainland enterprises. Reflecting difficulties in the Shanghai and Shenzhen markets, Mainland firms also benefit from having the imprimatur of a Hong Kong listing.

17. **Hong Kong serves a role as the premier risk management center for the Mainland**. Exchanges in China have resumed warrant trading lately and, to date, there are only seven warrants listed on the two Mainland exchanges. With many Mainland enterprises listed in Hong Kong, equity exposures can be managed through derivatives on Hong Kong

listed Mainland stocks and indices, the latest product being the FTSE/Xinhua China 25 index, which commenced to trade on the HKEx in May 2005.[12]

18. **Hong Kong markets provide an efficient channel for foreign investors to gain Mainland exposure**. Due to capital controls, foreign investors can achieve only minimal direct participation in the Mainland markets. To capitalize on the increasing interest in China, many foreign institutional and local retail investors view H shares and red chips and their related derivative products as the first choice of investment vehicle. This has resulted in a sharp rise in the share of turnover of Mainland-related equity products over the past decade.

19. **Hong Kong's financial services industry can assist the Mainland in bringing greater sophistication to its market**. Hong Kong's advantages in terms of overseas market networks and level of professional service have made it the main choice for Mainland enterprises venturing abroad. According to the 5th Survey of Mainland Private Enterprises,[13] over 47 of respondents consider overseas market expansion as their top development target, while 5 percent say they aim for a listing. The survey also found that a majority of the respondents opt for cooperation with foreign companies in seeking either domestic or overseas market expansion. Among them, 90 percent indicated they prefer Hong Kong companies or use Hong Kong services and 75 percent would choose Hong Kong as the location for listing in future.

D. Supervisory Issues

20. **The recent rapid growth in equity and equity-related derivatives trading reflects a healthy deepening of, and confidence in, Hong Kong financial markets**. While this paper covered equity and equity-based products, it should be noted that market deepening extends across all three asset classes, as well as other derivative products.[14] Although Hong Kong does possess important advantages over other existing and aspiring money centers, recent developments in the local markets can be viewed as a vote of confidence by the investor community. Financial capital is mobile and participants do have a choice as to where intermediation takes place.

21. **The growing depth and sophistication of the equities and derivatives markets underscores the importance of continued close supervision to preserve and enhance Hong Kong's role as a regional financial center**. Hong Kong remains at the forefront of financial sector supervision worldwide, and the authorities are mindful of the need to

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[12] This is increasingly true for other asset classes as well: as of November 2005, retail investors can trade RMB non-deliverable forward contracts over the counter.

[13] A special "study group" comprising the Propaganda Division of the CPC Central Committee, the All-China Federation of Industry and Commerce, and the All-China Society of Private Economic Research.

[14] For example, a description of the recent fast growth in credit derivatives and asset securitization, see Hong Kong Monetary Authority (2005).

maintain close surveillance over both the "hardware" (infrastructure) as well as the "software" (quality of supervision and regulations), in order to ensure that markets continue to function in an efficient and orderly manner. An important recent example is the SFC's recent review of the derivatives warrants market (SFC, 2005b) which was prompted by rapid growth and market concerns. Although the review found no systemic issues, it did propose a number of initiatives to strengthen the regulatory regime.[15]

22. **Hong Kong will almost certainly be the most important gateway for external fundraising for Mainland enterprises over the medium term, pointing to the necessity of continued cooperation with Mainland regulators and strengthening financial linkages**. Cooperation and coordination with the Mainland's financial authorities—across the banking, securities and insurance regulators—which have advanced well, will become increasingly important. Increasing access of Mainland firms to Hong Kong's financial infrastructure will also require continuous upgrading of cross-border linkages between payment, settlement and clearing systems. Progress in these areas will be dictated in large part by the pace of financial liberalization on the Mainland.

23. **Given the relatively high retail participation in Hong Kong markets, investor education takes on particular importance**. Although the local investor base is relatively sophisticated, retail access to increasingly complex financial instruments opens the possibility that even seasoned investors may not fully appreciate or understand the risks of the product they are buying. A fresh example is the SFC's recent finding that there is a fairly high level of misunderstandings about such products. While all supervisory bodies in Hong Kong SAR run active public education and information dissemination programs, there is an ongoing need to promote such efforts given the likely widening of the investor base and the likely continual flow of new and more complex financial instruments.

[15] The proposals seek to improve market integrity and conduct (for example through tightening liquidity provider provisions, and banning rebates and other potentially distortionary incentive schemes) and bolster investor education.

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Box IV.1. Derivative Warrants, Structured Notes and Volatility[1]

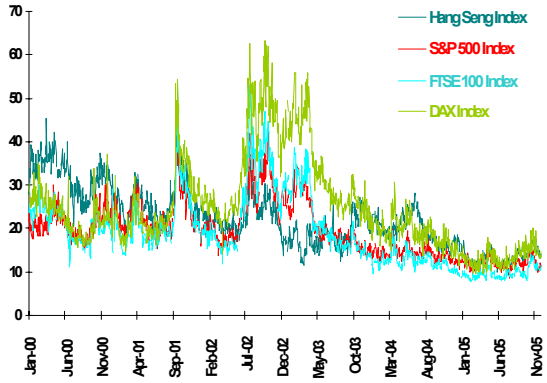
Some commentators have expressed concern that complex instruments such as derivative warrants add to market volatility. While this may be true for derivative warrants taken in isolation, it is necessary to look across instruments to assess whether there are any offsetting factors in the market. Indeed, in Hong Kong, many banks have in recent years have issued a large number of structured notes, many linked to the same underlying stock or indices as the derivative warrants. The overall impact of these two types of instruments is to lower the volatility of the underlying stocks or indices. The purpose of this box is to present a stylized version of this phenomenon using popular instruments in the Hong Kong market: warrants and equity-linked notes referenced to an underlying stock.

Taken in isolation, call warrants (which give the owner the right to purchase a stock at pre-specified price) can potentially add to market volatility. When the price of the underlying stock is rising, the probability that the warrant will be exercised by the warrant holder increases. Thus, the bank that issued the warrant is more likely to have to purchase shares of the underlying stock in order to fulfill its end of the contract. The effect is to exacerbate the rise in the share price, adding to volatility.

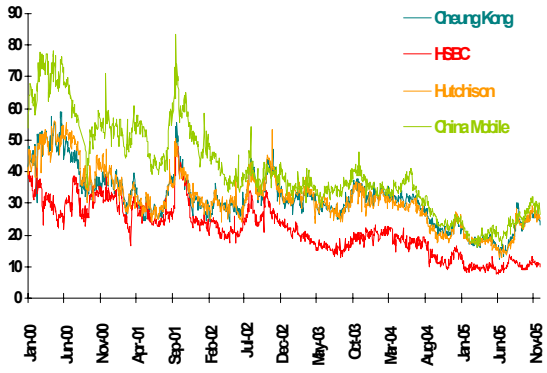
A structured note linked to the same underlying stock has the opposite effect on volatility. These notes, which pay an interest rate above the market rate, have the feature that if the underlying stock falls below a predetermined price, then the holder of the note is paid in stock rather than the currency denomination of the note. Thus, when the price of the underlying stock is rising, the probability that the issuing bank will have to pay out in stock, rather than currency, falls, offsetting the volatility effects of the warrant.

Charts in Box on Volatility

Implied Volatility by Major Market (%)



Implied Volatility of Major HSI Constituents (%)



Whether this favorable constellation of factors will persist is an open question. A key issue is the demand for structured notes in a rising interest rate environment. One attraction of these notes is to enhance returns over "plain vanilla" fixed income products, which was particularly important when yields were at or near historic lows. Now that U.S. dollar and Hong Kong dollar short-term interest rates have risen, the demand for such yield enhancing products may decline. On the other hand, new products may emerge with similar volatility characteristics.

1/ This box is based on Securities and Futures Commission (2005a).