Appendix to:

Bank Lending and Property Prices in Hong Kong

Main Results Using Property Loans as the Credit Variable

by Stefan Gerlach and Wensheng Peng

This annex summarises the main results of the estimation using property-related loans rather than total domestic credit as the lending variable. The main conclusions are similar to those obtained in the paper using total domestic credit, although the estimated coefficients differ in size for obvious reasons. Specifically:

(1) The results suggest a co-integrating vector between property loans, real GDP and real property prices, with lending adjusting to disequilibria rather than property prices.

(2) The short-run dynamic relationships suggest that changes in property prices drive property lending, but that property prices do not impact on lending.

(3) There was one-off fall in the elasticity of property loan growth with respect to property price changes, similar to the finding for total domestic credit growth presented in the paper.

Detailed results are provided below.

Long-run relationship

We follow the same empirical strategy as in the paper, estimating and testing for a co-integrating vector for the sample period up to 1998:4, and leaving the last 12 quarters for testing the stability of the relationship.[1] The results suggest one CI vector between real property loans, real GDP and real property price, as listed in Table 2A (corresponding to Table 2 in the paper).[2] The loading coefficient for property prices is of the correct (negative) sign, but is insignificant. This suggests that property prices are weakly exogenous, as found in the paper. However, the loading coefficients for both property loans and real GDP are significant, whereas in the paper only that for domestic credit is significant. This suggests that either property loans, or real GDP or both adjust to any disequilibrium in the long-run relationship. This difference in estimates does not affect our main conclusions, however, as we are concerned primarily with the interaction between property prices and bank lending. The coefficient for real GDP seems also close to unity, as in the paper. We thus restrict this coefficient to unity and the loading coefficient for property prices to zero, and test whether these restrictions violate the data. The results suggest that they are accepted by data with a p-value of 0.54.

---

[1] The sample periods are slightly different from those in the paper which use total domestic credit as the bank lending variable, owing to the availability of data on the breakdown between property-related and other lending.

[2] Initial estimates suggest that the inclusion of a constant in CI vector is useful for obtaining an economically reasonable relationship. However, the constant is highly insignificant with a p-value of 0.81. The co-integrating vector presented in Table 2A is the one obtained after restricting the constant to zero.

As in the paper, the relationship continues to hold after the sample period is extended to 2001:4, and the restrictions that the coefficient of real GDP is unity and that the loading coefficient for real property prices is zero are accepted with a p-value of 0.78. The final long-run relationship is presented in Table 3A (corresponding to Table 3 in the paper). It is noted that the coefficient for property price in the co-integrating vector (-0.53) is considerably larger in absolute value than the corresponding estimate in the paper (-0.36). This is perhaps not surprising, as the response of property loans to property price movements is likely to be larger than that of the aggregate domestic credit.

In sum, the long-run relationship between the variables is not sensitive to the use of overall lending rather than property-related lending. The one exception is that real GDP does not appear weakly exogenous. However, this difference appears to have little relevance for the questions we are asking.

Table 2A. Test for Cointegration
(1982:4 - 1998:4)

Panel A. Trace Test Statistics

	Null hypothesis of		
No. of cointegrating vectors	$r = 0$	$r \leq 1$	$r \leq 2$
Trace test statistics	49.29	19.30	6.37
p-value	(0.01)	(0.07)	(0.17)

Panel B. β and α Vectors

	β	α
Real bank lending	1.00	-0.05 (0.02)
Real GDP	-0.85	-0.03 (0.01)
Real property price	-0.71	-0.01 (0.02)

Note: Standard errors for α in parenthesis.

Table 3A. Long-run Relationship
(1982:4 - 2001:4)

	CI vector β	Loading coefficient α
Real property-related lending	1.00	-0.01 (0.004)
Real GDP	-1.00	-0.01 (0.002)
Real property price	-0.53	0.00

Note: Standard errors for α in parenthesis.

Restriction p-value: 0.78

Short-run dynamic relationship

Next we turn to the short-run relationships. As before, we reestimate the equations in the paper.

We first reestimate the equation for the growth rate of property loans:

$$\Delta lp_t = 0.217\Delta lp_{t-4} + 0.411\Delta y_{t-2} + 0.250\Delta p_t - 0.009CIP_{t-1} + 0.521(\Delta r_{t-1} - \Delta r_{t-2}) + 0.738(\Delta r_{t-3} - \Delta r_{t-4})$$

(0.095) (0.179) (0.059) (0.003) (0.261) (0.265)

$R^2 = 0.38$; Sample period: 1984:2 - 2001:4

where Δlp denotes growth in property loans and CIP residuals from the cointegrating vector.

Note that the coefficient on the lagged CI vector is significant and negative, confirming the co-integrating test results. Computing a Hausman test we conclude that the OLS estimates are consistent (p-value = 0.42). We also compute recursive estimates, which suggest instability in the early 1990s as did results obtained using total domestic credit reported in the paper (see Chart 6A).

Next we reestimate the equation for the growth of property loans and include the same dummy variable as used in the paper:

$$\Delta lp_t = 0.223\Delta lp_{t-4} + 0.400\Delta y_{t-2} + 0.497\Delta p_t - 0.286 dum*\Delta p_t - 0.007 CIP_{t-1} + 0.611(\Delta r_{t-1} - \Delta r_{t-2})$$
(0.093) (0.176) (0.151) (0.161) (0.003) (0.262)

$$+ 0.714\ (\Delta r_{t-3} - \Delta r_{t-4})$$
(0.261)

$R^2 = 0.41$; Sample period: 1984:2 - 2001:4

After adding an interaction term (which has a t-value of 1.8 and thus is significant at the 10% level) for the dummy variable and the growth rate of property prices, the other explanatory variables remain significant and their coefficients do not change much.

The estimated coefficients on Δp_t and on dum*Δp_t suggest that the elasticity of property loan growth to property price changes fell in 1991 from 0.50 to 0.29, compared with a drop from 0.40 to 0.13 in the case of total domestic credit reported in the paper. As expected, the sensitivity of property loan growth to property price changes is larger than that of total domestic credit growth both before and after the regime shift in the early 1990s. Recursive estimates suggest stable coefficients after this structural change is controlled for (see Chart 8A).

Finally, the equation for property price growth is unchanged from that of equation (4) in the paper. In particular, the Hausman test suggests that the residuals from an auxiliary regression for property price changes are significant with a p-value of 0.02, and that current property loan growth becomes insignificant with a p-value of 0.42. Thus, as in the case of total domestic credit, the results suggest that property-related lending did not play a structural role in driving property prices, although interest rates had an influence.

Overall, these estimates of the short-run models are very similar to those discussed in the paper.

Chart 6A: Recursive estimates of parameters of the property loan growth (DLP) equation (corresponding to Chart 6 in the paper)

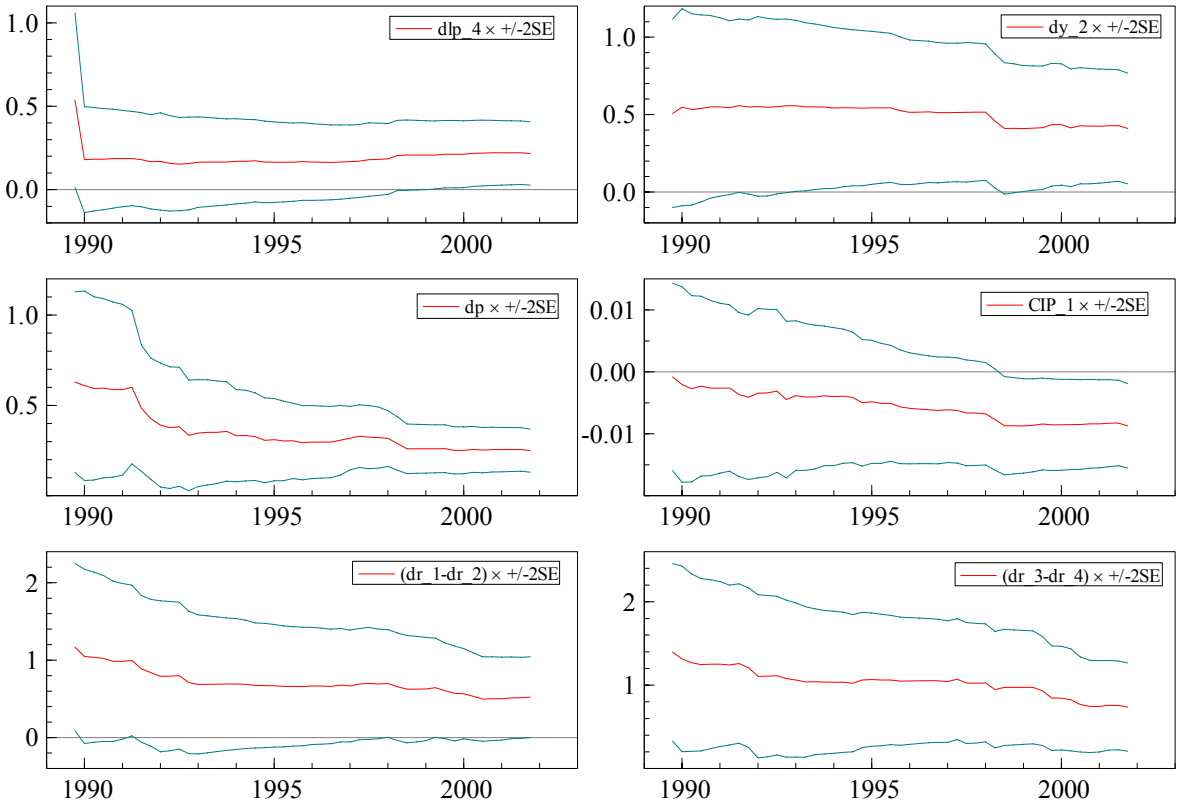

Chart 8A: Recursive estimates of parameters of the property loan growth (DLP) equation with a dummy (corresponding to Chart 8 in the paper)