

Determinants of loans to the private sector in Hong Kong

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Abstract

This article studies the determinants of private loans in Hong Kong from 1995 to 2019. Specifically, the relationship between private loans and domestic macroeconomic variables namely GDP, 3-month HIBOR and residential property prices were examined using the vector error correction model. The empirical results suggest that real GDP had a positive impact on real private loans over the next one to three quarters, while residential property prices would affect loans positively in the next quarter in the short run. In the long run, property prices remained a significant positive determinant of private loans, while the cumulative negative impact of the HIBOR became more significant.

影響香港私人貸款的主要因素

摘要

本文研究 1995 至 2019 年間影響香港私人貸款的主要因素。具體而言，本文使用向量誤差修正模型分析私人貸款與本地宏觀經濟變數（即本地生產總值、三個月期香港銀行同業拆息和住宅物業價格）之間的關係。實證結果顯示，在短期內，實質本地生產總值對未來一到三個季度的實質私人貸款產生正面影響，而住宅物業價格對下一季度的貸款有正面影響。長期而言，樓價仍是影響私人貸款的重要正面因素，而香港銀行同業拆息的累積負面影響則會更為顯著。

The views and analysis expressed in this article are those of the author and do not necessarily represent the views of the Office of the Government Economist.

I. INTRODUCTION

1. Credit granted to the private sector is an important source of financing for households and corporations and plays a crucial role in facilitating economic activity. Over the last few decades, Hong Kong's private credit has been on an increasing trend. This note examines how the growth in private loans in Hong Kong is driven by changes in domestic macroeconomic variables, in particular GDP, interest rate and property prices.

2. The structure of this article is as follows. Part II summarises the relevant empirical studies. Part III presents some stylised facts about private credit in Hong Kong. Part IV introduces the key variables, and Part V discusses tests of the variables and the final model chosen. Part VI presents the key empirical findings. Part VII concludes.

II. LITERATURE REVIEW

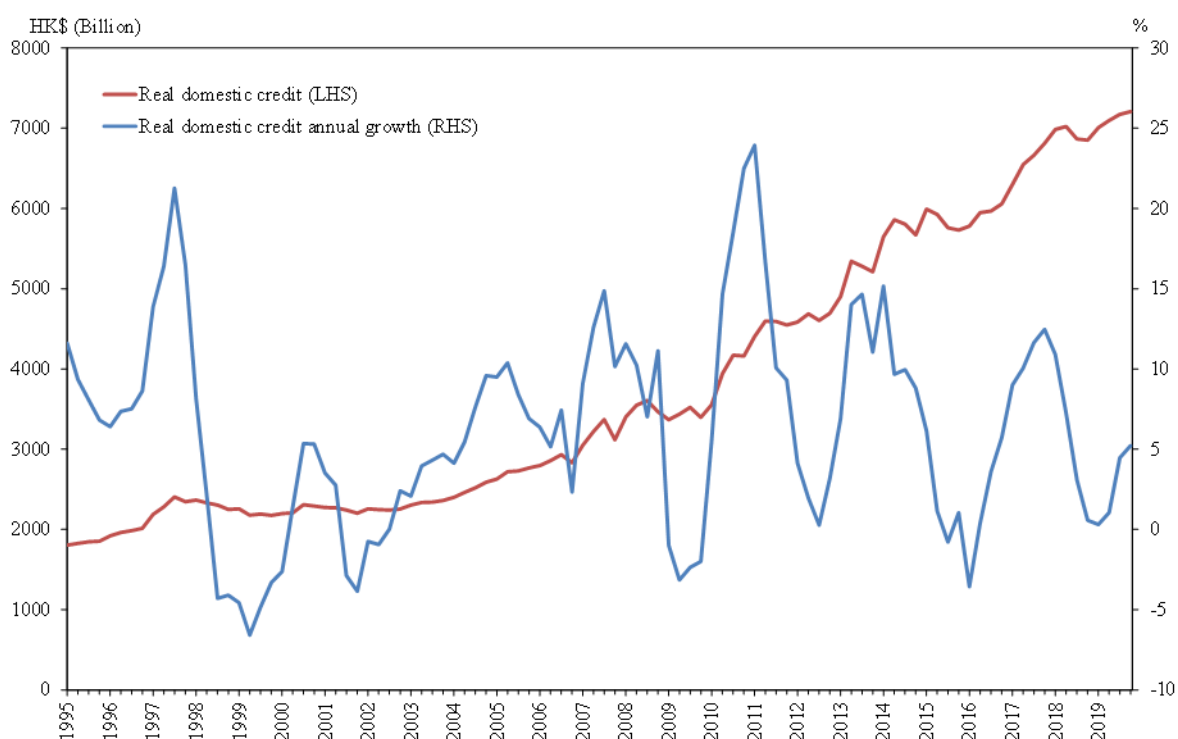
3. Many empirical studies suggest that GDP (reflecting economic conditions and activity) and interest rates (reflecting financing costs) are the main determinants of the demand for credit. For instance, Calza, Gartner and Sousa (2003) found that, in the long run, real loans to the private sector in 11 euro area economies were positively related to real GDP but negatively related to real interest rates. Similarly, Sharma and Gounder (2012) showed that average lending rates and inflation (reflecting costs of borrowing and in general) were detrimental to private sector credit growth in six South Pacific economies.

4. On top of these variables, the literature suggests that property prices also have a positive effect on private credit. Since property is both collateral and a source of wealth, it can influence private credit through both the supply and the demand side. For example, Hofmann (2001) found that real credit had a positive relationship with real GDP and real property prices in 16 industrialised economies, but a negative correlation with the real interest rate. In Hong Kong, the Hong Kong Monetary Authority (HKMA, 2002) found a positive relationship between real credit growth, real GDP growth and real property price growth with data from 1984-2001. Given likely cointegrating relationships among the variables, vector error correction models are often used to capture the short-run and long-run dynamics of the system.

III. STYLISTED FACTS ABOUT PRIVATE LOANS IN HONG KONG

5. In this study, data on total loans and advances for use in Hong Kong from the HKMA were used as a proxy for private loans in Hong Kong, which is the main dependent variable in the analysis. The data are quarterly, from 1995 Q1 to 2019 Q4. Nominal credit data were converted to real terms with the GDP deflator (2009 = 100). **Chart 1** shows the series in levels and growth rates. Overall, real total loans and advances in Hong Kong leaped by almost four times since 1995, with the year-on-year growth rate ranging from around -7% to 24% in a cyclical pattern. The average annual growth rate of loans and advances during the sample period was about 6.9%.

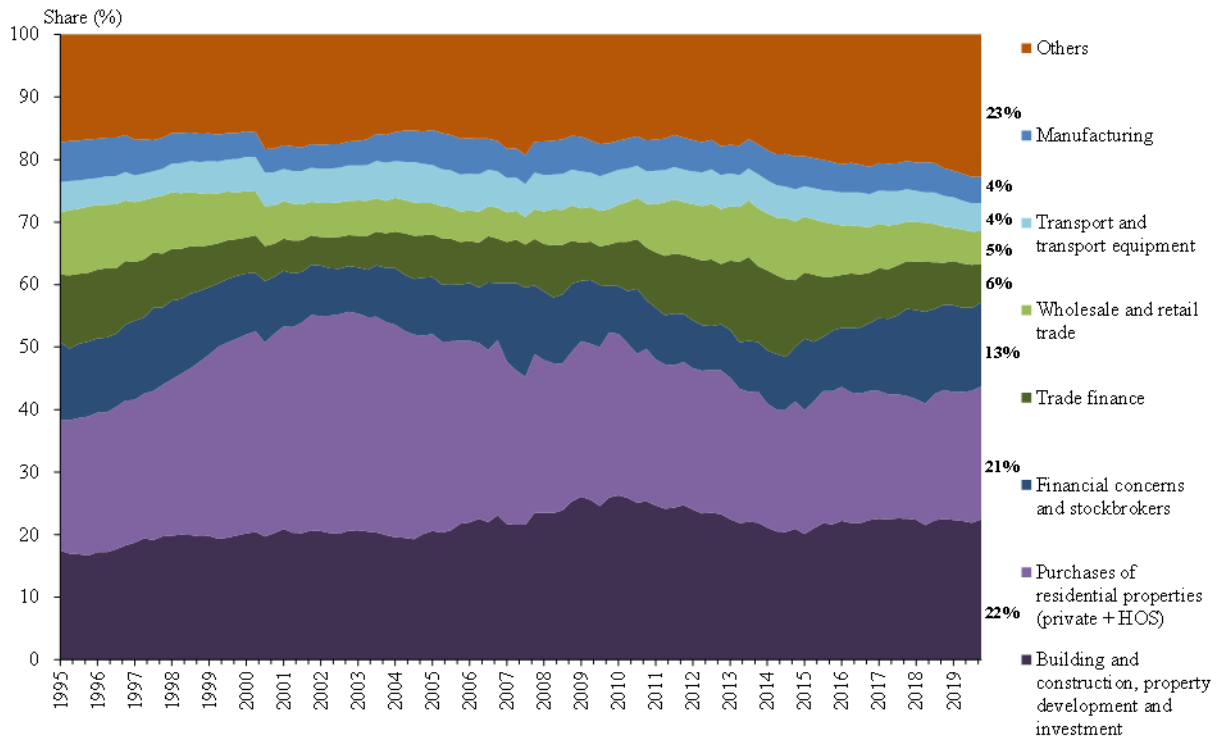
Chart 1: Real total loans and advances for use in Hong Kong



Sources: Hong Kong Monetary Authority, Census and Statistics Department.

6. Notably, property-related loans (i.e. loans for building and construction, property development and investment and loans for purchases of residential properties) accounted for 43% of the total loans and advances in the fourth quarter of 2019, the largest share among all segments not only in 2019 but a major category throughout the sample period (**Chart 2**). It is therefore reasonable to surmise that property prices would have a significant effect on private loans in Hong Kong.

Chart 2: Shares of loans for use by selected economic sectors in total loan & advances for use in Hong Kong

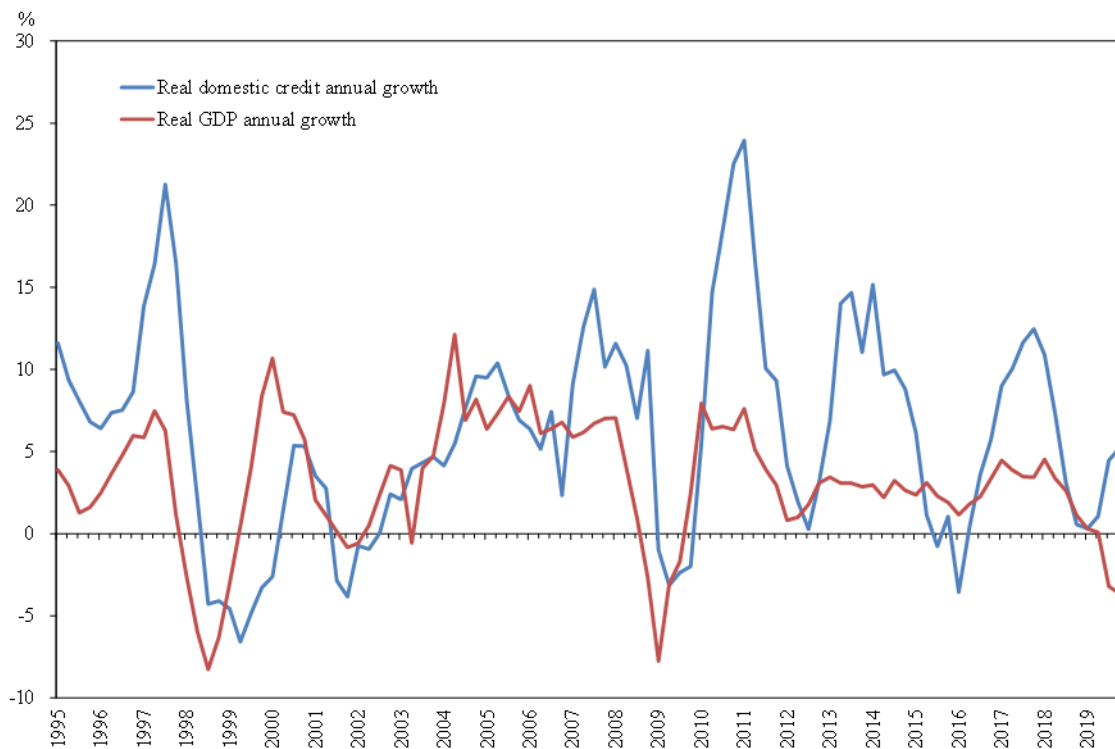


Source: Hong Kong Monetary Authority.

IV. DATA

7. As the first determinant of private sector loans, real GDP data from the Census and Statistics Department (C&SD) was used as a broad aggregate measure of real economic activity. **Chart 3** shows that the year-on-year growth of real private loans moved in the same direction as real GDP most of the time during the sample period, though loans were generally more volatile than GDP.

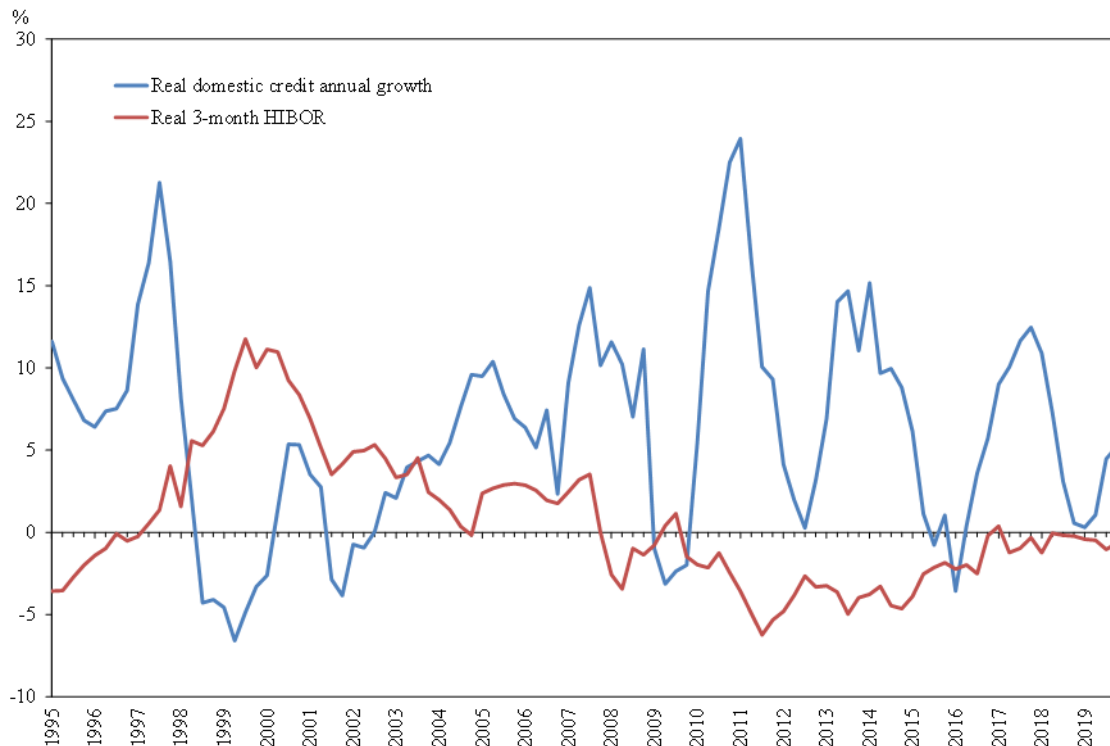
Chart 3: Real total loans and advances for use in Hong Kong and real GDP



Sources: Hong Kong Monetary Authority, Census and Statistics Department.

8. To examine the relationship between short-term real interest rates and private credit, this study uses the three-month HIBOR (sourced from HKMA) less composite consumer price inflation (sourced from C&SD) as the measure of financing costs to borrowers. **Chart 4** shows the two series plotted together. As expected, there was an inverse relationship between real credit growth and short-term real interest rates during the sample period.

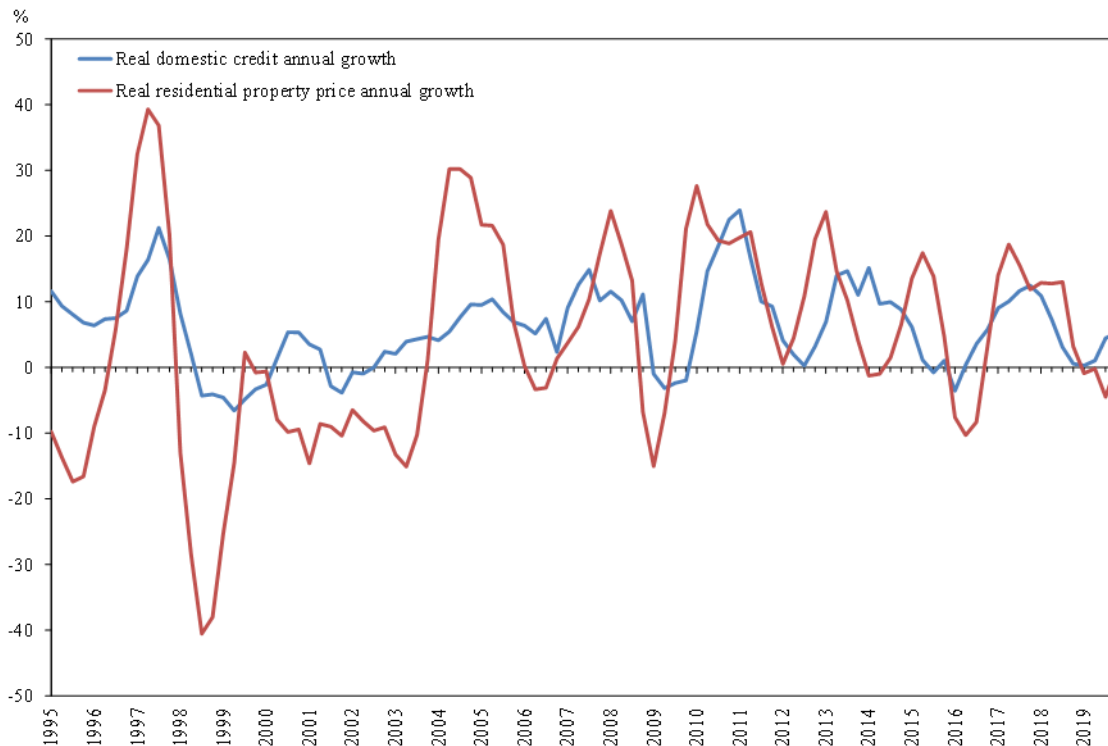
Chart 4: Real total loans and advances for use in Hong Kong and real 3-month HIBOR



Source: Hong Kong Monetary Authority.

9. For property prices, the overall residential property price index was sourced from the Rating and Valuation Department. The nominal data were transformed into real terms with the GDP deflator. **Chart 5** shows that real residential property price growth generally moved in the same direction as real credit growth, suggesting a positive relationship between the two variables.

Chart 5: Real total loans and advances for use in Hong Kong and real residential property price



Sources: Hong Kong Monetary Authority and Rating and Valuation Department.

10. Except for the HIBOR, the abovementioned variables (i.e. loans, GDP and the residential property price index) were converted to natural logarithms in the analysis.

V. MODEL

11. Since time series data were involved in the analysis, an augmented Dickey-Fuller test was conducted for each variable to test if a unit root was present in the series, i.e. whether the series was non-stationary. As the data were quarterly and a time trend was observed in the variables, four lags and a time trend were included in the test. The null hypothesis of the test is that there is a unit root and the series is non-stationary, while the alternative is that the series is trend stationary. If the null hypothesis is not rejected, the series in first differences is further tested. If the null hypothesis can be rejected after taking the first difference, the series is taken to be integrated of order 1 (I(1)).

12. The results of the augmented Dickey-Fuller tests are presented in **Table 1**. The results show that null hypothesis of having a unit root could not be rejected at 5% level of statistical significance for all the variables in levels. Nonetheless, after taking first differences, the null hypothesis could be rejected at the 5% significance level for all the variables, suggesting that these series are I(1). At this stage, a cointegrating relationship is possible, but not yet demonstrated.

Table 1: Augmented Dickey-Fuller test results

Series		t-statistics	p-values
log (loans)	Level	-2.477	0.340
	First difference	-4.186*	0.005
log (GDP)	Level	-3.107	0.105
	First difference	-3.731*	0.020
3-month HIBOR	Level	-2.633	0.265
	First difference	-4.362*	0.003
log (residential property price index)	Level	-2.206	0.487
	First difference	-4.921*	0.000

Note: (*) denotes rejection of the null hypothesis at the 5% significance level.

13. The next step is to use cointegration tests to determine whether the I(1) system should be modelled as a vector autoregressive model (if no cointegration) or a vector error correction model (if there is cointegration). To perform the tests, an optimal number of lags needed to be decided. As shown in **Table 2**, the final prediction error (FPE), Akaike's information criterion (AIC), the Hannan and Quinn information criterion (HQIC) and Schwarz's Bayesian information criterion (SBIC) lag-order selection statistics all suggested that 4 lags were appropriate.

Table 2: Selection-order criteria

lag	FPE	AIC	HQIC	SBIC
0	0.000209	2.87779	2.92098	2.98464
1	$9.6e^{-9}$	-7.11272	-6.89678	-6.57848
2	$7.0e^{-9}$	-7.42301	-7.0343	-6.46138
3	$2.9e^{-9}$	-8.32487	-7.0343	-6.93584
4	$1.3e^{-9}$	-9.13204	-8.39782	-7.31563

14. Next, a Johansen test, which is based on the augmented Dickey-Fuller test for unit roots in residuals, was used to see if there was any cointegrating relationship among the series. The result showed that the null hypothesis of having no cointegrating vector present in the data could be rejected at the 5% significance level. In other words, a cointegrating relationship existed among the variables in the data.

15. Given that a cointegrating relationship existed, a vector error correction model was used to study the short-run and long-run dynamics among the variables. The model is as follows:

$$\begin{aligned} \Delta \log(\text{loans}_t) = & \alpha_0 + \sum_{j=1}^3 \alpha_j \Delta \log(\text{loans}_{t-j}) + \sum_{j=1}^3 \beta_j \Delta \log(\text{GDP}_{t-j}) \\ & + \sum_{j=1}^3 \gamma_j \Delta \text{hibor}_{t-j} + \sum_{j=1}^3 \delta_j \Delta \log(\text{ppi}_{t-j}) + \theta [\log(\text{loans}_{t-1}) \\ & - \sigma \log(\text{GDP}_{t-1}) - \phi \text{hibor}_{t-1} + \omega \log(\text{ppi}_{t-1}) + \tau] + \mu_t \end{aligned}$$

where *loans* is real loans and advances for use in Hong Kong;

GDP is real GDP;

hibor is the real 3-month HIBOR;

ppi is the real residential property price index;

$\log(\text{loans}_{t-1}) - \sigma \log(\text{GDP}_{t-1}) - \phi \text{hibor}_{t-1} + \omega \log(\text{PPI}_{t-1}) + \tau$ is

the error correction term; and $\theta < 0$.

16. It is expected that the sign of the coefficient β_j for GDP will be positive. Theoretically, strong economic growth would have a positive impact on expected income and profits and thus on the overall financial strength of households and corporations, which would support higher levels of indebtedness to finance higher consumption and investments through credit. As for the HIBOR, the sign of the coefficient γ_j is expected to be negative. Intuitively, higher interest rates will lead to higher financing costs and thus loans become more expensive and loan demand should be reduced. For the coefficient δ_j for residential property prices, it is expected to be positive as residential property boosts the supply of credit as collateral for loans and the demand for credit through wealth effects.

VI. EMPIRICAL RESULTS

17. The estimated coefficients of the vector error correction model are summarised below:

$$\begin{aligned} \Delta \log(loans_t) = & 0.0053 + (-0.092 \quad -0.161 \quad -0.119) \begin{bmatrix} \Delta \log(loans_{t-1}) \\ \Delta \log(loans_{t-2}) \\ \Delta \log(loans_{t-3}) \end{bmatrix} \\ & + (0.340^{***} \quad 0.168^{***} \quad 0.436^{***}) \begin{bmatrix} \Delta \log(GDP_{t-1}) \\ \Delta \log(GDP_{t-2}) \\ \Delta \log(GDP_{t-3}) \end{bmatrix} \\ & + (-0.0003 \quad -0.0028 \quad -0.0011) \begin{bmatrix} \Delta hibor_{t-1} \\ \Delta hibor_{t-2} \\ \Delta hibor_{t-3} \end{bmatrix} \\ & + (0.074^* \quad -0.031 \quad 0.037) \begin{bmatrix} \Delta \log(ppi_{t-1}) \\ \Delta \log(ppi_{t-2}) \\ \Delta \log(ppi_{t-3}) \end{bmatrix} \\ & - 0.0188^{***} [\log(loans_{t-1}) - 0.016 \log(GDP_{t-1}) \\ & + 0.095^{***} hibor_{t-1} - 0.828^{***} \log(ppi_{t-1}) - 10.978] \end{aligned}$$

*** significant at the 5% level

** significant at the 10% level

* significant at the 15% level

18. In the short run, the results show that GDP had a positive impact on loans issued as expected. All three coefficients were significant at the 5% level. The interpretation is that a 1% increase in real GDP would increase loans issued by 0.340% in the next quarter, 0.168% two quarters later, and 0.436% three quarters later¹.

¹ Second-order effects through autoregressive terms were negligible.

19. As for the HIBOR, the signs of the coefficients were negative as expected, though the coefficients were not statistically significant. For residential property prices, the coefficient for the one quarter lagged term was positive and significant at the 15% significance level. A 1% increase in the real residential property price index would increase loans issued by 0.074% in the next quarter.

20. The coefficient of the error correction term had the correct sign (i.e. negative) and was significant at the 5% significance level. Nevertheless, the value of the coefficient is quite small, indicating that it would take considerable time for the model to reach the long-run equilibrium.

21. In the long run, the estimated relationship between the variables is extracted below:

$$\begin{aligned} & [\log(loans_{t-1}) \\ & = 0.016 \log(GDP_{t-1}) - 0.095^{***} hibor_{t-1} \\ & + 0.828^{***} \log(ppi_{t-1}) + 10.978] \end{aligned}$$

*** significant at 5% significance level

** significant at 10% significance level

* significant at 15% significance level

The signs of the coefficients generally matched those in the short-run part of the model. Interestingly, the cumulative negative impact of the HIBOR on loans became significant in the long run. Residential property prices also had a significant positive impact on loan growth in the long run. GDP, however, only had significant effects in the short run as discussed earlier.

VII. CONCLUSIONS

22. This note examined how real private loan demand in Hong Kong was affected by changes in real GDP, the real 3-month HIBOR and real residential property prices with data from 1995 Q1 to 2019 Q4. A vector error correction model was used to gauge the short-run and long-run dynamics of the variables. In the short run, the empirical findings suggest that real GDP had a positive impact on real private loans over the next one to three quarters, while residential property prices would affect loans positively in the next quarter. In the long run, property prices remained a significant positive determinant of private loans, while the cumulative negative impact of the HIBOR became more significant.

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