Household credit in Asia-Pacific[1]

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Abstract

Household credit in Asia-Pacific has grown strongly over the past two decades. Managing household credit booms and their financial stability implications has become a central task for policymakers. In this article, we assess the effects of changes in interest rates and macroprudential measures on various types of credit growth. We find that changes in monetary conditions reduce growth in household and housing credit over a two-year horizon. Macroprudential measures also significantly slow the growth of various credit aggregates. More precisely, we find that general bank credit tightening actions, such as increases in reserve requirements, reduce credit growth over one to four years, while housing credit tightening actions such as higher loan-to-value ratios are effective only on housing credit over one to two years.

Keywords: Credit growth, financial stability, monetary policy, macroprudential policy.

JEL classification codes: E01, E44, E58.

[1] We thank the participants in the BIS workshop on "Financial systems and the real economy" in Hong Kong SAR in July 2015, the seminar at the BIS Asian Office in March 2016, and the BNM-BIS conference on "Financial systems and the real economy" in Kuala Lumpur in October 2016 for comments and suggestions. We are also grateful to Francisco Amaral, Nina Furbach, Mario Richarz, Jimmy Shek and Agne Subelyte for research assistance. This article reflects the views of the authors, and does not necessary reflect those of the Bank for International Settlements.

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1. Introduction

The dangers of credit cycles and pronounced increases in economy-wide leverage have become apparent in the global financial crisis. In particular, household balance sheets and the dangers of credit-fuelled housing cycles have emerged as a priority in macroeconomic research (Mian and Sufi (2014) and Jordà, Schularick and Taylor (2016)). Central banks across the world are confronted with the task of maintaining financial stability by managing credit cycles and achieving other economic objectives simultaneously.

This warrants new thinking and potentially new tools that are yet to be tested. How can credit booms be effectively managed? What are the trade-offs, if any, between achieving financial stability and stabilising inflation and output? The debate about the efficacy of various policy tools has been very active in recent years (Stein (2013), Williams (2014) and Svensson (2015)). This paper contributes to this debate by studying the experience of Asia-Pacific economies over the past two decades.

We aim to assess the effects of changes in interest rates and various types of macroprudential policy action on credit growth in Asia and the Pacific from 1990 to 2014. Among different types of credit, we focus on household credit, housing credit and consumer (ie non-housing) credit, and also consider total bank credit to the private non-financial sector. In terms of econometric methods, we use the trilemma instrumental variable (IV) as in Jordà, Schularick and Taylor (2015) to identify exogenous changes in the interest rates of Asia-Pacific economies. We also use inverse propensity weight regression adjusted (IPWRA) estimators as in Jordà, Schularick and Taylor (2016) to address the endogeneity of macroprudential actions.

The main results of the paper are the following. First, both changes in the domestic policy rate and changes in the domestic policy rate instrumented by the US policy rate significantly reduce growth in household credit and housing credit by up to 2 percentage points over two years. The IV estimates confirm these estimates and point to somewhat stronger effects, which indicates that there is some attenuation bias in the naive estimations and that the actual effects of monetary policy are stronger.

Second, we find that general credit-targeted policies have larger effects on household credit than do housing credit-targeted policies. In particular, when we run OLS regressions to gauge the impact of general bank credit-targeted non-interest rate monetary policy actions, we find that the growth in all four types of credit (total bank credit to the private non-financial sector, household credit, housing credit and consumer credit) significantly slows over the next two to six quarters, with the strongest impact on total bank credit and the longest impact on household credit.

Third, when we try to mitigate endogeneity bias by using inverse propensity weights, we confirm that macroprudential policies are successful in slowing down the pace of credit growth. In particular, when we gauge the effect of macroprudential measures with inverse propensity-weighted local projections, we find that macroprudential measures remain statistically and economically more significant for a generally longer period on all four types of credit.

The structure of the paper is as follows. We first introduce data in Section 2. In Section 3, we present stylised facts for household credit growth in Asia and the Pacific in the past two decades. Section 4 then briefly introduces the methods used to

determine the effects of policy interventions. Section 5 shows how changes in interest rates and macroprudential polices affect credit growth. The final section concludes.

2. Data

The data used in this paper rely on various sources such as the BIS Databank for various bank credit series and the database on macroprudential policy actions in Shim et al (2013). In addition to the usual macroeconomic variables for Asia-Pacific economies, the paper also uses structural variables such as capital account openness and the degree of currency peg, as well as crisis dummies. All data are quarterly frequency from 1990Q1 to 2014Q4. The Asia-Pacific economies in the sample are the following 12 economies: Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

For dependent variables, we use various credit variables. In particular, we use data from the BIS Databank on bank credit to the private non-financial sector, household credit, housing credit and consumer credit (ie, non-housing household credit). We can also define corporate credit as the difference between bank credit to the private non-financial sector and household credit.

Explanatory variables include policy variables, other macroeconomic variables, asset prices, crisis dummies and structural variables. For policy rates, we use actual policy rates, backdated with one-month or three-month market interest rates obtained from the BIS Databank. For the US policy rate, we use the federal funds rate obtained from Bloomberg.

For macroprudential policy actions, we use the database for policy actions on housing markets constructed by Shim et al (2013). In particular, this paper uses the following two aggregated indicators of policy actions: (1) total bank credit-targeted measures, which is the sum of changes in reserve requirements, changes in liquidity requirements and credit growth limits; and (2) housing credit-targeted measures, which is the sum of LTV limits, DSTI limits, risk weights on housing loans, provisioning requirements and exposure limits on the property sector. When one tightening action of a category is taken within a quarter, the indicator variable takes value +1; when two loosening actions are taken within a quarter, it takes value –2; and when no action is taken in a given quarter, it takes value zero. Table 1 summarises the total number of total bank credit-targeted measures taken by the 12 Asia-Pacific economies over 1990–2013.

For other macro variables, data on gross capital formation as a percentage of GDP and per capital GDP are from the IMF WEO database, while data on current account balance over GDP are from the BIS Databank. Among the two asset prices used in the paper, equity prices are from the BIS Databank, and house prices from the BIS property price statistics. For crisis dummies, we use the banking crisis dummy and the currency crisis dummy obtained from Laeven and Valencia (2012).

Finally, we use two structural variables to construct a trilemma IV for domestic policy rate variables. To determine whether an economy's currency is pegged to the US dollar, we use an updated version of the Shambaugh (2004) de facto exchange rate classification data set and construct a dummy variable (PEG) taking value 1 when a country's currency is pegged or soft-pegged and value zero otherwise. To measure capital account openness, we use the updated Chinn-Ito (2008) index, normalised to

range between zero (least financially open) and 1 (most financially open) for our sample from 1990 to 2013 (KOPEN).

Macroprudential policy actions taken by Asia-Pacific economies, 1990–2013 Table 1

Economy	Monetary actions		Prudential actions		All macroprudential actions	
	Tightening	Loosening	Tightening	Loosening	Tightening	Loosening
Australia	–	–	2	–	2	–
China	35	9	23	2	58	11
Hong Kong SAR	1	–	15	6	16	6
India	18	17	11	2	27	17
Indonesia	3	1	1	–	4	1
Japan	1	2	–	–	1	2
Korea	2	3	20	6	22	9
Malaysia	12	7	6	4	18	11
New Zealand	3	–	1	-	4	–
Philippines	19	27	5	4	20	27
Singapore	–	–	12	2	12	2
Thailand	1	2	4	1	5	3
Total	95	68	100	27	189	89

Sources: Shim et al (2013); authors' calculations.

3. Household credit trends in Asia and the Pacific

In this section, we briefly describe the main trends with respect to the evolution of household credit in Asia-Pacific over the past two decades. Moreover, we ask whether the household credit cycle in Asia-Pacific has become more integrated over time.

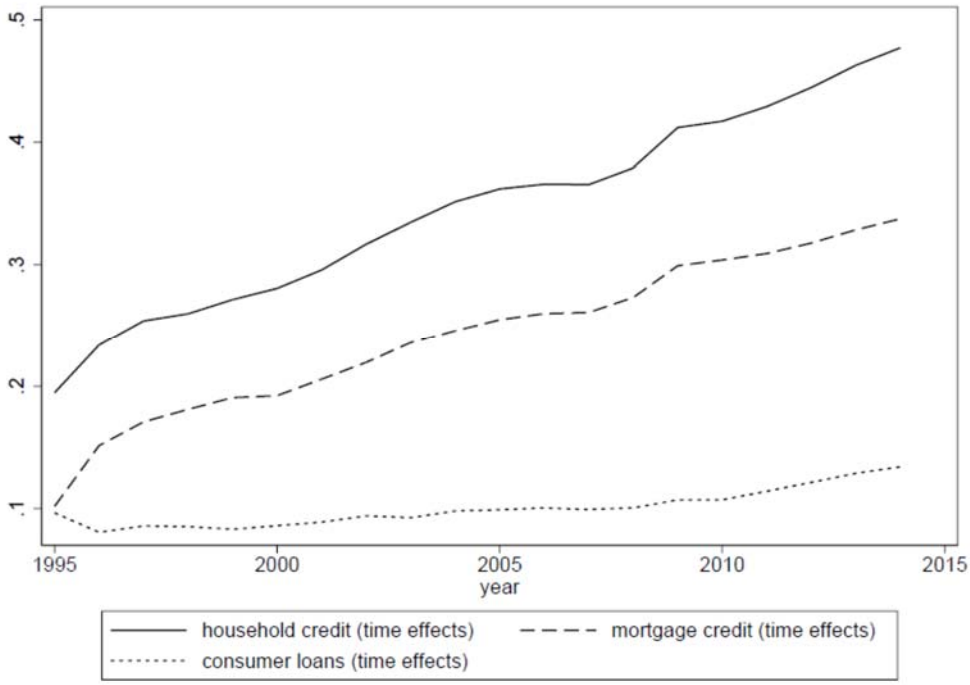
3.1. Aggregate trends

In the past two decades, the volume of bank lending to the household sector in Asia-Pacific has grown substantially relative to output, as shown in Figure 1. Total bank credit to the household sector more than doubled relative to GDP between 1995 and 2015. This increase is likely to be a lower bound estimate as credit creation by the shadow banking system is excluded from our banking sector data.

What has been driving the growth of household credit in Asia? Figure 1 tracks the evolution of household, mortgage and consumer (ie non-mortgage) lending by banks relative to GDP. The series depicts the time effects across the countries in the sample. The graph demonstrates that mortgage borrowing has accelerated markedly. This trend is observed in almost all individual economies. Mortgage lending to households accounts for the lion's share of the rise in credit to GDP ratios, as shown in Figure 2. This is in line with the advanced economy evidence presented in Jordà, Schularick and Taylor (2016). Household credit has grown strongly, mainly driven by the mortgage component of credit. However, in some countries such as Indonesia and Thailand, consumer credit has also shown considerable growth.

Household credit in Asia-Pacific

Figure 1



Mortgage credit vs consumer credit as a ratio to GDP

Figure 2

3.2. Country trends

There is considerable cross-country heterogeneity in the data. Figure 2 shows the development of two subcategories of household credit extended by banks – mortgage lending and (unsecured) consumer lending since the 1990s.

Table 2 decomposes on a country level the increase in total bank lending-to-GDP ratios. In particular, we can decompose the change in the ratio of total bank lending to GDP into the change in the ratio of household lending to GDP and the change in the ratio of corporate lending to GDP. In turn, the change in the ratio of household lending to GDP can be divided into that in the housing lending-to-GDP ratio and that in the consumer lending-to-GDP ratio. On average, increases in household lending contribute about 70% of increases in total bank lending, and increases in housing lending account for 78% of increases in household lending. In most countries, housing credit increased more than consumer credit. However, in Indonesia and Thailand, consumer loans increased more than housing loans.

Change in the ratio of bank lending to GDP from 1994 (or earliest available) to 2014

Table 2

Economy	Starting date	(1)	(2)	(3)	(4)	(5)
		Total bank loans	Household loans	Housing loans	Consumer loans	Corporate loans
Australia	1994Q4	0.71	0.55	0.54	0.01	0.16
China	1997Q4	0.43	0.23	0.16	0.07	0.20
Hong Kong SAR	1994Q4	0.86	0.27	0.17	0.10	0.60
India	1998Q4	0.30	0.06	0.04	0.03	0.24
Indonesia	1996Q4	–0.12	0.05	0.00	0.05	–0.17
Japan	1994Q4	–0.02	0.10	0.14	–0.05	–0.12
Korea	1996Q4	0.17	0.30	0.17	0.13	–0.13
Malaysia	2006Q4	0.20	0.16	0.14	0.01	0.04
New Zealand	1998Q4	0.50	0.33	0.33	0.00	0.17
Philippines	1994Q4	0.10	0.02	0.01	0.01	0.08
Singapore	2004Q4	0.28	0.16	0.16	–0.01	0.13
Thailand	2003Q4	0.16	0.29	0.08	0.21	–0.13
Average	–	0.30	0.21	0.16	0.05	0.09
Fraction of average	–	1.00	0.703	0.546	0.157	0.297

3.3. Cross-country correlation of credit cycles

Another way of studying these trends is to look at the cross-country correlation of credit growth rates in Asia-Pacific economies. Have greater financial openness and real economic integration led to more synchronised financial cycles across the region? Standard economic theory makes diverging predictions with respect to positive or negative international co-movement of financial variables.

A basic international real business cycle framework suggests a negative co-movement as a domestic total factor productivity shock increases the marginal product

of capital at home, leading to a temporary expansion there. At the same time, the foreign country contracts as world interest rates are pushed up by the home country's increased financing demand (Kollmann (1996) and Mendoza et al (2009)). In contrast, international macro models featuring bank intermediation can generate positive co-movement in international financial cycles. Kollmann et al (2011), for instance, present a model in which the negative co-movement inherent in international RBC models is supplemented by the synchronising forces of a global bank. Responding to a credit loss in one country, the global bank increases the loan-deposit spread in both countries to replenish its capital and thereby induces an internationally synchronised contraction.

The risk-taking channel of currency appreciation[4] can also generate positive correlation (Bruno and Shin (2015a and 2015b)). Our approach here will be to look at the evolution of the correlation between credit cycles in Asia-Pacific economies over predefined windows of 12, 18 and 24 quarters. We detrend the real household credit-to-GDP ratio using a HP filter. In this process, it is important to take into consideration that we have an unbalanced panel. That is, the household credit series is quite short for some economies, so the correlation for early years (eg in the 1990s) has a smaller number of countries than later years (eg in the 2010s). Even though capital account openness differs across countries (eg China and India have very low openness) and household credit booms are often driven by country-specific (ie idiosyncratic) financial development or financial liberalisation initiatives, Figure 3 shows that the average correlation has been increasing over the past 10 years or so. This suggests that a common global factor may have played a more and more important role over time.

Average rolling correlations of credit growth — Figure 3

[4] Shin (2012) shows that cross-border banking and the fluctuating leverage of the global banks are the channels through which accommodative financial conditions are transmitted globally. Borio (2016) argues that, in a world of free and huge capital flows, focusing on current account imbalances may lead to paying insufficient attention to potentially more disruptive financial imbalances, because the current account is not well suited to shedding light on issues such as the amount of financing a country gets from, or provides to, other countries, the direction of that financing (who lends to whom), and thus global financial instability.

4. Empirical methods

The goal of this paper is to assess the impact of monetary and macroprudential policy measures on credit growth. In this section, we briefly explain the methods we use to estimate the impact of these measures on credit variables. We will first test how changes in monetary conditions affect credit growth, before looking at the response of credit aggregates to macroprudential measures. We rely on the database of macroprudential measures developed by Shim et al (2013), and extend it to include observations from July 2012 to December 2013.

4.1. Local projections

Our empirical strategy to assess the impact of changes in monetary conditions on household credit relies on the local projection approach developed by Jordà (2005).

Let $\Delta_h y_{it-1} = y_{it+h} - y_{it-1}$ denote the response variable of interest, for example, the change in the credit-to-GDP ratio from the base quarter $t-1$ up to quarter $t+h$ with $h = 0,1,\dots,H$. The subindex i denotes the country. Let Δr_{it} denote the change in any variable whose perturbations we want to trace.

Next, consider two additional vectors of variables. The vector ΔW_{it} includes all the variables in the system observed at time t for country i. We are interested in estimating the dynamic multipliers of $\Delta_h y_{it-1}$ for $h = 0,1,\dots,H$ to an exogenous perturbation in Δr_{it}. Identification of this exogenous perturbation can be achieved by using a rich set of controls to isolate the selection mechanism based on observables. This is done via the auxiliary vectors ΔW_{it} and ΔX_{it-1}. Specifically, notice that the vector ΔW_{it} has the same timing as Δr_{it}.

Using these variable definitions, the specification of the local projections is

$$\Delta_h y_{it-1} = \alpha_i^h + \beta^h \Delta r_{it} + \Delta W_{it} \Gamma^h + \Delta X_{it-1} \Phi^h + u_{it+h}. \quad (1)$$

The α_i^h is country-fixed effects, and in the estimations below we use country-based cluster-robust standard errors. We will show the results of the standard OLS estimates of expression (1) with the instrumental variable approach discussed below to characterise the bias in the OLS estimates.

4.2. Instrumental variable local projections

The second basis for identification uses the instrumental variable z_{it} for Δr_{it} to account for selection based on unobservable factors. The equation can also be estimated by instrumental variables regression methods using z_{it} as the additional instrument for Δr_{it}. The dynamic multipliers of interest are the IV estimates of β^h for $h = 0,1,\dots,H$. We generically designate these as LP-IV coefficients, short for *local projection instrumental variables*.

To opt for an exchange rate peg means to sacrifice monetary policy autonomy, at least to some degree. Following Jordà, Schularick and Taylor (2015), we exploit this fact to isolate fluctuations in the short-term interest rate that are not explained by home economic conditions, but are driven by the base country and hence exogenous. We treat the term $z_{it} = [PEG_{it} \times KOPEN_{it} \times \Delta r_{it}^*]$ on the right-hand side of equation (1) as an exogenous influence on local monetary conditions in the home economy, notwithstanding other effects captured by the rest of the terms in the

equation. Thus z_{it} will serve in what follows as the instrumental variable for changes in home interest rates, and will permit us to identify causal influences of monetary conditions on credit conditions.

4.3. Synthetic control methods

We are also interested in the effects of macroprudential measures and aim to compare them with interest rates as a tool to manage the credit cycle. We are thus confronted with the problem that macroprudential policy measures are not taken at random. To achieve identification we not only rely on the rich set of economic controls discussed above, but also use synthetic control methods developed in previous work. The exposition here closely follows Jordà, Schularick and Taylor (2015). Building on a large literature in biostatistics and more recently in econometrics, Angrist, Jordà, and Kuersteiner (2013) propose a novel inverse probability-weighted (IPW) estimator. The estimation procedure consists of two stages. In the first stage, a model is constructed to determine the probability that the policy measure is taken: $p(d_\tau = 1|\{Y_{\tau-l}\}_{l=0}^{L})$. Here Y_τ denotes a vector of lagged observable macroeconomic controls observed up to *L* periods before the policy action is taken. This probability will be called the *propensity score* and we denote its estimate as $\hat{p}_\tau$. The propensity score model will be estimated using a logit estimator.

The second stage consists of running the local projections using weights given by the inverse of the propensity score in each bin. Weighting by the inverse of the propensity score puts more weight on those observations that were difficult to predict. These observations come closest to the random allocation ideal and hence receive more weight than those instances in which the observation was endogenous due to the other factors. Because it compensates for unknown non-linearities, the inverse probability weighting can be seen as a more flexible mechanism to control for the role of observables compared with controlling only through the conditional mean:

$$\Lambda^h = \sum_{d_\tau=1} \frac{\Delta_h y_{\tau+h}}{\hat{p}_\tau} - \sum_{d_\tau=0} \frac{\Delta_h y_{\tau+h}}{1-\hat{p}_\tau}. \quad (2)$$

Alternatively, we know that expression (2) can be recast as a simple regression estimate

$$\Delta_h y_{it+h} = \theta_n^h + \Lambda^h d_t + \epsilon_{\tau+h}. \quad (3)$$

Hence the counterparts to $\hat{\theta}_n^h$ and $\hat{\theta}_f^h$ in expression (3) can be directly obtained by noting that $\hat{\theta}_f^h = \hat{\theta}_n^h + \hat{\Lambda}^h$. In order to implement IPW in expression (2) all that is needed is to estimate expression (3) using weighted least-squares (WLS) with weights defined by $\omega_\tau = \frac{d_\tau}{\hat{p}_\tau} + \frac{1-d_\tau}{1-\hat{p}_\tau}$. A natural extension to expression (3) is to include controls $\{Y_{\tau-l}\}_{l=0}^{L}$ directly in the regression estimator as well, such as in Jordà and Taylor (2016). The WLS estimation of this extended regression is an example of a "doubly robust" method (eg Lunceford and Davidian (2004), Wooldridge (2010) and Glynn and Quinn (2010)). It is called *doubly robust* because we control for observables via two channels: first, directly in the regression; and second, indirectly through the propensity score. Only one of these two channels need be properly specified to produce consistent estimates. Further details can be found in Jordà, Schularick and Taylor (2016).

5. Empirical results

The first set of questions we ask includes the following: how does (household) credit growth respond to changes in monetary conditions? What is the impact of, say, a 100 basis point increase in interest rates on household credit growth over the following years? Moreover, do we observe differential responses of different credit components so that some subcomponents of household credit respond more strongly than others? Our strategy will be the following. We begin studying the effects of monetary policy before moving on to macroprudential policy. We will start with standard OLS estimates, but complement them with instrumental variable estimation in the case of monetary policy, and inverse propensity weighted local projections in the case of macroprudential measures. Going in both cases from the simple OLS to the IV/IPW estimates will also allow us to quantify the bias of relying on simple OLS estimates.

5.1. Monetary policy

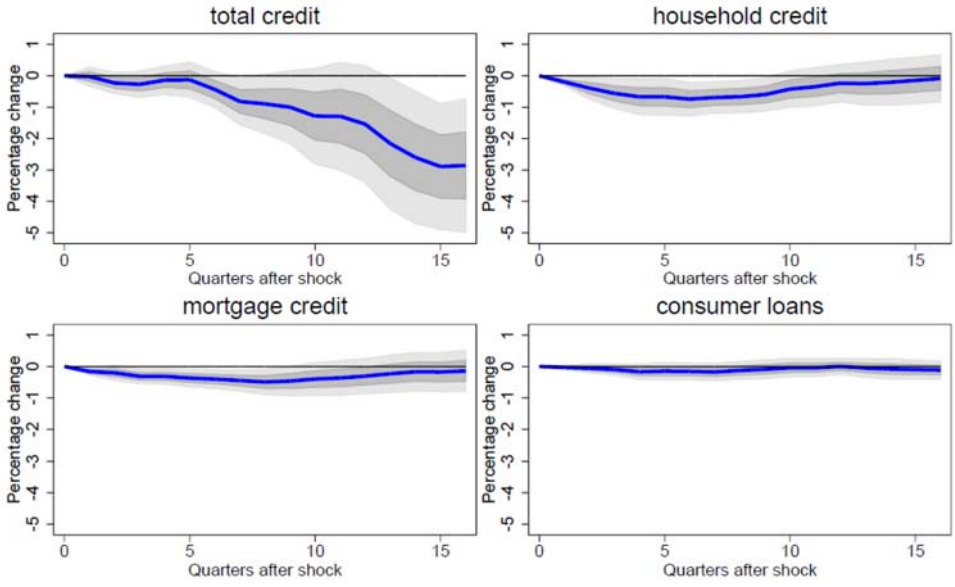
We begin by reporting results for two impulse variables: domestic policy change and the domestic policy change instrumented by US policy rate change under pegged exchange rates relying on the trilemma IV.

5.1.1. OLS estimates

The OLS estimates of a 100 basis point increase in domestic policy rates are shown in Figure 4. The local projections suggest an impact of monetary policy on credit aggregates, albeit a mild one in the case of household credit. As a benchmark estimate, the mortgage credit to GDP ratio falls by about half a percent over two years following a 100 basis point increase in policy rates, while total household credit falls by close to 1% after two years. It appears that the domestic policy rate has a stronger effect on total bank credit through its impact on business credit. Here, the effect of a 100 basis point policy rate increase accumulates to about 3% after four years. Figure 4 also shows that most of these effects are small but statistically significant.

Effects of domestic policy change

Figure 4



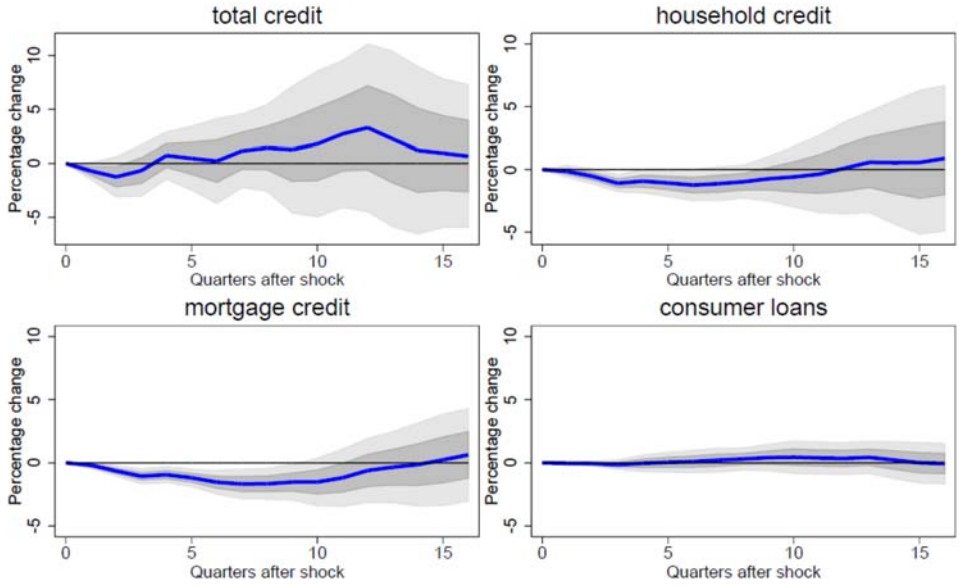
5.1.2. IV estimates

However, there are good reasons to suspect that simple OLS estimates are biased. Policymakers don't take policy at random, violating the random assignment assumption of the treatment. As explained above, we therefore turn to instrumental variable local projections, exploiting the well known macroeconomic trilemma. Countries that peg (de facto or de jure) their exchange rate under relatively open capital accounts are forced to import the monetary policy of the base country. In our IV estimates, we therefore only use the variation in monetary policy that is due to changes in base country interest rates. A necessary but defensible assumption here is that base country policymakers do not pay attention to economic conditions in the pegging country.

The IV estimates are displayed in Figure 5. Overall, the IV estimates reinforce the previous estimates, implicitly pointing to some attenuation bias in the OLS estimates. In particular, the effect of changes in monetary conditions on mortgage credit strengthens and cumulates to 1.66% after two years. Moreover, the effects are precisely estimated and significant over virtually all quarters in the first two years. Consumer credit tends to be negatively impacted by higher interest rates, but the effects are rather small economically and insignificant both in the OLS local projections and in the instrumental variable regressions.

Effects of IV

Figure 5



5.2. Macroprudential measures

In this section, we compare the effects of interest rate changes with other policy action by central banks, namely macroprudential measures. We first look at the effects in a simple event study format, controlling for observables. In a second step, we make use of synthetic control methods to tease out causal effects.

Moreover, we differentiate between two types of macroprudential policy tools. Our first variable covers tightening measures targeting housing credit. It codes all housing credit-targeted measures as the sum of LTV limits, DSTI limits, risk weights on housing loans, provisioning requirements and exposure limits on the property

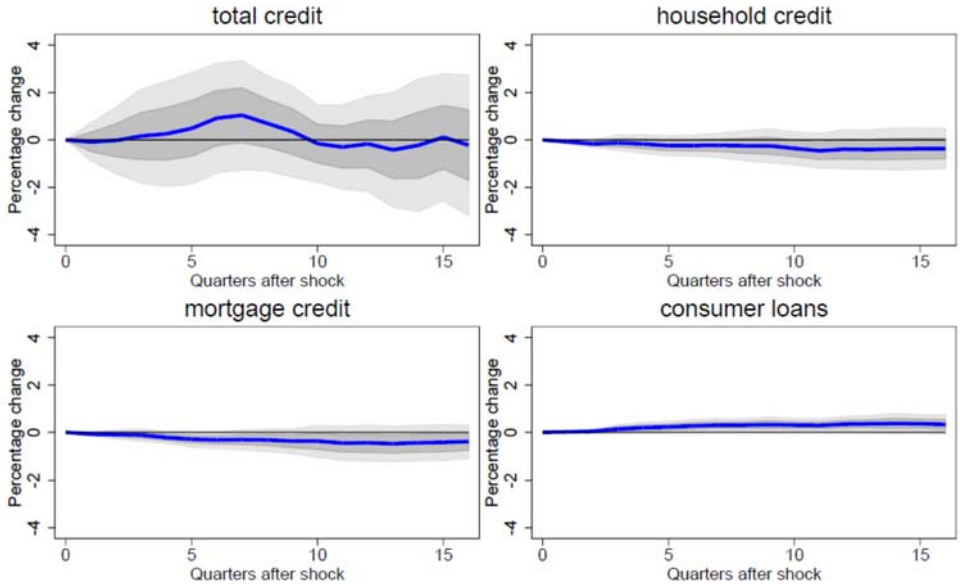
sector. The second variable relates to more general non-interest rate monetary policy actions targeting general bank credit, defined as the sum of changes in reserve requirements, changes in liquidity requirements and credit growth limits.

5.2.1. OLS event study

The OLS estimates of a macroprudential tightening measures targeting housing credit are shown in Figure 6. Figure 7 highlights the effects of non-interest rate monetary policy actions targeting general bank credit.

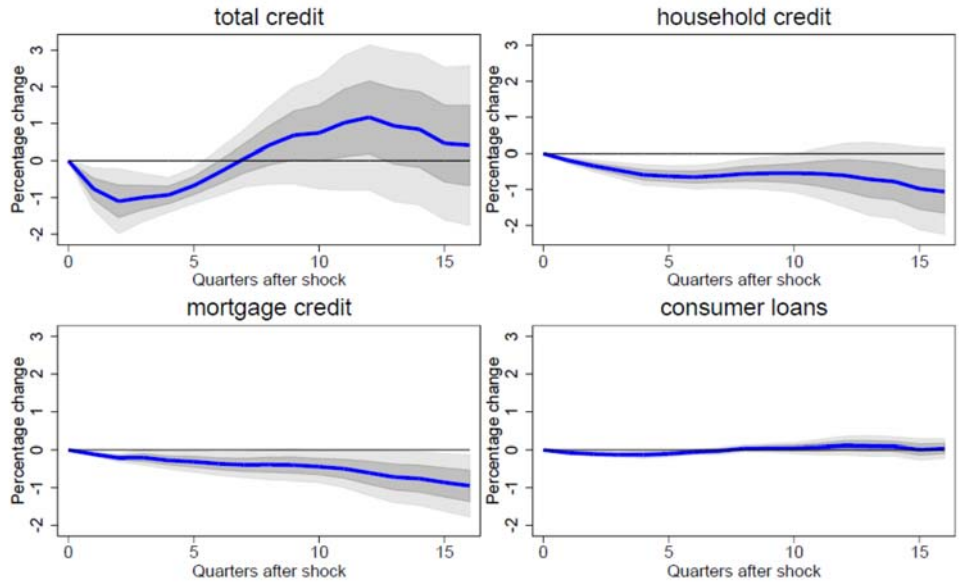
Effects of housing credit measures

Figure 6



Effects of general credit measures

Figure 7



Two results in particular stand out. First, macroprudential measures appear to put a break on credit growth, but the effects are relatively small. Second, at least in our sample of Asia-Pacific economies, it appears that macroprudential measures targeting the housing market only are less effective than measures such as higher reserve requirements that affect all kinds of credit.

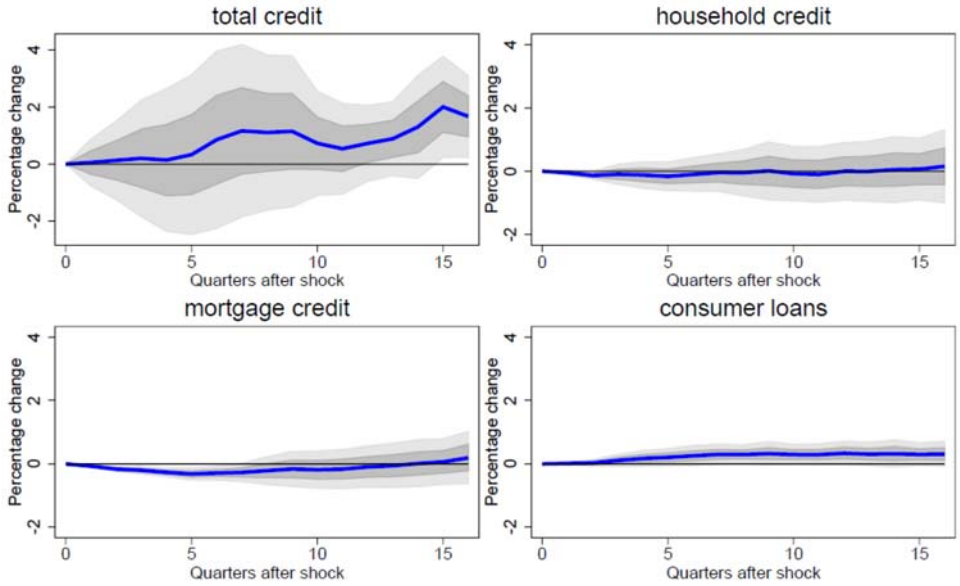
In additional, we find statistically significant but economically weak evidence that housing credit policies increase consumer loans after one year. This finding suggests that housing credit-targeted prudential policies may generate leakages from housing credit to consumer credit.

5.2.2. Local projections using inverse propensity weights

We now turn to the local projection estimates using inverse propensity weights (IPW). We will compare them with the OLS estimates above to gauge to what extent the synthetic control strategy alters the "naive" OLS estimates. Figure 8 shows the effects of housing credit restrictions, while Figure 9 shows the effects of general credit restrictions. In both cases, we estimate fixed effects panel regressions using inverse propensity weights obtained from a first stage panel probabilistic model, where the dependent variable is an indicator variable for a macroprudential measure taken by the authorities at time t. We estimate the probability that the authorities take a macroprudential action using the following log-odds model:

$$log\left(\frac{Pr(S_{it}=1|X_{it})}{Pr(S_{it}=0|X_{it})}\right)=\alpha_i+\beta X_{it}+\epsilon_{it}. \quad (4)$$

Effects of housing credit measures (IPW) Figure 8



X_{it} contains four lags of the growth rates of credit to GDP, real GDP growth, asset prices and inflation. To soak up country heterogeneity we will include a country fixed effect α_i for each of the countries. We then use the time-varying probabilities of macroprudential measures being taken to weigh observations in the local projections. The lower the probability, the bigger the weight of the observation in the weighted least squares regression as the "unpredictable" actions come closest to the random allocation ideal.

Effects of general credit measures (IPW) Figure 9

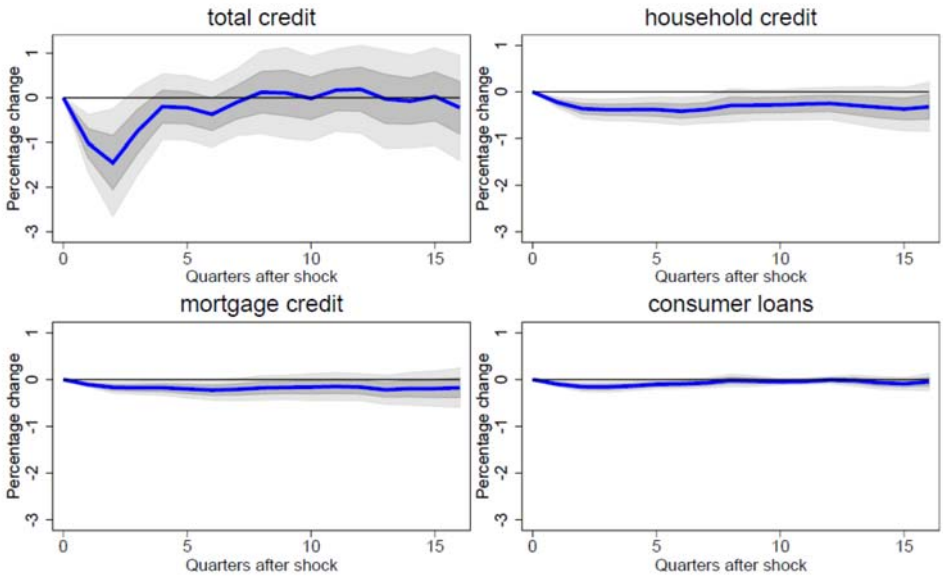


Figure 8 shows the effects of housing market lending restrictions estimated using inverse propensity weights, while Figure 9 tracks the response of the credit aggregates to general credit measures.

The results confirm a small but, certainly in the case of general credit measures, significant impact of macroprudential actions on the credit cycle. However, in particular in the case of general credit measures, the estimated effects appear a little smaller once we use synthetic control group measures. Finally, similar to when we run simple OLS regressions, we find weak evidence that consumer credit increases after housing credit policies are tightened.

Overall, we conclude that macroprudential measures appear to have slowed down the credit cycle in the Asian economies under study here. The main economic effects – essentially a stabilisation of the credit-to-GDP ratio over a two-year period – do not appear to be extremely pronounced, but can play a role in controlling the build-up of financial imbalances.

6. Conclusion

In this paper, we ask how central banks can manage the household credit cycle and which types of policy action hold more promise than others. We find that general credit-targeted policies have larger effects on household credit than housing credit policies, that there is evidence that housing credit policies generate leakages from housing credit to consumer credit, and that mitigation of attenuation bias by using IV estimates of domestic policy rates reveals stronger policy effects than domestic policy rates themselves.

There are numerous areas for further research. First, in this paper, we used the US policy rate as an instrument for domestic policy rates if an economy's capital account is open and its exchange rate is pegged, and tested the transmission channel from monetary policy to household credit using local projections. Alternatively, we

could feed Romer and Romer (2004) policy shocks into local projections and consider their impact on credit growth. Second, this paper only considers 12 Asia-Pacific economies, including both advanced economies and emerging market economies (EMEs). Second, we can extend the analysis to non-Asia-Pacific economies to the extent that data on household, housing and consumer credit are available. We have relatively long household credit series for most advanced economies in Europe and North America. Among non-Asian EMEs, we found that we could consider at least nine more EMEs in central and eastern Europe and Latin America.

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