HONG KONG INSTITUTE FOR MONETARY RESEARCH

THE RELATIONSHIP BETWEEN COMSUMPTION, INCOME AND WEALTH IN HONG KONG

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The Relationship between Consumption, Income and Wealth in Hong Kong

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Abstract

This paper sets out to estimate a consumption function for Hong Kong along the lines of the standard Life-Cycle Model formulated by Ando and Modigliani (1963). This is not a straightforward exercise given the lack of official estimates of household sector income and wealth holdings in Hong Kong. The paper reports the results of empirical tests between alternative proxies for aggregate labour income which are derived from official estimates of average pay and employment, and employs a new series developed by the Hong Kong Monetary Authority for private sector housing wealth. We find a stable relationship between consumption, labour income and wealth in Hong Kong with plausible long run estimates of the implied marginal propensity to consume out of income and wealth. In particular, the marginal propensity to consume out of housing wealth is estimated to be lower than in other industrialised economies which is consistent with a relatively uneven distribution of wealth in Hong Kong. Arithmetically, the decline in housing wealth in Hong Kong since 1997 can more than account for the weakness of consumption since then.

1. Introduction

This paper investigates the relationship between consumption, income, and wealth in Hong Kong. This is not a straightforward exercise because of the lack of official estimates of household sector income and wealth holdings. In order to estimate a consumption function, we first of all need to construct proxies for aggregate labour income. In addition, we extend previous empirical work on consumption equations for Hong Kong by employing a more comprehensive measure of household sector wealth. For housing wealth we exploit a new series recently developed by HKMA staff, while for financial wealth we attempt to take account of the value of non-equity as well as equity wealth.

Our aim is to address an important policy issue, concerning the role of declining property prices in explaining the weakness of consumption growth in recent years. Since 1997, average house prices in Hong Kong have fallen by almost 60% (up to 2002 Q2) and, at the same time, consumption has been unduly weak. We do not address the question of whether house prices have now reached some kind of equilibrium or fair value, which is the subject of other research[1], but it is useful to try to quantify the role played by housing wealth in the downturn given the other influences on consumers' spending.

The paper is organised in five parts. Section 2 briefly recaps consumption theory and describes our empirical approach. Section 3 looks at the data issues and describes the proxies used for labour income, housing and financial wealth before going on to examine recent developments in these variables. Section 4 reports our empirical results from estimating a consumption function along the lines of the Life-Cycle Hypothesis — a standard approach in macro models around the World — and draws out the implied marginal propensities to consume out of income and wealth. Section 5 concludes.

2. Theory

A standard approach to modelling consumption assumes that consumers aim to maximise the present value of the sum of utilities of consumption in each future period subject to an intertemporal budget constraint which states that the difference between labour income and consumption is accumulated assets.

Maximise $E_0 \left[\sum_{t=0}^{T} (1+\delta)^{-t} U(C_t) \right]$ subject to:

$$W_{t+1} = (1+R_t)(W_t - YL_t - C_t) \tag{1}$$

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[1] See Peng, W., "What drives property prices in Hong Kong" HKMA Quarterly Bulletin, 2002.

where $U'(.)$ is the derivative of a concave one-period utility function, C_t is consumption, δ is the subjective rate of time preference, W_{t+1} is end-period net housing and financial wealth, YL_t is labour income, and R_t is the real interest rate.

In general, there are two approaches to solving this optimisation problem. The first generates an Euler equation or first order condition for the optimal consumption path of a representative consumer who can borrow and lend at the risk free rate (see equation 2). At the optimum, an individual should be unable to increase her expected lifetime utility by reducing consumption by one unit and increasing her assets, and consuming the extra gross returns the next period:

$$U'(C_{t-1}) = E_{t-1} \{(1+R_t / 1+\delta) \ U'(C_t)\} \tag{2}$$

Under certain assumptions, namely that preferences are quadratic and the real interest rate is constant and equal to the subjective rate of time preference, the growth of aggregate consumption follows a random walk (Hall (1978)):

$$\Delta C_t = \alpha + \varepsilon_t \tag{3}$$

where ε_t is the revision between time t-1 and t in individuals' assessment of their permanent income which should be, under the assumption of rational expectations, orthogonal to any known information at time t-1. Provided that there are no constraints on borrowing, consumers choose their optimal level of consumption on the basis of their expected permanent income — comprising average labour income plus the return on any initial wealth endowment. Revisions to permanent income will, of course, lead to changes in consumption but the central idea of the Hall model is that these should be unpredictable on the basis of any information available when expectations are formed. Empirically, the model predicts that lagged variables will be statistically insignificant in explaining consumption growth.[2]

A second approach is the Life-Cycle Model (LCM) formulated by Ando and Modigliani (1963) where individuals maximise utility from consumption subject to lifetime resources, which comprise current and expected future labour income and financial and housing assets. Gali (1990) shows that it is possible to derive a linear relationship between aggregate consumption, labour income and non-human wealth under the assumption of finite horizons and lifetime saving, identical to that postulated by Ando and Modigliani, along the lines of equation (4):

$$C_t = \alpha_0 + \alpha_1 \ YL_t + rW_t \tag{4}$$

where the structural parameters depend on the aggregate return to wealth, the rate of accumulation of life-cycle savings, and the growth rate of aggregate labour income. In the presence of life-cycle savings, the marginal propensity to consume out of labour income will be less than one.

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[2] Empirical failures of the Euler equation approach are well documented and Hall (1978) himself found that lagged changes in stock prices were statistically significant in explaining consumption growth although he argued that these were too small to be of economic significance.

The joint behaviour of consumption, labour income and non-human wealth is fully characterised by equations (1) and (4) together with an assumed stochastic process for aggregate labour income which many researchers find is well-represented by a unit root process[3]. Gali (1990) shows that, with finite horizons, aggregate consumption and aggregate (stochastic) labour income will share a common trend. Moreover, the presence of life-cycle savings links the trend in non-human wealth to that of labour income. Empirically, these results imply the existence of a cointegrating relationship between aggregate consumption, labour income and wealth. Note that, under the LCM, changes in aggregate consumption should be predictable by lagged labour income, lagged consumption and lagged wealth even though, at the individual level, consumption follows a random walk.[4]

3. Data Issues

Before turning to estimation, it is first of all necessary to address some important data issues. In particular, the lack of published quarterly estimates of household sector income and wealth holdings in Hong Kong poses significant problems in estimating and interpreting the coefficients in a standard consumption function along the lines of equation (4). Existing studies tend to employ GDP as a proxy for household income, and house prices and/or stock prices as a proxy for wealth.[5] These find that consumption, GDP and house prices are cointegrated, and that the restriction that the coefficients on GDP and house prices sum to 1 cannot be rejected. In fact, the coefficient on GDP alone is very close to one, which could reflect the high share of consumption in GDP rather than any meaningful behavioural relationship between consumption and income. The fact that consumption accounts for the lion's share of GDP also limits the usefulness of existing consumption equations for short-term forecasting because of the circularity involved in forecasting GDP in order to forecast consumption. For these reasons, it is worth asking whether better proxies of income can be constructed, which is the subject of the next section.

Estimates of whole economy labour compensation are published on an annual basis in Hong Kong. Conceptually, this is the most comprehensive measure of labour income to use in explaining consumption but because estimates are only available annually there is an issue about how to interpolate these for quarterly estimation. An alternative is to construct simple proxies[6] of aggregate labour income using published quarterly estimates of the number of people employed and average earnings:

Whole Economy Labour Income = Employment * Average Earnings

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[3] Since shocks to labour income will cause consumption and non-human wealth to change, the disturbance term will typically be correlated with current income and wealth.

[4] To see this intuitively, suppose that the growth rate of aggregate labour income is positive. Because households entering the population will be richer than those exiting aggregate labour income will trend upwards over time leading to an associated trend rise in consumption and, through life-cycle savings, non-human wealth.

[5] See Lai, Kitty., "The nexus of consumer credit, household debt service and consumption" HKMA Quarterly Bulletin, 2002.

[6] These are not complete because they do not include transfer payments, e.g. government benefits, or income in kind.

For the number of people employed there is a choice between two series, 'employment' or 'persons engaged'. These measures are based on different surveys, the employment series is based on the General Household Survey (GHS) while estimates of the number of persons engaged come from the Quarterly Survey of Employment and Vacancies. The latter measure has a more narrow coverage and excludes civil servants and the self-employed which together account for about 400,000 workers or 12% of total employment. Employment has grown faster than the number of persons engaged since the middle of the 1990s, possibly reflecting changes in the composition of employment as the economy has slowed, namely a shake-out of employees and an associated increase in the number of self-employed who are included in employment but excluded from the persons engaged series. However, differences in coverage are not the whole story since the number of civil servants and the self-employed are too small in number to explain the difference between the growth rates of employment and the number of persons engaged. There are also likely to be sampling errors affecting one or both measures, consequently, the choice of which measure best explains consumption is treated as an empirical issue.

For average earnings, we use the published data on average monthly payrolls scaled up to derive a quarterly series. Payrolls data relate to persons engaged and are therefore not comprehensive in terms of coverage, and so we test two different proxies of aggregate labour income. These are average payrolls grossed up by total employment, on the assumption that average labour income for civil servants and the self employed is the same as for employed persons, which we label YL1, and average payrolls grossed up by the number of persons engaged, YL2. These two measures are compared with labour compensation data interpolated to a quarterly frequency using the growth profile of our constructed measure, YL1, which we call YL3. These alternative proxies of aggregate labour income are shown in Chart 1.

All of these measures relate to gross labour income reflecting the lack of published quarterly estimates of salary taxes before 1991. However, the distinction between gross and net pay is likely to be less important in Hong Kong than in other industrialised economies because of the low rate of income tax and high tax thresholds which produce a low effective rate of income tax. This is confirmed by regressions which show that the use of gross or net labour income makes little difference to the consumption estimates over the shorter sample period, 1991-2002. Consequently, we ignore taxes and use gross labour income in favour of a longer estimation period going back to the mid 1980s.

For household sector gross housing wealth, we use a new series recently developed by HKMA staff constructed from disaggregated data on the privately-owned housing stock by size and region (Central, Kowloon, and New Territories), as follows:

Gross Housing Assets = Number of Privately-Owned Residential Units *
                Average Price Per Square Foot * Average Size of Property

One measurement issue is that these estimates do not include the value of publicly-built flats which have been bought from the government at a discounted price. This is because the government does not publish data on the transaction prices of these properties (in any case, no attempt is made to cover these in the headline house price series because these sales are not representative of market prices[7]). These subsidised sales accounted for 16% of home ownership in 2001, and have been the main driver in the growth of home ownership in the last 15 years (Chart 2), and so the exclusion will impart a downward bias to HKMA estimates of the level and growth rate of housing wealth.

Looking forward to the discussion later, it is worth noting that this will result in an overstatement of the estimated marginal propensity to consume out of housing wealth, although we think that the effect will be limited for two reasons. First, the average price of publicly-built dwellings is lower than for privately-built dwellings so these properties will account for a smaller share of housing wealth than their share of the housing stock. Second, to the extent that there are government restrictions on the sale of these properties, changes in the value of this wealth may have a smaller effect on individuals' consumption behaviour.

There are no separate official estimates for household sector financial wealth, so we need to proxy this. This is complicated by the lack of a split between the household and corporate sectors for bank deposits and equity holdings, and the inability to distinguish between residents' and foreigners' holdings across the stock of financial assets more generally[8]. Despite these measurement problems, the estimated elasticity on financial wealth may still provide a reasonable guide to the effect of changes in household sector financial wealth on consumption provided that household and corporate shares of financial wealth are reasonably stable over time. In this regard, it is encouraging that household sector holdings of risky financial assets appear to have been reasonably stable over recent years. A survey of retail investors conducted every three years by the Securities and Futures Commission Survey (SFC) shows that around one-fifth of respondents either have traded or plan to trade in shares, and that this has remained broadly the same since 1996 (Table 1). Note also that, in the same survey, less than 1% of individuals report any trading in bonds so we can effectively ignore these financial assets. Thus, we proxy gross financial wealth in our empirical work by notes and coins held by the public plus bank deposits from customers plus the market capitalisation of the Hang Seng index. We net off credit card borrowing and 'loans for other private purposes' to derive net financial wealth.

Recent Developments in Consumption, Income and Wealth

Now that we have some, albeit simple, proxies for household income and wealth, it is worth looking at a few plots of the relationship between consumption, income and wealth before moving on to discuss our estimation results.

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[7]   An exception is made for secondary sales of publicly-built flats sold into the 'open market' where the initial discount needs to be repaid to the government, but these are thought to be small in number.

[8]   There are some balance of payments estimates on the net stock of foreign assets and liabilities but these are annual and only go back to 1997. The inability to distinguish between resident and foreign holdings of the housing stock also affects HKMA estimates of household sector housing wealth, although foreign ownership of property is likely to be less of a distortion than foreign ownership of financial assets.

The growth rate of real consumers' spending in Hong Kong has been exceptionally weak since the mid 1990s, growing at an average annual rate of 1.7% compared with 6.2% historically (Chart 3). This reflects a sequence of negative shocks, namely a fall in asset prices in the mid 1990s; fall-out from the crisis in East Asian economies in 1997 and 1998, which caused consumption growth in Hong Kong to turn sharply negative and, in more recent quarters, the post-2000 collapse in global stock markets. The weakness has been pretty much across the board with durables, non-durables and services all growing below their long term average, though the weakness in durable goods spending — which is usually much more cyclical — has been especially marked. In levels terms, real consumption had only just about returned to its pre-Asian crisis heights by 2002 Q2 (Chart 4).

The cycles in consumption growth have been mirrored by similar fluctuations in real aggregate labour income which declined especially sharply in the wake of the Asian crisis as the growth of average payroll declined, and unemployment rose (Charts 5 and 6). Labour income subsequently recovered, as employment growth rallied, only to weaken again at the start of 2000. In nominal terms, the decline in earnings growth has been more marked post Asian Financial Crisis, reflecting sharp deflation in consumer prices, although interestingly this has only turned negative on two occasions, in 1999 and again at the beginning of 2002.

Wealth and Real Interest Rates

Charts 7 and 8 plot the annual change in real consumption growth against changes in real house and stock prices. Average house prices have been volatile in Hong Kong and especially over the last decade or so. There have been three cyclical swings, in 1991-92, 1993-95, and 1996-97, with real house prices turning negative in the last two downturns. On the face of it, there appears to be a strong correlation between changes in house prices and consumption and this is especially the case for the 1997-98 downturn which was associated with a sharp fall in the level of real consumption. The weakness in house prices has persisted over the last five years with house prices falling by almost 60% between their peak in 1997 and 2002 Q2.

Equity prices have shown a similar pattern of cyclical swings over the 1990s. But these appear to be more volatile than house prices especially over the 1980s, and the less good correlation with consumption over that earlier decade could explain the weak explanatory power of stock prices relative to house prices found in existing consumption studies on Hong Kong (e.g. see Lai (2002)).

The real interest rate, proxied by the 1-month HIBOR rate minus the (actual) annual rate of consumer price inflation, is shown in Chart 9. It declined between the mid 1980s and early 1990s as the inflation rate accelerated from around 3% to 10% between 1985 and 1990, and then stayed high as nominal interest rates declined from over 8% to under 4% between 1990 and 1992. But the most striking observation is the steep run-up in the real interest rate between 1992 and 1998 from -5% to almost 10%. From the mid 1990s onwards, this primarily reflected the deceleration in the annual inflation rate, which turned negative in 1998 and averaged -4% in 1999. The real interest rate peaked at an average annual rate of 9.8% in 2000 and, since then, has fallen as nominal interest rates were reduced from around 6.5% to under 2% in the two years to 2002 Q2, outweighing the effect of a gradual easing in the annual rate of consumer price deflation.

Turning to the levels relationships, Chart 10 plots the ratio of the level of consumption to labour income for our three alternative measures of labour income.[9] The ratio declined following the Asian Financial Crisis in 1997/98 and this is apparent across all three of our measures of labour income suggesting that it is not related to the way in which whole economy labour income is estimated.

There are two types of explanation for the apparent downward drift in the consumption to labour income ratio. The first is that it reflects measurement error. Consumption may be understated and/or labour income is overstated, or both may be true. For this to be a candidate explanation, the error would need to be steadily increasing over the second half of the 1990s which is plausible for a couple of reasons:

- Following the hand-over in 1997 and the increase in cross-border shopping flows, it is possible that spending by Hong Kong residents in the Mainland is less reliably captured by existing consumer surveys, and that the error is increasing as the number of day-trippers increase.[10]

- The economic downturn following the Asian Financial Crisis and post-2000 fall in global stock markets may have led to weaker labour income than recorded by official estimates. Indeed, surprise is often expressed at the fact that real earnings growth has not fallen more sharply given the increase in unemployment (see Chart 6).

Alternatively, there may be good economic reasons for why consumers appear to have reduced their propensity to spend out of labour income.

- First, consumers may have revised downwards their expectations of their life-cycle labour income. Since the Asian Financial Crisis, average real monthly payrolls have grown by 3.9%, compared with growth of 5.4% between 1990 and 1997. To the extent that expectations are formed extrapolatively, this decline in actual income may have caused consumers to lower their expectations about their future income.

- Second, the value of household sector wealth holdings has fallen sharply. The fall in house prices since 1997 has resulted in a sharp fall in housing wealth and this has been reinforced by falls in stock market wealth in more recent years to reduce overall net wealth (see Charts 11 and 12).

- Third, the rise in real interest rates during the 1990s may have caused some individuals to reduce their current consumption in favour of increasing their savings and raising their future spending. This intertemporal substitution of current for future consumption would mainly affect the spending of consumers who are not liquidity constrained.

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[9] The ratio of consumption to aggregate labour income is greater than one because there are other elements of total income which are used to finance consumption, such as investment income and government benefits. By way of comparison, the ratio in Hong Kong (using our constructed measures YL1) was 1.22 (2002 Q2), similar to that for the UK of 1.32 (2001 average).

[10] Consumption includes estimates of Hong Kong residents' spending in the Mainland and excludes Mainland residents' spending in Hong Kong, so there may be an offsetting error in the estimates of the latter. Any errors should not affect GDP since any error in measuring Hong Kong residents' spending in the Mainland should have a counterpart and offsetting error in imports to leave GDP unchanged.

- Fourth, there may be balance sheet effects arising from deflation. Deflation leads to a redistribution of income from borrowers to savers for individuals with assets and liabilities fixed in nominal terms. This may cause aggregate consumption to fall if borrowers have a higher marginal propensity to consume, which is plausible. These redistributional effects may be quite significant given the increase in consumer debt ratios in Hong Kong over the second half of the 1990s.

4. Estimation Results

This section reports the results from estimating a consumption function along the lines of equation (4) where, in the long run, aggregate consumption depends on labour income and wealth. In the short run, consumption can deviate from its desired level reflecting adjustment costs and so we estimate the equation in error correction form along the lines of equation (5):

$$\Delta C_t = \delta_0 - \delta_1 (C_{t-1} - \gamma_1 YL_{t-1} - \gamma_2 W_{t-1}) + \sum_{i=0}^{m} \theta_i \Delta YL_{t-i} + \sum_{j=0}^{n} \tau_j \Delta W_{t-j} + U_t \qquad (5)$$

So far we have assumed that consumption is linear in the levels of the variables so that the coefficients measure the effect on consumption of a unit increase in income and wealth. However, many authors have found that aggregate time series data on consumption, income and wealth are closer to being linear in logs of variables rather than levels. Hence, we use a log specification in which case the estimated coefficients are elasticities, and the implied level responses need to be backed out using the consumption to income, and consumption to wealth, ratios evaluated at their sample means. Where relevant, the variables are measured in real terms using the consumers' expenditure deflator, and seasonally adjusted by the Census X-12 method in Eviews. The sample period is 1985 Q2 – 2000 Q4 reflecting the limited time series data on stock market capitalisation which feeds into net financial wealth, and starts in 1985, and on labour compensation, which is only available up to 2000.

As a preliminary step, we first of all test for the order of integration of the log of aggregate consumption, (private sector) net financial wealth, net housing wealth, and our three alternative measures of labour income. Table 2a reports standard ADF tests for the null hypothesis of a unit root in the variables. It also includes the real and nominal interest rate, the inflation rate, and the unemployment rate which will be used in the analysis of the dynamics. All of the variables appear to be non-stationary or I(1), with the exception of the real interest rate and the log of the unemployment rate. In the case of the real interest rate, it is possible that this is picking up a persistent increase in the real interest rate between 1992 and 1998. In theory, it makes little sense for these to be non-stationary variables and so we proceed on the assumption that these variables are stationary or I(0) variables.

The next step is to test for the existence of a cointegrating relationship between aggregate consumption, labour income and wealth as implied by the LCM (Gali (1990)). We use the multivariate framework to cointegration testing proposed by Johansen to check for the existence of a long run relationship, and allow for an intercept but no trend in the cointegrating vector. Table 2b presents the eigenvalue and trace statistic for each measure of labour income in turn. In all three cases, there appears to be a single cointegrating vector between consumption, income, net housing wealth and (private sector) net financial assets at the 5% level of significance, and, in many cases, at the 1% level too.

Having confirmed the existence of a single cointegrating vector, we estimate the long run relationship and the dynamics using OLS estimation. Although the equation includes non-stationary variables, the existence of a cointegrating relationship between these ensures that the coefficient estimates are asymptotically normal. The same dynamic specification is used for each measure of labour income.

The results are shown in Table 3.[11] All of the coefficients are correctly signed in all three equations and the error correction term is highly significant in two out of the three equations, with a t-statistic of 4.9 in equation (i) and 4.0 in equation (ii), though not in equation (iii). Comparing across the three measures of labour income, the equations based on payrolls data, equations (i) and (ii), perform significantly better than that based on estimates of whole economy labour compensation, equation (iii). The standard error on the equations is lower and many of the coefficients are more precisely determined and are statistically significant. Equation (i), which uses payrolls grossed up by employment to measure labour income (YL1), looks particularly good, and is taken as our preferred model. The implied marginal propensity to consume out of labour income in equation (i) is 0.87[12], that is, at an aggregate level 0.87 cents of every extra dollar of labour income is spent, which is plausible when compared to estimates for other countries, e.g. 0.89 for the UK according to the Bank of England's consumption function[13].

Turning to the wealth coefficients, the long run coefficients on net housing and net financial wealth in equation (i) look plausible when compared to similar estimates for other industrialised economies. This is discussed in greater detail in the next section. They are also similar in magnitude suggesting that it may be total wealth that matters for consumption in the long run, however, given the problems in measuring net financial wealth at the household level, we do not impose this restriction. Housing wealth in these equations is defined net of mortgage debt but it makes little difference to the coefficients if housing wealth is defined gross instead, as we shall see later. Similarly, the estimated long run elasticity on wealth (and labour income) is robust to adding extra lags of the dynamic terms which, in any case, are not significant at the 5% level.

The short-term real interest rate is highly significant and negatively signed in equation (i). This effect is over and above the wealth effects associated with changes in real interest rates, and is interpreted as picking up intertemporal substitution effects. A rise in the real interest rate, which reduces the price of future consumption, causes individuals to substitute current for future consumption.[14] According to

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[11] We use aggregate consumption in all of the regressions presented in this paper, but sensitivity analysis showed that using non-durables consumption instead made little difference to the results.

[12] For computation of the marginal propensity to consume, see footnote (1) to Table 8. Gali (1990) shows that, in the presence of finite horizons and life cycle savings the marginal propensity to consume out of labour income will be less than one. It depends among other things on the age structure of the population and the distribution of income and wealth by age group.

[13] See "Economic models at the Bank of England, September 2000 update".

[14] This is measured by the 1-month HIBOR minus the annual rate of CPI inflation (results are similar using the 3-month and 12-month HIBOR). We note that short-term interest rates may not be the best conceptual measure to use. Others have suggested that expected long-term rates are more appropriate, where price expectations are modelled econometrically. Research by HKMA suggests that such a measure may be less variable than the measures we use — see "Real interest rates in Hong Kong" HKMA Quarterly Bulletin, August 1999. This issue may, however, be overplayed. The choice between short and longer term rates depends on various factors, among them the term structure of consumer debt. In HK, most mortgages are floating rather than fixed rate and so consumption may well be heavily influenced by changes in short-term interest rates.

equation (i), a 100 basis point increase in the real interest rates reduces the level of consumption by 0.39%, which is similar to estimates for other countries e.g. the UK estimate of 0.28%.[15] The response is lower in equations (ii) and (iii), but is not significant at the 10% level in either equation.

The change in the log of the unemployment rate is significant and negatively signed in all three equations, which can be interpreted as picking up precautionary savings motives along the lines suggested by Carroll (1992). A rise in aggregate unemployment raises the probability of job loss at the individual level thereby raising precautionary savings by risk-averse consumers anxious to avoid the disutility associated with a possible sharp fall in their consumption.

Wealth Effects

The marginal propensity to consume out of wealth ($\delta C / \delta W$) can be retrieved by dividing the estimated wealth elasticity $\{(\delta C / C) / (\delta W / W)\}$ in the above equations by the average ratio of wealth to consumption (W/C) over the sample period, using:

$$\frac{(\delta C / C)}{(\delta W / W)} = \frac{\delta C}{\delta W} * \frac{W}{C} = \text{Marginal Propensity to Consume * Wealth to Consumption Ratio}$$

The implied marginal propensity to consume out of wealth will depend on a number of factors, most importantly, the size of wealth holdings and their distribution. Because richer households tend to have a lower marginal propensity to consume than poorer ones, a very uneven distribution of wealth skewed towards richer households is likely to lower the implied marginal propensity to consume, other things equal. In the case where wealth is entered in a disaggregated way, the different marginal propensities to consume will depend on the share of particular assets in the overall wealth holdings of the household sector and their fungibility, with less liquid assets, such as pension fund savings and to a lesser extent housing wealth, expected to have less of an effect on consumption.

Housing Wealth

Table 4 compares the estimated elasticity and implied marginal propensity to consume out of housing wealth in Hong Kong, using equation (i) in Table 3, with other industrialised economies based on the estimates given in Bertaut (2002). The estimated elasticity is lower than in many other industrialised countries. This reflects a relatively low marginal propensity to consume out of housing wealth which is estimated to be 0.03 for Hong Kong compared with 0.10 in the US, and 0.08 in Canada. Nevertheless, a 10% increase in house prices is estimated to raise aggregate consumption by around 1%, similar to the effect in the US, UK and Canada, reflecting the size of housing wealth relative to consumption.

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[15] Op cit, see footnote 13.

The low marginal propensity to consume out of housing wealth in Hong Kong is consistent with an uneven distribution of wealth, skewed towards richer households. Table 5 gives a breakdown of the Hong Kong housing stock by ownership, published by the Census and Statistics Department. Around two-thirds of the publicly and privately-built housing stock is in private ownership, which is low compared with other countries (e.g. in the UK the figure is around 80%), reflecting the importance of the public rented sector in Hong Kong (see also Chart 2). Moreover, according to a separate survey by the Housing Association (which gives a similar estimate for private ownership), the rate of owner-occupation is lower still, at around 50%. The difference between the rate of private ownership and owner-occupation reflects the size of the private rented sector which, according to the figures in Table 5, is around 16%[16]. The low rate of home ownership in Hong Kong relative to other industrialised economies (e.g. 67% for the UK, which is, in turn, lower than in the US) is consistent with relatively high land and property prices which makes it difficult for first-time buyer households to enter the housing market.

Using the above estimates of the marginal propensity to consume out of housing wealth, it is possible to calculate the impact on consumption from the fall in house prices in Hong Kong since 1997. Between their peak in 1997 Q3 and 2002 Q2, average house prices fell by 58% and housing wealth fell by 52%. If sustained, that would reduce the level of annual 2001 consumption by around HKD 66 billion, or just under 9% of annual 2001 consumption. Note that this is similar to the actual fall in the level of annual consumption between 1997 and 2001 of 7.6%.[17]

Financial Wealth

The estimated elasticity of consumption with respect to financial wealth for Hong Kong is shown in Table 6 and compared with other economies. It is similar to that in the UK and France, but lower than for the US and Japan. Recall, that this estimate is based on a measure of financial assets — comprising notes and coins, bank deposits and equities — for the private sector as a whole rather than the household sector separately. In the very long run, such a distinction may not matter since firms are ultimately owned by households. Evaluating the elasticity using the ratio of private sector financial assets to consumption implies a marginal propensity to consume out of net financial wealth of 0.012 which is low compared with other industrialised economies.

An alternative approach is to calibrate a marginal propensity to consume on the assumption that the ratio of household sector financial wealth relative to consumption in Hong Kong is similar to that in other industrialised economies. This varies between 2.5 (Australia) and 5.2 (US) for the group of selected economies shown in table 6, taken from Bertaut (2002). That would imply a marginal propensity to consume of between 0.016 and 0.034, which is similar to that for Canada, France, the UK and the US.

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[16] For completion, note that the survey showed that 2% of households lived in temporary dwellings.

[17] However, it is worth noting that Hong Kong's net external asset position is very positive. In 2001, these were valued at around 162% of GDP for all sectors, and 37% of GDP for the non-bank, private sector. External assets/liabilities are not included in the estimates of household wealth because of the lack of a long time series. However, increases in the value of these assets could help to explain why consumption has not declined by more given the collapse in the value of domestic housing wealth.

There is some limited information on household share ownership in Hong Kong from a 1999 survey by the Securities and Futures Commission, which found that 17% of households owned risky assets, predominantly equities. Assuming that these shares are directly held, this suggest ownership levels close to those in Canada, the UK and the US and higher than in European countries (see Table 7).[18] (The level of stock market capitalisation is, of course, much higher in Hong Kong reflecting Hong Kong's status as an international financial centre and the large number of foreign companies listed on the stock market). Overall then, these estimates could point to a marginal propensity to consume out of financial wealth of between 0.02 (the UK) and 0.04 (Canada and the US).

Robustness

Table 8 below shows the estimated elasticities and implied marginal propensity to consume out of labour income and wealth for various definitions of wealth. Equation 1 updates our preferred equation (i) to 2002 Q2. The elasticities on net housing and net financial wealth are now identical, but the implied marginal propensity to consume out of income and wealth are little changed. If housing wealth is defined gross instead of net of mortgage liabilities, as shown in equation 2, the elasticity rises a little but the implied marginal propensity to consume out of housing wealth is virtually unchanged.

When net financial wealth is dropped from the long run of the equation, the elasticity and implied marginal propensity to consume out of labour income rises markedly, from around 0.70 to close to 1. The elasticity on net housing wealth is, somewhat surprisingly, little changed. Similarly, it is little changed when average house prices rather than the HKMA estimates of net housing wealth are included, as shown in equation 4. This perhaps reflects the flatness of private ownership of the housing stock once public subsidised sales are excluded, as mentioned earlier in the discussion of measurement of housing wealth (see also chart 2). Adding stock prices to this specification has little effect on either the coefficient on labour income and housing wealth (equation 6). However, the coefficient on stock prices is substantially lower than that on net financial wealth and is not significant at the 5% level. Given the reasonable levels of share ownership, the lack of significance may be due to the high volatility of stock prices over the period.

If housing wealth and financial wealth are entered in an aggregate way instead of separately, as in equation 7, the wealth elasticity more than doubles from 0.10 to 0.24 while the coefficient on labour income is little changed from our preferred equation. This could mean that the marginal propensity to consume is higher than suggested by our estimates thus far, though it is worth recalling that the estimate of net financial wealth is defined across the private rather than household sector and so may not be appropriate.

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[18] The survey does not specify whether these equities are directly held or, alternatively, indirectly held through pension and other mutual funds, but it seems likely that respondents would answer with respect to their direct holdings. There is no time series information available about indirect share ownership, although this is believed to be low compared with other industrialised economies because of the undeveloped market in private pensions.

In summary, in the disaggregated wealth equations, the long run coefficient on housing wealth seems robust to whether this is measured by the level of housing wealth or house prices, and whether or not net financial wealth is included. The marginal propensity to consume out of housing wealth varies between around 0.03 and 0.05. If housing wealth is aggregated with private sector financial wealth, the wealth elasticity rises markedly, but we have reservations about these estimates which are based on a level of financial wealth that is certainly too high because it includes corporate sector financial assets.

The coefficient on the level of the real interest rate also appears to be robust to different definitions of wealth, varying within a narrow range of 0.23 to 0.29 (not shown). The elasticity on labour income, on the other hand, appears to be rather sensitive to the way in which household wealth is measured, varying within a wider range of 0.61 to 0.99.

We also estimated our preferred specification across two sub-samples, allowing for ten years worth of data in each sub-sample to ensure sensible estimates of the long run coefficients (Table 9). In the earlier sample period, labour income plays a more important role in explaining consumption than the long run wealth variables. Net financial wealth is not significant in either the long run or dynamics of the equation, and housing wealth is only significant at the 20% level. The long run coefficient on labour income falls markedly in the second sub-sample, giving an implied marginal propensity to consume of 0.63, consistent with our earlier observation of a decline in the consumption to labour income ratio following the Asian Financial Crisis.

5. Conclusions

This paper set out to estimate a consumption function for Hong Kong along the lines of a standard Life-Cycle Model. This is not straightforward given the lack of official quarterly estimates of household sector labour income and wealth holdings. However, using proxies for labour income and housing and financial wealth we can uncover a stable relationship which gives plausible estimates of the long run marginal propensities to consume out of income and wealth.

The marginal to propensity to consume out of labour income is estimated to be 0.87 for Hong Kong, broadly in line with estimates for other industrial countries, e.g. the UK. There is some evidence that it declined during the 1990s, possibly reflecting a sequence of large negative shocks to the Hong Kong economy, which include the Asian crisis in 1997-98 and the global economic downturn starting in 2000.

The implied marginal propensity to consume out of housing wealth is estimated to be 0.03, which is lower than estimates for other industrialised economies but consistent with a relatively uneven distribution of housing wealth in Hong Kong. Nevertheless, because of the sheer size of housing assets in Hong Kong, it is estimated that the 52% drop in housing wealth since 1997 may have reduced consumption by up to HKD 66 billion, or just under 9% of annual 2001 consumption. The actual fall in consumption between 1997 and 2001 was 7.6%.

For financial wealth, the implied marginal propensity to consume is estimated to lie between 0.02 and 0.04, similar to estimates for Canada, the UK and the US. These estimates are partly calibrated due to data limitations on households' holdings of financial assets in Hong Kong, and are perhaps less soundly based than the estimates relating to housing wealth.

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Table 1. Securities and Futures Commission Survey of Retail Investors

% of individuals trading stocks and other risky assets (shown in brackets) [1]

	1996	1999	2001
% of individuals trading in last 3 years	20%	18% (2%)	23% (3%)
% of individuals trading in last 12 months	N/A	12% (2%)	18% (3%)
% of individuals planning to trade	16%[2]	15% (4%)[3]	16% (3%)[2]

[1] Includes derivatives, funds, leveraged forex contracts & bonds; [2] Next six months; [3] Next twelve months.

Source: Securities and Futures Commission Survey of retail investors 1996, 1999 and 2001.

Table 2a. Unit Root Tests

Augmented Dickey-Fuller Unit Root Test

All variables in logs, except for unemployment and interest rates, seasonally adjusted, and in real terms (unless stated otherwise) by deflating by consumers' expenditure deflator

Variable	Level	Log change
Consumers' spending	-2.38 ^{c}	-3.69 ^{c} ***
Labour income (LY1)	-2.38 ^{c}	-5.20 ^{c,t} ***
Labour income (LY2)	-2.07 ^{c}	-4.42 ^{c,t} ***
Labour income (LY3)	-2.15 ^{c,t}	-9.66 ^{c} ***
Short real interest rate	-1.06	-5.28 ***
(1 month HIBOR minus annual CPI inflation)		
Net housing wealth	-1.06	-4.70 ***
Net financial wealth	3.29	-4.79 ^{c} **
Unemployment rate	-1.53 ^{c,t}	-4.40 ^{c,t} ***

MacKinnon critical values for unit root tests. *** and ** and *denote significant at 1% and 5% and 10% level.

All variables are expressed in real terms using the consumers' expenditure deflator and are in logs (except for real interest rate) and, where relevant, seasonally adjusted using Eviews Census X-12 method. Sample period is 1982-2002. The lag length was chosen on the basis of the AIC, and the unit root tests include a constant and time trend where appropriate.

Table 2b. Johansen Cointegration Rank Test

Variables: Consumption, labour income, net financial wealth and net housing wealth (all variables in
real terms and in logs)

Trend assumption: Linear deterministic trend

Lags interval (in first differences): 1 to 2

Using LY1		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.414424	61.06014	47.21	54.46
At most 1	0.266420	28.41548	29.68	35.65

Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.414424	32.64467	27.07	32.24
At most 1	0.266420	18.89893	20.97	25.52

Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Using LY2		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.445700	55.58410	47.21	54.46
At most 1	0.200944	19.59111	29.68	35.65

Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.445700	35.99299	27.07	32.24
At most 1	0.200944	13.68378	20.97	25.52

Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Using LY3		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.423333	52.29991	47.21	54.46
At most 1	0.198049	18.72003	29.68	35.65

Trace test indicates 1 cointegrating equation(s) at the 5% level

Trace test indicates no cointegration at the 1% level

Hypothesized		Max-Eigen	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None **	0.423333	33.57988	27.07	32.24
At most 1	0.198049	13.46318	20.97	25.52

Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels

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Table 3. Dynamic Equations

Dependent variable: Quarterly change in log of real consumption
Sample period: 1985Q2 – 2000Q4

	Equation (i) using payrolls * employment (LY1)		Equation (ii) using payrolls * person engaged (LY2)		Equation (iii) using total compensation to employees (LY3)	
Constant	1.65	(4.5)	1.13	(3.39)	0.61	(1.8)
Log change in labour income	0.29	(2.8)	0.15	(1.59)	0.11	(1.0)
Log change in net housing wealth	0.07	(2.6)	0.08	(2.53)	0.09	(2.8)
Log change in net financial wealth	0.05	(2.7)	0.05	(2.3)	0.06	(2.7)
Log change in unemployment rate	-0.26	(-2.5)	-0.03	(-2.8)	-0.03	(-2.2)
Log consumption (-1)	-0.55	(-4.9)	-0.36	(-4.0)	-0.22	(-2.5)
Log labour income (-1)	0.32	(4.2)	0.20	(3.4)	0.08	(1.3)
Log of net housing wealth (-1)	0.039	(2.6)	0.033	(2.1)	0.024	(1.3)
Log of net financial wealth (-1)	0.047	(2.3)	0.032	(1.5)	0.048	(2.1)
Real interest rate (-1)	-0.39	(-4.1)	-0.09	(-1.5)	-0.08	(-1.2)
Long run elasticities[1]:						
Labour income	0.58		0.55		0.36	
Housing wealth	0.07		0.09		0.11	
Financial wealth	0.08		0.09		0.22	
Sum of coefficients	0.73		0.73		0.69	
Wald test of equality of wealth coefficients; F-stat (1,53)	0.74		0.96		0.35	
Diagnostics:						
R-squared	0.68		0.64		0.57	
S. E. Regression (x100)	1.20		1.30		1.40	
Breusch-Godfrey LM(4), F-stat	0.80		0.51		0.48	
ARCH LM(4), F-stat	0.89		0.52		0.85	
Normality	0.39		0.63		0.67	
Ramsey reset test, F-stat	0.78		0.69		0.58	

[1]   The long run elasticities are given by the coefficient on labour income and wealth divided by the coefficient on the error correction term.

[2]   All variables are in real terms, in logs (except for real interest rate and unemployment rate) and are seasonally adjusted using eviews Census X-12 method.

Table 4. Consumption Response to a Permanent 10% Increase in House Prices

Sample period	Hong Kong (Equation 1 in Table 3) 1985-2000	US 1960-2000	UK 1970-2000	Canada 1976-2000	Australia 1981-1999
Long run wealth elasticity [1]	0.072	0.136	0.092	0.407	0.219
Long run MPC out of wealth [1], [2]	0.03	0.10	0.04	0.08	0.05
Housing wealth to consumption (1998)	2.9 [3.7]	1.0	2.7	1.3	3.2
Estimated % increase in consumption from permanent 10% increase in house prices	0.9 [1.1]	1.0	1.1	1.1	1.6

[1] For Hong Kong, the US and the UK, the estimated elasticity is based on housing wealth, while for Canada and Australia, it is based on aggregate - housing and financial - wealth.

[2] Evaluated at average wealth to consumption ratio across whole sample period for Hong Kong; and the period 1995-99 for other countries. Note, the estimated marginal propensity to consume for Hong Kong would be smaller, at 0.02, if evaluated at 1995-99 average in line with other country estimates.

Source: Estimates for Hong Kong are based on equation (i) in table 3 and from Bertaut (2002) for other countries.

Table 5: Ownership of Residential Dwellings

	C&SD estimates % of stock 2001	% of stock 1999	Housing Association estimates % of stock 1999	% of households owner-occupier 1999
Total private ownership	67.2	65.3	64.5	
of which:				
privately built dwellings	51.2	50.8	51.7	
publicly built dwellings (subsidised sales)	16.0	14.5	12.8	
Public rented dwellings	32.8	34.7	32.5	
Other (temporary dwellings)			2.0	
Total	100	100	100	48.9

Source: Census and Statistics Department; "Survey of Housing Aspirations of Households" conducted by the Housing Association (1999).

Table 6. Consumption Response to a Permanent 10% Increase in Financial Wealth

	Hong Kong (Equation 1 in Table 3) 1985-2000	US 1960-2000	UK 1970-2000	Canada 1976-2000	Australia 1981-1999	Japan 1976-2000	France 1981-1999
Long run financial wealth elasticity	0.085	0.230	0.088	0.139	0.219	0.285	0.101
Long run MPC out of financial wealth [1]	–	0.04	0.02 [2]	0.04	0.09	0.06	0.03
Financial wealth to consumption (1998)	–	5.2	4.8	3.8	2.5	4.6	3.4
% increase in consumption from 10% increase in financial wealth	–	2.1	1.0	1.5	2.3	2.8	1.0
Equity wealth to consumption (1998)	–	2.0	2.0	1.2	1.1	0.8	0.5
% increase in consumption from 10% increase in equity prices	–	0.8	0.4	0.5	1.0	0.5	0.2

[1] The wealth variables in the regressions are defined as follows: financial and non-financial wealth for Hong Kong, the US and the UK; equity and non-equity wealth for Canada; financial wealth only for Japan and France; and aggregate — housing and financial - wealth for Australia.

[2] The consumption function in the Bank Of England's main macro model has a similar elasticity of 0.11 giving an implied marginal propensity to consume of 0.023.

Source: Estimates for Hong Kong are based on equation (i) in table 3, and are from Bertaut (2002) for other countries.

Table 7. Indicators of Household Sector Equity Wealth Holdings

	% of households directly owning equities	% of households owning equities including pension and mutual funds	Stock market Capitalisation to GDP
Hong Kong	17% [1]		309
1999 Securities and Futures Survey of retail investors			
US	19%	49%	130
1998 Survey of Consumer Finances			
UK	24%	27%	153
1995 Family Expenditure Survey			
Canada	21%	37%	90
1996 Family Expenditure Survey			
France	9%	13%	89
Paris Bourse (1997)			
Germany	5%	10%	59
1996 soll und Haben Marketing Survey			
Italy	7%	13%	48
1995 Survey of Household Income and Wealth			

[1] % of private investors holding risky investment products — the majority of which are Hong Kong stocks as suggested by trading information: of the 20% of households who said they had traded in risky assets in past 3 years, 18% involved HK stocks.

Source: 1999 SFC Survey for Hong Kong and Bertaut (2002) for other countries

Table 8. Sensitivity of Income and Wealth Coefficients

Sample period 1985 Q2 — 2002 Q2

Eq	Long run variables	Estimated elasticity	Implied marginal propensity to consume[1]	Adjusted R^2 of equation
1.	Labour income	0.482**	0.719	0.60
	Net housing wealth	0.102**	0.039	
	Net financial wealth	0.102**		
2.	Labour income	0.450**	0.672	0.60
	Gross housing wealth	0.125**	0.040	
	Net financial wealth	0.090**		
3.	Labour income	0.645**	0.963	0.57
	Net housing wealth only	0.106**	0.040	
4.	Labour income	0.664**	0.991	0.56
	House prices only	0.144**	0.046	
5.	Labour income	0.613**	0.915	0.56
	Net housing wealth	0.096**	0.037	
	Stock prices	0.032		
6.	Labour income	0.630**	0.940	0.57
	House prices	0.132**	0.042	
	Stock prices	0.032		
7.	Labour income	0.410**	0.612	0.55
	Aggregate net housing and financial wealth	0.241**		
	Net housing wealth		0.092	
	Net financial wealth			

** Significant at 5% level

[1] To calculate the implied marginal propensity to consume, the ratio of labour income to consumption is 0.67; the ratio of net housing wealth to annual consumption is 2.63 and, for gross housing wealth, is 3.15 calculated over the sample period.

Table 9. Sub-sample Stability

Dependent variable: Quarterly change in log of real consumption					
	1985 Q2-1995 Q2		**1992 Q2-2002 Q2**		**1985 Q2-2002 Q2**
Constant	1.26	(2.4)	2.40	(3.8)	1.78	(4.8)
Log change in labour income	0.30	(2.6)	0.45	(2.0)	0.29	(2.7)
Log change in net housing wealth	0.07	(1.7)	0.04	(0.9)	0.07	(2.7)
Log change in net financial wealth	0.02	(0.6)	0.07	(2.3)	0.06	(3.0)
Log change in unemployment rate	-0.03	(-2.4)	-0.03	(-2.0)	-0.03	(-2.6)
Log consumption (-1)	-0.59	(-4.2)	-0.58	(-3.8)	-0.53	(-4.8)
Log labour income (-1)	0.44	(4.2)	0.24	(2.7)	0.26	(3.9)
Log of net housing wealth (-1)	0.032	(1.4)	0.056	(2.9)	0.054	(3.7)
Log of net financial wealth (-1)	0.017	(0.6)	0.062	(2.4)	0.054	(2.6)
Real interest rate (-1)	-0.37	(-2.4)	-0.22	(-1.9)	-0.29	(-3.7)
Long run coefficients:					
Labour income	0.75		0.41		0.48
Housing wealth	0.05		0.10		0.10
Financial wealth	0.03		0.11		0.10
Sum of coefficients	0.83		0.62		0.68
Diagnostics:					
R-squared	0.60		0.75		0.65
S. E. Regression (x100)	1.20		1.10		1.20
Breusch-Godfrey LM(4), F-stat	0.61		0.55		0.73
ARCH LM(4), F-stat	0.55		0.47		0.80
Normality	0.92		0.32		0.42
Ramsey reset test, F-stat	0.04		0.65		0.74

Chart 1

Alternative Estimates of Total Real Labour Income

HKD bns

— Payrolls (employment)   — Payrolls (persons engaged)

— Compensation (employment)
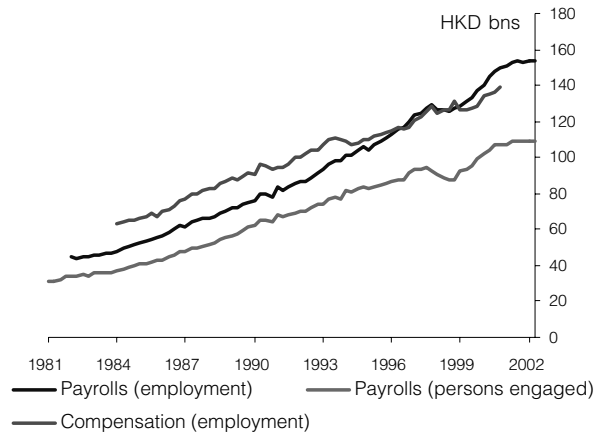
Chart 2

Private Ownership of Residential Stock

% residential stock

— Private and subsidised sales — Private
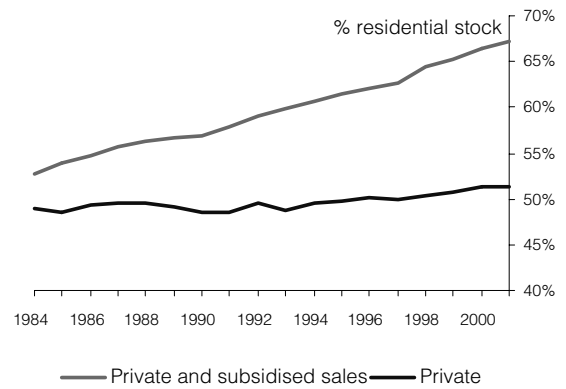
Chart 3

Consumption Growth

% change on year earlier
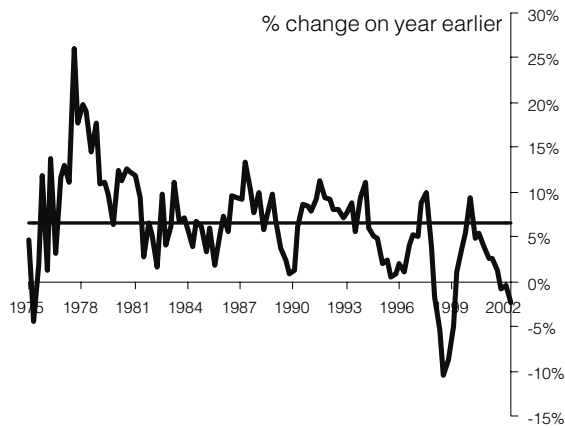
Chart 4

Consumption Level

HK$ bns
Seas. Adj
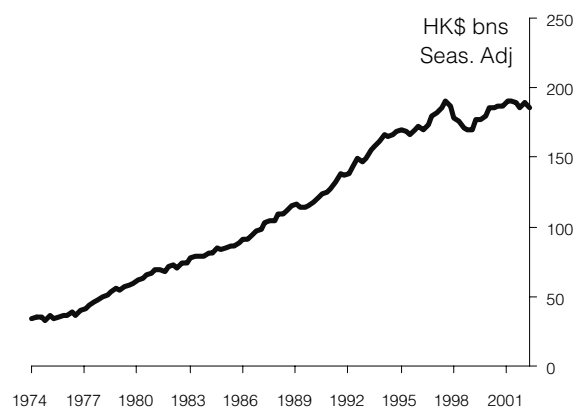
Chart 5

Average Monthly Payrolls

% change on year earlier

— Real — Nominal
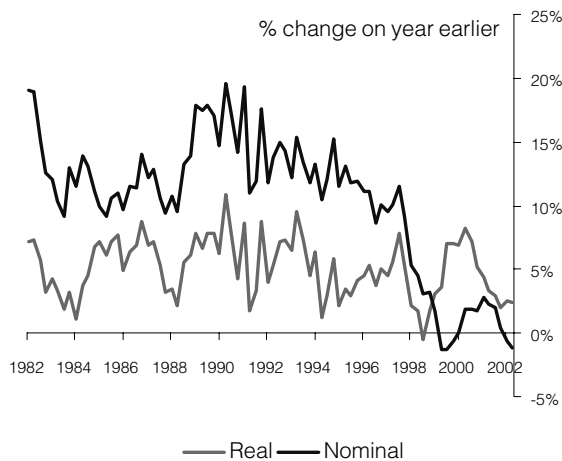
Chart 6

Earnings Growth and Unemployment

YOY growth   Rate (s.a.)

— Average monthly payrolls, deflated (lhs)
— Unemployment rate (rhs)
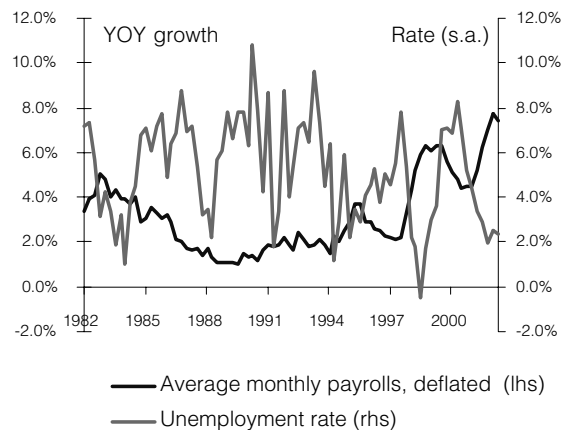
Chart 7

Consumption and House Prices

% change on year earlier

— House prices (rhs) — Consumption (lhs)
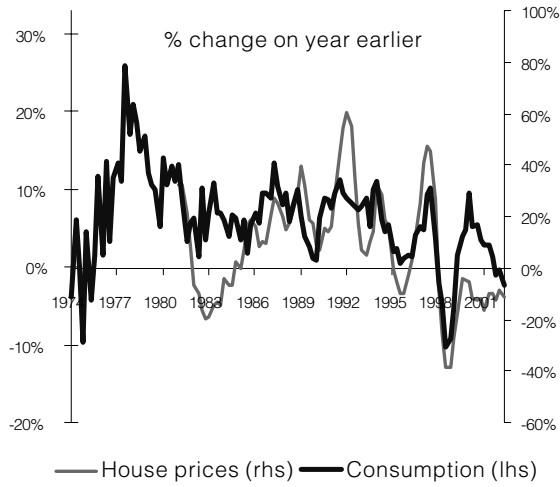
Chart 8

Consumption and Stock Prices

% change on year earlier

— Stock prices (rhs) — Consumption (lhs)
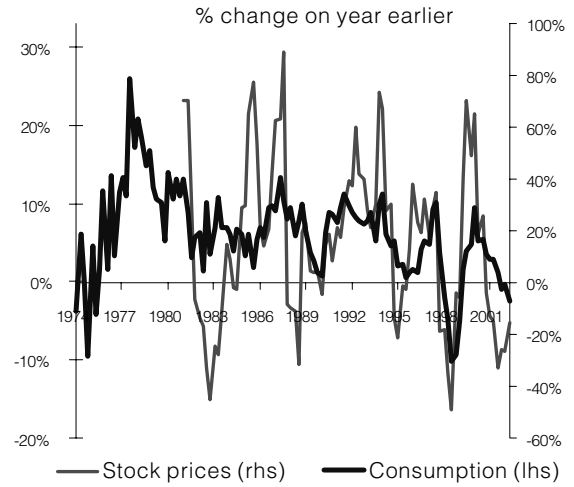
Chart 9

Consumption and Real Interest Rate

— Real interest rate (level, rhs)

— Consumption growth (lhs)
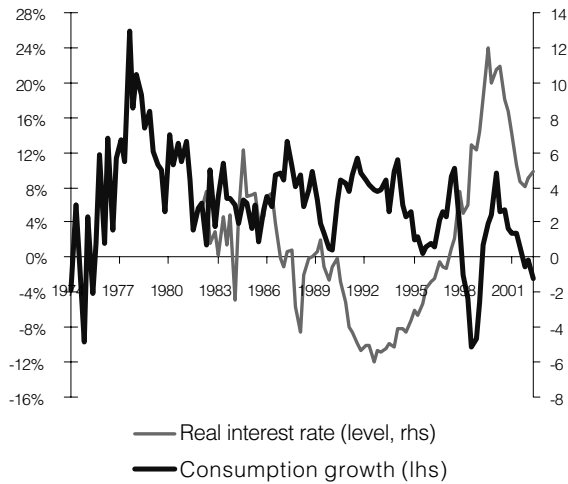
Chart 10 (See footnote 9 also)

Consumption to Labour Income Ratio

— Payrolls (employment)   — Payrolls (persons engaged)

— Compensation (employment)
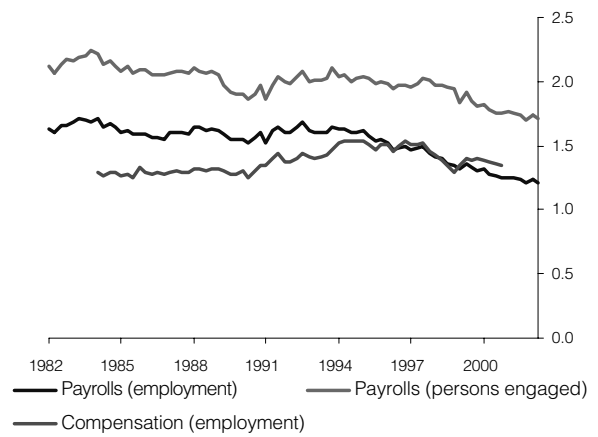
Chart 11

**Housing Wealth to Annual Labour
Income Ratio**

Level

— Gross housing wealth — Net housing wealth
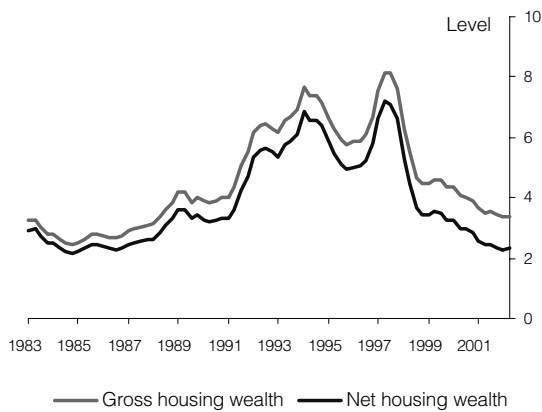
Chart 12

Wealth to Labour Income Ratios

Log level

— Net financial wealth (private sector)

— Net housing wealth

— Total net wealth
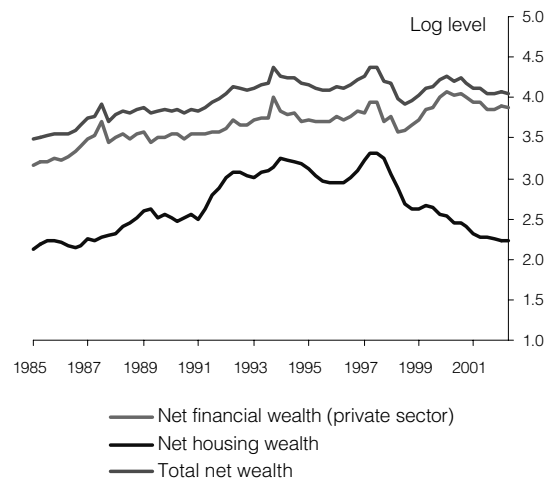
Appendix

Data Definitions

Consumers' spending	Private consumption expenditure at constant 2000 prices (Census and Statistics Department)
Real labour income (YL1)	Nominal average payroll per person engaged (HKD) multiplied by employment (General Household Survey) deflated by consumers' expenditure deflator
Real labour income (YL2)	Nominal average payroll per person engaged (HKD) multiplied by number of persons engaged (Census and Statistics Department) deflated by consumers' expenditure deflator
Real labour income (YL3)	Compensation of employees (HKD, Census and Statistics Department)
Short real interest rate	1 month HIBOR minus annual Consumer Price Index inflation
Net housing wealth	HKMA estimates of gross private housing wealth less loans to purchase subsidised flats and other residential properties (Hong Kong Monetary Authority)
Net financial wealth	Notes and coins held by non-banks plus deposits from customers and total stock market capitalisation less loans for credit card advances and for other private purposes (Hong Kong Monetary Authority)
Unemployment rate	Unemployment rate (%, Census and Statistics Department)