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# MODELING ECONOMIC GROWTH IN CONTEMPORARY HONG KONG

# Modeling Economic Growth in Contemporary Hong Kong

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# Modeling Economic Growth in Contemporary Hong Kong

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# Introduction

Through vigorous theoretical and empirical analyses, this book reviews and provides new insights on Hong Kong's major economic growth and development issues in housing, monetary and financial systems, immigration, and health care. Specific issues were investigated not only from Hong Kong's socio-economic perspectives but also from the perspective of the increasingly integrated Chinese Mainland and Hong Kong economies. This book provides a coherent view of Hong Kong's economic growth and development issues by addressing the above unique and yet interrelated topics.

Housing is the largest component of household investment in Hong Kong. Chapter 1 investigates the financial market and housing wealth effects on consumption in a sample of developed and developing economies including China and Hong Kong. Housing performs the dual functions as both a commodity providing a flow of housing services and an investment providing a flow of capital income. Using the permanent income hypothesis as a framework, the authors empirically show that a rise in housing price has both a positive wealth effect and a negative price effect on consumption.

Chapter 2 extends the analysis from Chapter 1 by examining the existence of absolute and conditional convergence in house prices among cities in China. The authors found strong evidence for conditional convergence. The findings suggest that each city possesses its own steady-state housing price to which it is converging, which depends on the city's own socio-economic characteristics. Their findings inform the kinds of interventions and resources that are most likely to be effective in reducing income disparity.

In Chapter 3, the author provides a time-series analysis on the substitution effect of Renminbi on Hong Kong dollar. Her argument is that the development of an offshore RMB market in Hong Kong will lead to a substitution of RMB for Hong Kong dollar in the long term. Factors considered include the RMB-HKD-USD exchange rates, interest rate differentials, and trade and investment flows. Her findings have implications on the role of Hong Kong in promoting RMB internationalization.

Population growth has long been a major determinant of sustainable economic growth and is particularly important to an aging economy like the one in Hong Kong. The author of Chapter 4 conducted a thorough economic analysis on the immigration of Mainland Chinese into Hong Kong. The analysis was conducted in terms of human capital and wealth transfer that interact with Hong Kong's economic growth. A major finding is that immigrants' and natives' returns to

schooling and work experience are interdependent on GDP growth, which provides practical implications for Hong Kong's immigration policies.

Public health care is known as a key element in long-term economic development. Finally, Chapter 5 provides a study on the long-term determinants of public and private healthcare expenditures in Hong Kong. The authors found that age distribution of the population rather than income is a major determinant of both public and private healthcare expenditures in Hong Kong. Moreover, a large part of the recent rise in private healthcare spending went to private health insurance, reflecting a maturing social attitude toward long-term healthcare planning.

Chapter 1

# The Wealth Effects of Housing and Stock Markets on Consumption: Evidence across Nations Including China and Hong Kong

*Michael K. Fung and Arnold C. S. Cheng*

## Abstract

Using a sample of developed and developing nations (including China and Hong Kong), this study examines the financial market and housing wealth effects on consumption. Housing performs the dual functions as both a commodity providing a flow of housing services and an investment providing a flow of capital income. With an empirical framework based on the permanent income hypothesis, this study's findings suggest that a rise in housing price has both a positive wealth effect and a negative price effect on consumption. While the positive wealth effect is caused by an increase in capital income from housing investment, the negative price effect is caused by an increase in the cost of consuming housing services. Moreover, the sensitivity of consumption to unanticipated changes in housing price is related to the level of financial and institutional development.

*Keywords*: Wealth effect; housing market; stock market; consumption; growth; Hong Kong; China

*JEL Classifications*: E2; O4; R3

## Introduction

Accounts for about 50%–70% of GDP in most economies, consumption has long been a crucial element in macroeconomic studies. Until recently, sparse empirical works have been conducted on the role of assets and asset prices in shaping the pattern of consumption. Households typically hold a portfolio of assets consisting of both liquid and illiquid assets. Different types of assets have different degree of liquidity. For instance, pension funds, life insurance funds, and housing

are relatively illiquid assets, while stocks and bonds are more liquid ones. As Muellbauer and Lattimore (1995) pointed out, marginal propensities to spend are usually smaller for illiquid assets than for liquid assets because the degree of liquidity of an asset affects the asset's spendability. This study therefore investigates not only the stock and housing markets wealth effects on consumption but also the possible relationship between financial liberalization and the spendability of stock and housing assets.

Housing plays a special role in the class of illiquid assets. In particular, housing has spending consequence which differs from financial assets because housing services enter households' utility function. An increase in housing price not only increases the wealth of the owners but also increases the cost of consuming housing services. That is to say, the positive wealth effect could be partly offset by a negative price effect. Deaton and Muelbauer (1980) formulated this idea analytically and found that the importance of wealth effect declines with the proportion of people who are not owner-occupiers. Moreover, increases in housing price tend to redistribute wealth from young households to older households because the former has typically accumulated less housing wealth. Previous empirical studies, for example, Murata (1994), Lattimore (1993), Muellbauer and Murphy (1994) support this dual nature of housing prices.

Using Hong Kong data, Cheng and Fung (2008) find that a rise in housing price has both a positive wealth effect and a negative price effect on consumption. While the positive wealth effect is caused by an increase in capital income, the negative price effect is caused by an increase in the cost of housing services. With reference to a sample of developed and developing nations including Hong Kong and China, this study investigates the dynamic relationship between consumption, income, housing prices, capital income, and interest rate.

## Empirical Framework

The permanent income hypothesis (PIH) has become one of the most important topics in mainstream macroeconomics since the seminal papers by Friedman (1956) and Muth (1960). A large body of research has been conducted to test for the restrictions implied by Hall's (1978) formulation of rational-expectation permanent income hypothesis (REPIH). Hall's derivation gives rise to the following type of stochastic Euler equation:

$$c_{t+1} = c_t + \varepsilon_{t+1} \tag{1.1}$$

Where Equation (1.1) implies that the observed consumption ($c_t$) follows a random walk. That is to say, lagged information (e.g., lagged income) should give no explanatory power with respect to current changes in consumption because consumption changes only in response to news on permanent income. This is the orthogonality condition on the disturbance term imposed by rational expectation. A typical way to test for the orthogonality condition is to augment Hall's Euler Equation (1.1) with lagged variables and test for their significance. For instance, Flavin (1981) used the following two-equation simultaneous system.

$$\Delta c_t = \gamma + \beta_1 \Delta \widehat{y}_t + \beta_2 \Delta \widehat{y}_{t-1} + \theta \varepsilon_t + u_t \tag{1.2}$$

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \varepsilon_t \tag{1.3}$$

where Equations (1.2) and (1.3) are the consumption and income equations, respectively. The error term $u_t$ in Equation (1.2) captures the measurement error in consumption change as well as the effects of information about permanent income that the consumer may have but not captured by the autoregressive specification of income. $\theta \varepsilon_t$ in Equation (1.2) is the warranted change in consumption because of income innovations (i.e., unpredictable income shocks). $\beta_1$ and $\beta_2$ are the excess sensitivity parameters that are supposed to be zero under the PIH.

Flavin (1981)'s framework provides a basis for other empirical studies on REPIH. However, a large number of past studies obtained empirical results inconsistent with the orthogonality condition of REPIH. For instance, Hall (1978), Flavin (1981), Muellbauer (1983), Nelson (1987), Campbell and Deaton (1989), Deaton (1992), Kim (1996), Alessie and Lusardi (1997), Falk and Lee (1998), Seater (1998), DeJuan and Seater (1999), and Baxter and Jermann (1999) found that consumption is excessively sensitive to current income changes after accounting for permanent income changes, which is the so-called "excess sensitivity" of consumption. Another line of research, first considered by Deaton (1987), argued that if labor income is a difference stationary process, the observed consumption is far less volatile than the theory predicts. This is the so-called "excess smoothness" of consumption.

Despite the mixed empirical findings from past research, PIH has been taken as axiomatic in many macroeconomic investigations because of its theoretical appeal. This also has motivated some to explore alternative explanations for PIH so as to reconcile the empirical inconsistency between the theory and data. For instance, the roles of durable goods, liquidity constraints, and interest rates in PIH have been considered (see Deaton (1992) for a survey of these articles).

Under the PIH, household consumption is determined by permanent income that is the present value of the future stream of disposable income. Disposable income includes labor income and capital income. This study investigates the housing and stock markets wealth effects on consumption because fluctuations in these two markets accounted for a dominant part of unanticipated changes in household wealth. This study decomposes the anticipated and unanticipated components of wealth innovations based on Flavin's (1981) framework and estimates their effects on consumption with a sample of developed and developing countries. Two sources of growth in wealth are considered, namely, labor income growth and capital income growth. The latter is further decomposed into housing market growth and stock market growth, which are measured by the housing market index ($H_t$) and stock market index ($S_t$), respectively. As a source of capital income, the wealth effects created by $H_t$ and $S_t$ on consumption are expected to be similar in magnitude. However, if (either anticipated or unanticipated) changes in real housing price are fully capitalized by $H_t$, a rise in $H_t$ will generate a negative price effect in addition to a positive wealth effect on consumption. While the

positive wealth effect is caused by an increase in capital income, the negative price effect is caused by an increase in the cost of housing services. As a result, the wealth effect of $H_t$ will be partly offset by the price effect and thus, other things being constant, a rise in $H_t$ will has a smaller "net wealth effect" on consumption *vis-à-vis* a rise in $S_t$. This difference in wealth effect between the housing and stock markets provides a basis for estimating the magnitude of the housing market price effect on consumption. Specifically, the following system of equations is used as an empirical framework for this study:

$$\Delta C_t = \gamma_0 + \beta_Y \Delta \widehat{Y}_t + \beta_H \Delta \widehat{H}_t + \beta_S \Delta \widehat{S}_t + \beta_R \Delta \widehat{R}_t +$$
$$\phi_Y \widehat{\varepsilon}_{Y_t} + \phi_H \widehat{\varepsilon}_{H_t} + \phi_S \widehat{\varepsilon}_{S_t} + \phi_R \widehat{\varepsilon}_{R_t} + \mu_t \qquad (1.4)$$

where (4) is the growth equation of consumption. While $\Delta \widehat{Y}_t$, $\Delta \widehat{H}_t$, $\Delta \widehat{S}_t$, and $\Delta \widehat{R}_t$ are anticipated changes, $\widehat{\varepsilon}_{Yt}$, $\widehat{\varepsilon}_{Ht}$, $\widehat{\varepsilon}_{St}$, and $\widehat{\varepsilon}_{Rt}$ are unanticipated shocks in $Y_t$, $H_t$, $S_t$, and $R_t$. Note that $Y_t$, $H_t$, and $S_t$ are log-transformed.

In Equation (1.4), the $\beta$-coefficients measure the response of consumption to anticipated changes in income, housing prices, stock prices, and interest rate, which are also the excess sensitivity parameters according to Flavin's (1981) framework. The orthogonality condition imposed by rational expectation implies that the values of $\beta'$s are all zero. The $\phi$-coefficients in Equation (1.4) measure the response of consumption to unanticipated innovations in income, housing prices, stock prices, and interest rate, respectively. The signs of $(\beta_Y + \phi_Y)$, $(\beta_s + \phi_s)$, and $(\beta_H + \phi_H)$ are expected to be positive because of the positive wealth and income effects on consumption. The sign of $(\beta_R + \phi_R)$ is expected to be negative because interest rate indicates the cost of borrowing. Countries with a larger degree of financial deregulation are expected to have larger values of $(\beta_s + \phi_s)$ and $(\beta_H + \phi_H)$ because of the larger spendability of their stock and housing market assets. In addition, $(\beta_H + \phi_H) < (\beta_s + \phi_s)$, if the wealth effect of an increase in housing price is partly offset by the price effect associated with the higher cost of housing services. A change in housing prices is expected to have a smaller effect than a change in stock prices on consumption if the price effect is negative.

## Data

Data on housing market indices of a sample of developed and developing nations (including Hong Kong and China) were taken from official statistics published by their respective governments. Data on stock market indices were taken from the IMF Financial Statistics. Data on interest rates, consumptions, and incomes were taken from the database of World Development Indicators. The unbalanced panel data set runs from 1984–2004 before the structural change possibly caused by the 2008 Global Financial Crisis. A list of the nations included in the sample and the sample means of major variables are given in Table 1.1. As seen in Table 1.1, majority of the sample nations experienced positive growth in their housing markets, stock markets, incomes, and consumptions in the sample period.

Table 1.1. Countries in the Sample.

| Country | Consumption Growth (%) | Housing Price Growth (%) | Stock Price Growth (%) | Income Growth (%) |
|---|---|---|---|---|
| Argentina | −5.03 | 1.82 | −6.81 | −4.87 |
| Australia | 3.63 | 4.51 | 5.15 | 3.28 |
| Canada | 2.36 | 2.59 | −1.50 | 2.53 |
| China | 7.09 | 0.23 | −3.63 | 9.38 |
| Hong Kong | 4.35 | −0.43 | 17.96 | 4.81 |
| Egypt | 2.43 | 5.25 | 49.17 | 4.20 |
| Finland | 2.81 | 1.03 | −9.79 | 2.75 |
| Germany | 1.44 | 3.12 | 5.70 | 1.46 |
| Ireland | 5.89 | 1.50 | 11.82 | 7.67 |
| Japan | 1.43 | 0.71 | −1.54 | 1.22 |
| Republic of Korea | 5.81 | 4.46 | 15.18 | 6.77 |
| Mauritius | 5.41 | 0.96 | 12.48 | 5.34 |
| Netherlands | 2.39 | 1.49 | 6.92 | 2.28 |
| New Zealand | 5.07 | 6.13 | 19.25 | 4.00 |
| Norway | 2.88 | 4.25 | 16.75 | 2.96 |
| Philippines | 3.97 | 0.06 | −3.89 | 3.95 |
| Singapore | 3.69 | −0.36 | −0.25 | 2.94 |
| South Africa | 5.21 | −0.99 | 4.75 | 3.26 |
| Spain | 3.41 | 0.92 | 16.48 | 3.20 |
| Sweden | 1.61 | 4.50 | 12.57 | 2.16 |
| Thailand | 5.00 | 0.62 | 11.98 | 5.09 |
| Trinidad and Tobago | −5.73 | −3.23 | 38.43 | 9.69 |
| United Kingdom | 2.50 | 2.60 | 7.05 | 2.29 |
| United States | 3.18 | 3.07 | 11.29 | 3.17 |

## Results

Equation (1.4) was estimated by ordinary least square. Country-dummies were included to take care of the fixed effect. The equation was estimated in three specifications: Model 1 is the basic model; Models 2 and 3 allow changes in housing and stock prices to interact with country-specific characteristics. The results are reported in Table 1.2.

Table 1.2. Results.

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| $\Delta \widehat{Y}_t$ | $-0.008(-0.139)$ | $0.064(1.083)$ | $0.019(0.311)$ |
| $\Delta \widehat{R}_t$ | $-0.001(-1.337)$ | $-0.000(-0.786)$ | $-0.001(-1.504)$ |
| $\Delta \widehat{H}_t$ | $0.004(0.329)$ | $0.013(1.160)$ | $0.001(0.066)$ |
| $\Delta \widehat{S}_t$ | $0.015^{**}(2.822)$ | $0.015^{**}(2.759)$ | $0.016^{**}(2.911)$ |
| $\widehat{\varepsilon}_{Yt}$ | $0.886^{**}(18.058)$ | $0.859^{**}(16.474)$ | $0.850^{**}(15.683)$ |
| $\widehat{\varepsilon}_{Rt}$ | $-0.000(-0.468)$ | $-0.000(-0.549)$ | $-0.001(-1.499)$ |
| $\widehat{\varepsilon}_{Ht}$ | $0.011^{*}(2.036)$ | $0.020^{*}(2.324)$ | $0.026^{*}(2.074)$ |
| $\widehat{\varepsilon}_{St}$ | $-0.008(-1.460)$ | $0.038^{*}(1.993)$ | $0.045^{*}(2.213)$ |
| $\widehat{\varepsilon}_{Ht} \times EDU_t$ | – | $-0.017(-1.024)$ | – |
| $\widehat{\varepsilon}_{Ht} \times CRT_t$ | – | $0.001(1.222)$ | – |
| $\widehat{\varepsilon}_{Ht} \times CAP_t$ | – | $0.000(0.284)$ | – |
| $\widehat{\varepsilon}_{Ht} \times STRD_t$ | – | $-0.001^{*}(-2.160)$ | $-0.001^{*}(-2.064)$ |
| $\widehat{\varepsilon}_{Ht} \times ENFOR_t$ | – | – | $0.000(0.020)$ |
| $\widehat{\varepsilon}_{Ht} \times REGIS_t$ | – | – | $-0.004^{**}(-2.955)$ |
| $\widehat{\varepsilon}_{st} \times EDU_t$ | – | $-0.006(-1.768)$ | – |
| $\widehat{\varepsilon}_{st} \times CRT_t$ | – | $-0.000(-1.030)$ | – |
| $\widehat{\varepsilon}_{st} \times CAP_t$ | – | $-0.000(-0.597)$ | – |
| $\widehat{\varepsilon}_{st} \times STRD_t$ | – | $0.000(0.794)$ | – |
| $\widehat{\varepsilon}_{st} \times ENFOR_t$ | – | – | $0.002(1.129)$ |
| $\widehat{\varepsilon}_{st} \times REGIS_t$ | – | – | $-0.004(-0.917)$ |
| Adj. R-square | 0.816 | 0.816 | 0.835 |

*Notes*: The following equation was estimated by ordinary least squares (OLS):

$$\Delta C_t = \gamma_0 + \beta_Y \Delta \widehat{Y}_t + \beta_H \Delta \widehat{H}_t + \beta_S \Delta \widehat{S}_t + \beta_R \Delta \widehat{R}_t + \\ \phi_Y \widehat{\varepsilon}_{Y_t} + \phi_H \widehat{\varepsilon}_{H_t} + \phi_S \widehat{\varepsilon}_{S_t} + \phi_R \widehat{\varepsilon}_{R_t} + \mu_t$$

where $\Delta \widehat{Y}_t, \Delta \widehat{H}_t, \Delta \widehat{S}_t$, and $\Delta \widehat{R}_t$ are anticipated changes and $\widehat{\varepsilon}_{Yt}, \widehat{\varepsilon}_{Ht}, \widehat{\varepsilon}_{St}$ and $\widehat{\varepsilon}_{Rt}$ are unanticipated shocks in $Y_t, H_t, S_t$, and $R_t$. $EDU_t$ is the education expenditure as a percentage of GNI, $CRT_t$ is the domestic credit to private sector as a percentage of GNI, $CAP_t$ is the stock market capitalization as a percentage of GDP, $STRD_t$ is the total value of stocks traded as a percentage of GDP, $ENFOR_t$ is the number of procedures to enforce a contract, and $REGIS_t$ is the number of procedures to register a property. Note that $Y_t, H_t$, and $S_t$ are log-transformed. Country-dummies were included to take care of the fixed effect. *—significant at 5% level. **—significant at 1% level. Values in parentheses are t-statistics.

The results with regard to PIH are mixed. The insignificant coefficient for $\Delta \widehat{Y}_t$ and the significantly positive coefficient for $\widehat{\varepsilon}_{Yt}$ across all model support the PIH: consumption responds to news on permanent incomes only, current and lagged incomes give no explanatory power with respect to current consumption changes.

The response of consumption to changes in housing price is also consistent with PIH: consumption responds positively to an unanticipated increase in housing price (significantly positive coefficient on $\widehat{\varepsilon}_{Ht}$), but it does not respond to an anticipated increase housing price (insignificant coefficient on $\Delta\widehat{H}_t$). However, the significantly positive coefficients for both $\Delta\widehat{S}_t$ and $\widehat{\varepsilon}_{St}$ suggest that consumption responds to both anticipated and unanticipated changes in stock price, which is inconsistent with PIH.

The empirical findings do provide some evidence for the dual-impact of housing price. As aforementioned, a change in real housing price (either anticipated or unanticipated) generates both a positive wealth effect and a negative price effect. Hence, the "net wealth effect" of $H_t$ will be smaller than that of $S_t$. i.e., $(\beta_H + \phi_H) < (\beta_s + \phi_s)$, if the price effect is sufficiently large. The estimated coefficients from Models 2 and 3 suggest that $\beta_H < \beta_S$ and $\phi_H < \phi_S$, which imply that the price effect partly offset the wealth effect for both anticipated and unanticipated changes in housing price.

By including interaction terms in the regression equation, Models 2 and 3 examine the effects of education($EDU_t$), financial development ($CRT_t$, $CAP_t$ and $STRD_t$), and institutional development ($ENFOR_t$ and $REGIS_t$) on the sensitivity of consumption to unanticipated changes housing and stock prices. $EDU_t$ is the education expenditure as a percentage of gross national income (GNI), $CRT_t$ is the domestic credit to private sector as a percentage of GNI, $CAP_t$ is the stock market capitalization as a percentage of GDP, $STRD_t$ is the total value of stocks traded as a percentage of GDP, $ENFOR_t$ is the number of procedures to enforce a contract, and $REGIS_t$ is the number of procedures to register a property. The results as reported in Table 1.2 show that most of the estimated coefficients of the interaction terms are not significantly different from zero, except for the ones of $\widehat{\varepsilon}_{Ht} \times STRD_t$ and $\widehat{\varepsilon}_{Ht} \times REGIS_t$. The negative coefficient for $\widehat{\varepsilon}_{Ht} \times STRD_t$ implies that the level of financial market development has a negative impact on the housing market wealth effect. A plausible explanation is that a more liquid stock market will make the real estate market less attractive for capital investment. In addition, the sensitivity of consumption to unanticipated changes in housing price is negatively related to the number of procedures required to register a property. The finding is not surprising because the number of such procedures affect the liquidity of the housing market.

## Conclusions

Consumption has long been a central element in most macroeconomic models because it accounts for about 50%–70% of GDP in most economies. In addition, housing plays a special role in the class of illiquid assets. In particular, housing has spending consequence which differs from financial assets because housing services enter households' utility function. An increase in housing price not only increases the wealth of the owners but also increases the cost of consuming housing services. That is to say, the positive wealth effect is partly offset by a negative price effect.

With reference to a sample of developed and developing nations including Hong Kong and China, this study investigates the dynamic relationship between

consumption, income, housing prices, capital income, and interest rate. Under the PIH, household consumption is determined by permanent income that is the present value of the future stream of disposable income. Disposable income includes labor income and capital income. This study investigates the housing and stock markets wealth effects on consumption because fluctuations in these two markets accounted for a dominant part of unanticipated changes in household wealth.

The findings from this study suggest that a rise in housing price has both a positive wealth effect and a negative price effect on consumption. While the positive wealth effect is caused by an increase in capital income, the negative price effect is caused by an increase in the cost of housing services. Moreover, the sensitivity of consumption to unanticipated changes in housing price is related to the level of financial and institutional development. A plausible explanation is that a more liquid stock market will make the real estate market less attractive for capital investment. In addition, the sensitivity of consumption to unanticipated changes in housing price is negatively related to the number of procedures required to register a property.

## Acknowledgment

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