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**FINANCIAL CYCLES IN ASSET
MARKETS AND REGIONS**

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Abstract

This paper provides a comprehensive analysis of financial cycles in asset markets and regions. Using a large sample of 38 advanced and emerging economies to enable a comparative assessment, the analysis conforms with the prevailing literature on financial cycles pertaining to advanced economies, but finds that equity market cycles in emerging market economies in Asia, Latin America, and Eastern Europe may be a more useful gauge of the financial cycle compared to cycles in credit and property markets. Similar to more advanced economies, it is found that financial and business cycles in emerging economies are synchronized, albeit partially and with some cross-country heterogeneity. This underscores the importance for policy makers to be vigilant of interlinkages between real and financial sectors, pointing toward a need for carefully designed macroprudential policies. Finally, it is found that financial cycles in emerging markets remain vulnerable to global risk aversion in financial markets and spillovers from the United States, thereby reinforcing the importance of continuing to strengthen domestic macroeconomic fundamentals, and develop further local financial sectors through targeted structural reforms.

Keywords: financial cycle, business cycle, emerging markets

JEL Classification: C38, E32, E44

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1. INTRODUCTION

This paper carries out an analysis of differences in cycles across asset markets and regions, and examines differences in determinants across regions. It is useful from a policy perspective to gain insight into whether there are systematic differences in turning points across indicators used to gauge the financial cycle (e.g., credit/GDP, equity prices, real estate prices, and broader risk aversion). As noted by Claessens, Kose, and Terrones (2011), credit, property, and equity are key measures of the financial cycle in respect of the core role that these markets play in financial intermediation. In addition, the determinants of the cycle across regions are assessed. While there has been a substantial amount of recent academic work carried out on the role of the global financial cycle in capital flows and the underpinning investor behavior (e.g., Borio 2012; Rey 2013), relatively little attention has been paid to the heterogeneity of cyclical patterns across asset classes and interactions within and across regional financial cycles. Moreover, while cycles tend to incorporate a common global component, they do not necessarily move in step. For example, financial cycle downswings in many advanced economies in recent years have coincided with upswings in many large emerging market economies (EMEs) (BIS 2014). Across a sample of 38 advanced and emerging economies, this paper aims at: (i) understanding the extent to which cyclical behavior in credit, property and equity are synchronized and assessing which measure of the financial cycle may be more important for policy purposes; (ii) analyzing the degree of synchronization between financial and business cycles, and (iii) gaining insight into the domestic and global factors driving the financial cycle.

Gaining an understanding of differences in cyclical behavior across indicators used to gauge the financial cycle is of key importance from a financial stability perspective. This is particularly the case for economies that are at the late stage of the cycle. As a result of accommodative monetary policies in advanced economies and the search for yield by investors, capital inflows to emerging markets have contributed to credit expanding at growth rates in excess of nominal GDP growth. This has resulted in many emerging economies being at the late stage of the credit cycle, notably those in Asia and Latin America. For example, in the early part of this decade, credit growth as a whole in emerging economies has grown, on average, about five percentage points higher than GDP growth (compared to advanced economies, where credit growth was lower than GDP growth). At a country-level, of the major emerging markets, credit growth appears to be excessive in Brazil, the People's Republic of China, and India. Moreover, rising non-performing loan rates in Brazil, India, and South Africa suggests that asset quality may already be deteriorating. Emerging markets at the late stage of the credit cycle may encounter risks to financial stability that are linked to lower credit quality for new credit, capital flow reversals, asset price collapses, and detrimental effects on bank profitability. These risks are exacerbated in the absence of space for accommodative domestic fiscal and monetary policies, and poor prudential regulation. Managing the gradual unwinding of financial imbalances therefore poses challenges for many emerging markets. While strengthening the resilience of the financial sector can play a key role, the use of both domestic macroeconomic policy where possible and macroprudential measures can help to alleviate the extent to which the credit cycle damages the economy.

This paper contributes to the literature in three main ways. First, an attempt is made to evaluate different measures of the financial cycle and identify which measure may warrant more importance for policy makers. Second, a comprehensive assessment of financial and business cycles is carried out across a large sample of 38 advanced and emerging economies. Previously, the literature tended to focus on selected advanced

economies, the findings of which may not necessarily hold for emerging markets. Global capital flow developments and monetary policies in advanced economies mean that financial and business cycle dynamics may differ substantially in emerging economies. Third, the literature has tended to focus on measuring the cycle as opposed to understanding the drivers. Using a fixed effects panel approach, this paper provides estimates of global and domestic factors driving the financial cycle across a large sample of advanced and emerging economies. These results have important implications for policy makers, investors, and academics.

The main findings are that, as a gauge of the financial cycle, equity market cycles in Asia and other emerging markets may be more useful compared to cycles in credit and property markets. A possible explanation for this may relate to underlying structural differences in the financial sector in emerging economies compared to advanced economies (e.g., the depth of financial markets, the efficiency and effectiveness of financial intermediation, and the overall level of financial development). Similar to advanced economies, it is found that financial and business cycles in emerging economies are synchronized, albeit partially and with some cross-country heterogeneity. This underscores the importance for policy makers to be vigilant of interlinkages between real and financial sectors, thus pointing toward a need for carefully designed macroprudential policies. Finally, it is found that financial cycles in emerging markets in Asia and elsewhere remain vulnerable to global risk aversion in financial markets and spillovers from the United States (US) in particular. This underscores the importance for Asian economies to continue to strengthen domestic macroeconomic fundamentals, and particularly in developing further local financial sectors through targeted structural reforms.

2. RELATED LITERATURE

Financial and business cycles can be broadly split into two phases: expansion and contraction. Academic research on credit cycles has tended to draw on the work of Minsky (1992), who was the first economist to demonstrate that asset price bubbles are driven by credit cycles. Minsky described the credit expansion cycle in three distinct phases. In the first stage of expansion, borrowers are able to meet all interest and principal amounts related to the borrowings—so-called “hedge borrowers.” In the second expansion phase, so-called “speculative borrowers” only have the ability to service their loan holdings, and rollover their debts in order to make these service payments. In the final phase of credit expansion, so-called “Ponzi borrowers” are not able to either repay principal amounts or make service payments. Such borrowers can only survive by refinancing and rolling over debt in an environment of rising asset prices. Recent data for some major emerging markets suggest that the Minsky credit cycle is close to or has already reached its peak. In theory, the end of the expansion cycle, or the turning point, should also coincide with a decline in asset prices, forcing “Ponzi borrowers” to sell, thereby pushing prices further downwards. This paper aims at filling the gap in the literature as regards looking more closely at financial cycle dynamics relative to a large set of advanced and emerging economies. In particular, the paper contributes to the strands of the literature on financial (and business) cycle synchronization and early warning properties.

The characterization of financial cycles is a feature of Claessens, Kose, and Terrones (2011), who find that for a sample of 21 advanced economies, credit and equity price cycles are highly synchronized, and contractions in credit and equity markets tend to be of greater duration and more pronounced. Studies have also been carried out on synchronization across countries. For example, Meller and Metiu (2017) conduct a study

of credit cycle synchronization across 12 European countries, finding some clusters of synchronization. In addition, Schüler, Hiebert, and Peltonen (2015) show that credit and asset prices share cyclical similarities for a sample of European countries, and overall concordance of financial and business cycles about two-thirds of the time. The recent literature also forms the consensus view that the financial cycle is longer and of greater amplitude than the business cycle (e.g., Borio 2012). For Asia, Pontines (2017) examines financial and business cycles in Hong Kong, China; Malaysia; the Philippines; and Thailand, finding that financial cycles are longer in duration than business cycles, in line with the literature on advanced economies. This paper contributes to the strand of the literature on characterizing the cycle through an analysis of financial and business cycle synchronization using a large sample of advanced and emerging countries.

This paper also contributes to the strand of the literature on the early warning properties associated with financial cycles. The early work in this regard can be traced back to Kindleberger (1978) and Minsky (1986), who examined the role of credit booms leading to crisis events. Prior to the global financial crisis, work on financial cycles was not prevalent in a direct way, e.g., studies on the role played by asset price booms and credit aggregates on economic activity (Detken and Smets 2004; Goodhart and Hofmann 2008; Schularick and Taylor 2012). After the crisis, more direct analysis on financial cycles was undertaken. Drehmann, Borio, and Tsatsaronis (2012) show that financial cycle peaks are closely associated with financial crises. Moreover, a strong role was found for credit aggregates and property prices in characterizing the financial cycle in advanced economies. More recently, Aikman et al. (2014) relate large swings in credit to banking crises—boom phase characterized by large deviations from trend. While the research carried out in this paper largely conforms with the findings in the previous literature pertaining to advanced economies, it has been found that this result does not necessarily hold for emerging economies. In addition, more broadly, academic work on financial cycles in emerging markets is not very prevalent in the literature and that is one of the motivations underpinning this research.

3. DATA AND METHODOLOGY

Data is collected from the BIS and IMF for 38 advanced and emerging economies over as long a time series as possible for the financial and business cycle variables. For the majority of the countries, the sample runs from 1970Q1 to 2018Q3 across the following variables: credit/GDP, credit level, property prices, equity prices, and GDP.¹ All variables are in real terms and transformed into logarithms (excluding credit/GDP). For the analysis of the determinants of the financial cycle, the following variables were collected: GDP growth, CPI inflation, real effective exchange rate, current account/GDP, fiscal balance/GDP, interest rate (3-month money market rate), global risk aversion (VIX). A regional financial spillover variable was constructed as a GDP-weighted average of financial cycles in the region (excluding the object country), while spillovers from the US financial cycle variable are also estimated.

¹ See Appendix for precise sample periods by country. The selection of countries was underpinned by data availability over a sufficiently long time period.

A multi-faceted methodology is employed in this paper. In a first step, the medium-term cyclical component is extracted from the financial and business cycle variables using the Christiano-Fitzgerald band-pass filter.² The Christiano-Fitzgerald band-pass filter approach is rationalized due to three key properties: (i) it constitutes the estimation of an optimal finite linear approximation to the precise band-pass filter; (ii) compared to the Hodrick-Prescott filter, the Christiano-Fitzgerald filter permits the extractions of cyclical components within a specific frequency range; and (iii) it overcomes the end-point problem given that it is asymmetric. In implementing the approach, a bandwidth of 32 to 120 quarters is used where possible in order to extract the medium-term component (depending on the length of the time series available).³

In addition, the synchronization between financial cycle measures is tested using the longest common sample period available across variables (at least 25 years of (quarterly) data up to 2018Q3 for the majority of countries). A similar analysis is carried out for financial and business cycles. Following Meller and Metiu (2017), the financial cycle variable, $f_{i,t}$, is mapped into a binary variable, $Z_{i,t}$, taking the value of 1 when cycle phasing upwards and -1 when phasing downwards, i.e.,

$$Z_{i,t}^{phase} = \frac{\Delta f_{i,t}}{|\Delta f_{i,t}|} = \begin{cases} 1: \text{if cycle in upward phase} \\ -1: \text{if cycle in downward phase} \end{cases} \quad (1)$$

$Z_{i,t}$ also defined in terms of a deviation from a long-run trend

$$Z_{i,t}^{gap} = \frac{f_{i,t}}{|f_{i,t}|} = \begin{cases} 1: \text{if cycle higher than long run trend} \\ -1: \text{if cycle lower than long run trend} \end{cases} \quad (2)$$

Synchronization, denoted $S_{i,t}^{ij} = Z_{i,t}Z_{j,t}$, takes a value of 1 where cycles i and j and in the same phase and -1 otherwise. Finally, the extent and statistical significance of the synchronization term is determined by a regression of $S_{i,t}^{ij}$ on a constant, denoted as follows:

$$S_{i,t}^{ij} = \beta s^{ij} + \varepsilon_t \quad (3)$$

As well as examining cycle synchronization, an assessment is also made of which indicator should be more closely examined across countries to reflect the financial cycle. First, the eigenvector loadings from the first principal component over the longest common sample period of credit, equity and property cycles is examined across regions (Kunovac, Mandler, and Scharnagl 2018). This equates to a measure of the correlation of each financial cycle variable with the first principal component. The principal components are defined recursively and represent linear combinations of the cycle

² The estimation takes the following form: $c_{i,t} = B_0 y_{i,t} + B_1 y_{i,t+1} + B_{T-1-t} y_{i,T-1} + \tilde{B}_{T-t} y_{i,T} + B_1 y_{i,t-1} + \dots + B_{t-2} y_{i,2} + \tilde{B}_{t-1} y_{i,1}$, where $B_j = \sin(j_b) - \sin(j_a)/\pi j$, $j \geq 1$, and $B_0 = b - a/\pi$, $a = 2\pi/p_u$, $b = 2\pi/p_l$; $\tilde{B}_k = -1/2B_0 - \sum_{j=1}^{k-1} B_j$.

³ See Table A1 in Appendix for full details of frequency bandwidths and sample periods used across countries. It is also worth noting that the bandwidths selected are robust to alternative bandwidths ± 6 periods. The baseline selection is based on that shown in Table A1. In addition, following Rünstler and Vlekke (2018) and Oman (2019), for the synchronization analysis, to aid comparability, a common (or at least overlapping) frequency bandwidth across countries is used to extract the cyclical components from credit, property, equity and GDP. Indeed, Rünstler and Vlekke (2018) showed that the medium-term component in the GDP cycle (i.e., the business cycle) correlates closely with that of the credit and property cycle for a sample of advanced economies.

measures that are not correlated.⁴ Second, the early warning properties of the cycles (based on logistic regressions using the Laeven Valencia [2018] indicator for systemic banking crisis [vulnerability horizon of 8 quarters]):

$$Pr(Crisis_{i,t}=1|f_{i,t},\alpha_i)=\exp(\alpha_i+\beta f_{i,t})/1+\exp(\alpha_i+\beta f_{i,t}) \quad (4)$$

where $Crisis_{i,t}$ denotes a dummy variable taking the value of 1 where a country has incurred a systemic banking crisis according to Laeven and Valencia (2018), $f_{i,t}$ denotes the financial cycle variable, and α_i are country-specific fixed effects. This indicator is available for all countries over the period 1970 to 2017 at annual frequency, and is interpolated to quarterly.

Finally, the determinants of the financial cycle are assessed using a balanced fixed effects panel approach over the period 1995Q4 to 2018Q3, with the preferred financial cycle variable across regions used accordingly (as indicated from the prior analysis), based on the following equation:

$$f_{i,t} = \alpha + \alpha_i + \beta X_{i,t-1} + \lambda S_{i,t-1} + \delta VIX_{t-1} + \mu USP_{t-1} + \varepsilon_{i,t} \quad (5)$$

where $f_{i,t}$ denotes the financial cycle variable, $X_{i,t}$ represents a set of economic fundamentals, $S_{i,t}$ is the regional financial spillover for the region in which country i is located and excludes country i itself, VIX is the Chicago Board Options measure of 30-day expected volatility of the US stock market based on the prices of options on the S&P 500 Index, USP is a US financial cycle spillover, α is a common intercept, while α_i are country-specific fixed effects. First-differences of the variables are used where non-stationarity in levels exists. Given that a common intercept is included in the model, these fixed effects denote the country-specific deviations from the common intercept. The fixed effects control for arbitrary correlation between the unobserved country-specific effects and the observed explanatory variables (Wooldridge 2002). Moreover, under the assumption of strict exogeneity, it also takes into account country-specific differences.

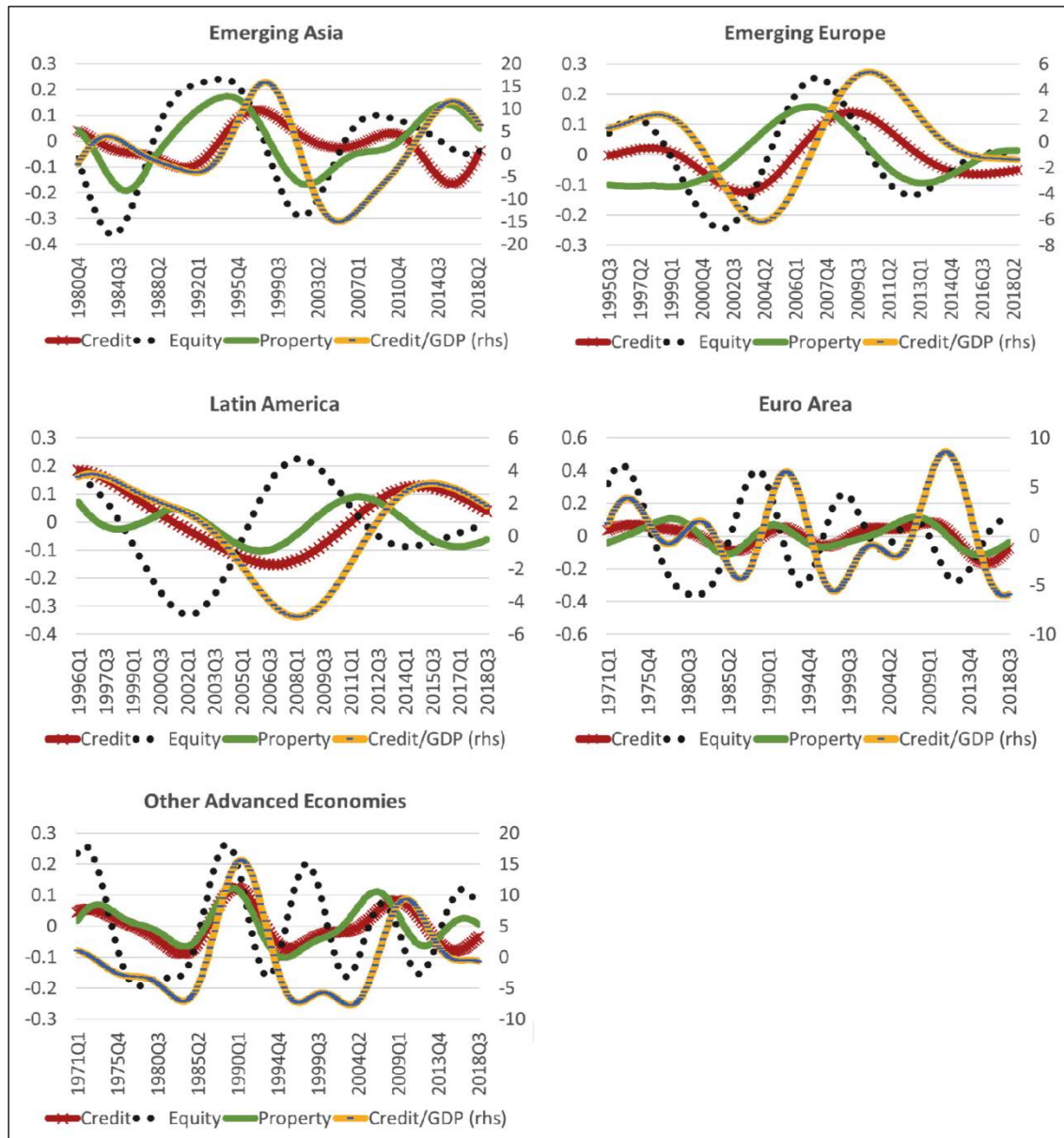
4. EMPIRICAL RESULTS

4.1 Characterizing the Financial Cycle

The financial cycles are estimated using the Christiano-Fitzgerald approach. Figure 1 plots the results from advanced and emerging economies.⁵

⁴ More formally, in a random vector X of n dimensions, where $X = X_1, \dots, X_n$ with covariance matrix Σ with eigenvalues $\lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_n \geq 0$. If $\omega_i = (\omega_{i1}, \dots, \omega_{in})$ is an n -dimensional vector, where $i=1, \dots, n$ then linear combinations of X can be defined as $Y_i = \omega_i'X = \sum_{j=1}^n \omega_{ij}X_j$. The variance and covariance of these linear combinations of X can be denoted as $\text{Var}Y_i = \omega_i'\Sigma\omega_i$ and $\text{Cov}(Y_i, Y_j) = \omega_i'\Sigma\omega_j$. The first principal component is then defined as a linear combination of $Y = \omega_i'X$ with maximum variance subject to the constraint that $\omega_i'\omega_i = 1$, i.e., by standardizing by applying a unitary weighting vector. The analysis is applied to the longest available common sample period across the variables (see Appendix).

⁵ The Appendix provides the financial cycles on a country-specific basis for the 38 advanced and emerging economies in the sample.

Figure 1: Financial Cycles Advanced and Emerging Economies

The extracted financial cycles appear to be a good reflection of major economic events. For example, crisis events as such the global financial crisis of 2007/08 and the Asian crisis of 1997 are associated with cyclical downturns across all measures of the financial cycle for the main countries affected. That said, with the exception of credit and property cycles in advanced economies, it is clear that cycles are not fully synchronized across measures. This is particularly the case for emerging economies in Asia, Latin America, and Eastern Europe. In addition, over the entire sample period there can be episodes of differences as regards the direction and scale (amplitude) of cycles depending on which financial cycle measure is monitored. This undoubtedly affects the extent to which economies can lean against financial cycles with appropriate policy responses. Nonetheless, the question also arises as to which financial cycle measure contains more forward-looking information. Table 1 provides the extent of synchronization of financial cycles across different indicators of the financial cycle *within* countries over the sample period.

Table 1: Synchronization (Phase) across Measures of the Financial Cycle within Countries

	Credit/GDP: Credit	Credit/GDP: Equity	Credit/GDP: Property	Credit: Equity	Credit: Property	Equity: Property
<i>Latin America</i>						
Argentina	0.60***	-0.44**	n/a	-0.29	n/a	n/a
Brazil	0.96***	-0.18**	0.56***	0.02	0.60***	-0.16
Mexico	0.96***	0.23	0.26	0.23	0.30	0.16
<i>Asia</i>						
People's Republic of China	0.19	-0.10	n/a	-0.21	n/a	n/a
Hong Kong, China	0.91***	0.08	0.69***	0.08	0.69***	0.27
India	0.90***	0.40**	n/a	0.50***	n/a	n/a
Indonesia	0.90***	0.62***	n/a	0.60***	n/a	n/a
Republic of Korea	0.14	-0.39***	-0.66***	0.30**	0.18	0.60***
Malaysia	0.81***	-0.29	0.13	-0.41**	0.02	0.57***
Singapore	0.43**	-0.88***	0.25	-0.31	0.16	-0.13
Thailand	0.86***	-0.02	-0.16	-0.02	-0.16	0.64***
<i>Eastern Europe</i>						
Czech Rep.	0.82***	0.16	n/a	-0.07	n/a	n/a
Hungary	0.50**	0.64***	-0.39*	0.50**	0.11	-0.11
Poland	0.76***	-0.44**	-0.38**	-0.21	-0.38*	0.71***
Russian Federation	0.82***	0.62***	n/a	0.80***	n/a	n/a
Saudi Arabia	0.52***	0.12	n/a	0.21	n/a	n/a
South Africa	0.71***	0.39***	0.44***	0.48***	0.69***	0.39***
Turkey	0.84***	0.60***	0.04	0.68***	0.00	0.16
<i>Euro Area</i>						
Austria	0.73***	-0.12	-0.01	0.06	0.24*	-0.10
Belgium	0.68***	-0.32**	0.08	-0.09	0.36***	-0.04
Germany	0.43***	-0.02	-0.21	0.14	-0.36**	-0.34**
Finland	0.62***	-0.29**	0.16	0.08	0.54***	0.55***
France	0.49***	-0.08	0.00	0.01	0.47***	-0.26*
Greece	0.71***	0.15	0.17	0.33*	0.46***	0.52***
Ireland	0.13	-0.55**	-0.13	0.27	0.75***	0.52**
Italy	0.82***	-0.01	0.43***	0.08	0.38**	-0.34**
Netherlands	0.68***	-0.24	0.79***	-0.01	0.75***	0.56***
Portugal	0.71***	0.31*	0.04	0.60***	0.33*	0.54***
Spain	0.72***	-0.17	0.39***	-0.09	0.63***	0.22
<i>Other Advanced</i>						
Australia	0.69***	0.53**	0.32**	0.56***	0.54***	0.10
Canada	0.24*	-0.28**	0.26*	-0.01	0.14	-0.38***
Denmark	-0.18	-0.11	0.18	0.48***	0.40***	0.13
Japan	0.91***	0.23	0.72	0.17	0.70***	0.33**
Norway	0.71***	0.12	0.17	0.03	0.21	-0.09
Sweden	0.81***	0.12	0.19	0.18	0.31**	-0.38***
Switzerland	0.53***	-0.06	0.40***	0.26*	0.73***	0.19
United Kingdom	0.84***	0.21	0.64***	0.17	0.80***	0.08
United States	0.51***	-0.01	0.49***	0.19	0.38***	-0.10

Note: Table 1 reports the β coefficients as described in equation (3) using the “phase” definition as per equation (1).

Table 2: Synchronization (Phase) of Financial and Business Cycles within Regions

	Credit	Equity	Property	GDP
<i>Latin America</i>				
Argentina	0.43**	0.26	n/a	0.48***
Brazil	0.76***	0.14	0.14	0.48***
Mexico	0.15	0.48***	0.14	0.07
<i>Asia</i>				
People's Republic of China	-0.35***	0.05	n/a	0.35**
Hong Kong, China	0.43***	0.36**	0.74***	0.32*
India	-0.16	0.79***	n/a	0.54***
Indonesia	0.60***	0.40**	n/a	0.18
Republic of Korea	0.37**	0.81***	0.03	0.37**
Malaysia	-0.03	0.43**	0.18	0.49***
Singapore	0.42**	0.57***	0.12	0.32*
Thailand	0.79***	0.14	0.32	0.66***
<i>Eastern Europe</i>				
Czech Republic	0.57***	0.67***	n/a	0.82***
Hungary	0.08	0.70***	-0.10	-0.01
Poland	0.11	0.87***	0.60***	0.39**
Russian Federation	0.42**	0.70***	n/a	0.82***
Saudi Arabia	0.37**	0.39**	n/a	0.82***
South Africa	0.80***	0.32*	0.87***	0.44**
Turkey	0.52***	0.37**	0.27	0.49***
<i>Euro Area</i>				
Austria	0.47***	0.31*	-0.07	0.74***
Belgium	0.37***	0.74***	0.25	0.84***
Germany	0.24	0.64***	-0.04	0.33**
Finland	0.36**	0.78***	0.63***	0.64***
France	0.56***	0.83***	0.54**	0.83***
Greece	0.15	0.59***	0.38**	0.54***
Ireland	0.27*	0.59***	0.73***	0.27*
Italy	0.44***	0.87***	0.52***	0.90***
Netherlands	0.15	0.79***	0.02	0.80***
Portugal	0.47***	0.64***	0.33*	0.79***
Spain	0.54***	0.89***	0.77***	0.76***
<i>Other Advanced</i>				
Australia	0.75***	0.65***	0.52**	0.43***
Canada	0.28**	0.65***	0.21	0.81***
Denmark	0.57***	0.45***	0.18	0.64***
Japan	0.36***	0.62***	-0.12	0.48***
Norway	0.16	0.50***	0.17	0.33**
Sweden	0.38***	0.57***	0.32**	0.80***
Switzerland	0.28**	0.55***	0.12	0.41***
United Kingdom	0.48***	0.69***	0.81***	0.80***
United States	0.43**	0.45***	0.33**	0.72***

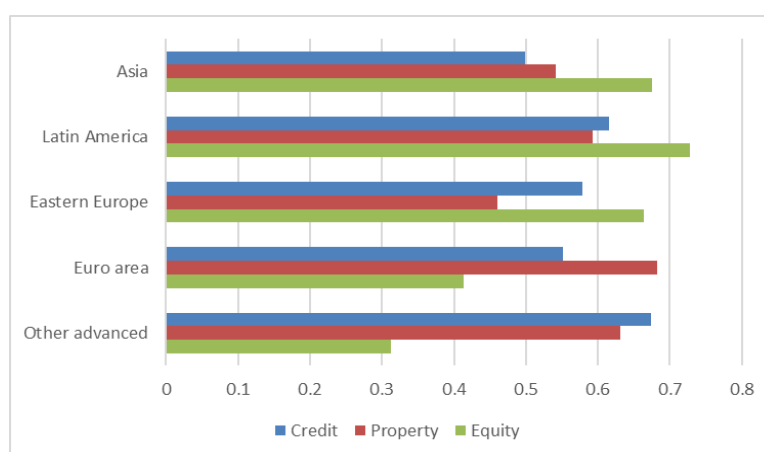
Note: Table 2 reports the β coefficients as described in equation (3) using the “phase” definition as per equation (1). The business cycle variable is constructed using the Christiano-Fitzgerald band-pass filter on real GDP for each country in the sample.

From Table 1, it is apparent that credit and property in advanced economies are partially and positively synchronized. The statistical significance of the results is remarkably high, with a size of the effect at around or slightly above 0.5. Positive synchronization between credit and equity, and equity and property in advanced economies is only evident in some of the countries. In Asia and Eastern Europe, cycles in credit and equity, and property

and equity are positively synchronized in many cases, with little evidence of synchronization in credit and property markets cycles. This points toward the important role that equity market cycles may have in these regions as a measure of the financial cycle, in contrast to advanced economies, i.e., equity markets cycles appear reflect reasonably well fluctuations in credit and property over the entire sample period on average, while this is largely not the case for advanced economies (indeed, for many advanced economies, equity and property market cycles are inversely synchronized on average over the sample period). For robustness, an alternative definition of synchronization is used, based on equation (2), whereby synchronization is defined in terms of a deviation from a long-run trend instead of whether it is phasing upwards for downwards from period to period. These synchronization results, shown in Table A2 in the Appendix, are in line with the findings in Table 1. Table 2 provides details of the extent to which financial and business cycles *within regions* are synchronized.

Table 2 indicates that within regions, financial cycle measures and the business cycle are largely well synchronized.⁶ This is the case largely across the entire sample of advanced and emerging economies. This is perhaps not surprising. For example, close interdependencies within regions in terms of financial and trade channels would imply an expectation that asset-market-specific cycles as well as the real sector would move in tandem. Nonetheless, the question still remains as to which measure of the financial cycle is most important. To get at this question, the next stage of the approach comprises identifying which indicator is preferable based on (a) its correlation with the first principal component across a vector of all financial cycle variables, and (b) its early warning properties. Figure 2 plots the eigenvector loadings from the first principal component of credit, property, and equity.

Figure 2: Eigenvector Loadings from First Principal Component



Note: Reported are the eigenvector loadings from a principal component analysis that extracts a common factor from equity, credit, and property price cycles.

For emerging economies in Asia, Latin America, and Eastern Europe, it is clear that there exists a strong common factor among credit, property, and equity price cycles, and this is largely not surprising. It is notable, however, that compared to emerging economies, the correlation of equity with the first principal component in advanced economies is lower. For emerging economies, it appears that the equity market is most prominently

⁶ Indeed, given some marginal differences in bandwidth frequencies at the regional level (although still overlapping), the magnitudes of the estimated synchronization coefficients may even be understated.

correlated with the first principal component of credit, property, and equity, pointing toward the importance of monitoring stock market developments for turning points in the financial cycle. The relative importance of each measure of the financial cycle is also examined through an assessment of the early warning properties of credit, property, and equity via a series of logistic regressions based on the Laeven Valencia (2018) indicator for systemic banking crises (taking a vulnerability horizon of eight quarters). These results indicate that equity prices are more informative than credit and property prices in emerging Asia, Latin America, and Eastern Europe as regards early warning properties (Figure 3).

Figure 3: Early Warning Properties



Note: Reported are the McFadden r^2 values from a set of panel logistic regressions from equation (4) in the methodology using the Laeven Valencia indicator for systemic banking crisis as the dependent variable (based on vulnerability horizon of eight quarters). More specifically, $\Pr(\text{Crisis}_{i,t} = 1 | f_{i,t}, \alpha_i) = \exp(\alpha_i + \beta f_{i,t}) / 1 + \exp(\alpha_i + \beta f_{i,t})$ is estimated over the period 1970Q1 (or earliest available; see Appendix) to 2017Q4 where $\text{Crisis}_{i,t}$ denotes a dummy variable taking the value of 1 where a country has incurred a systemic banking crisis according to Laeven and Valencia (2018), $f_{i,t}$ denotes the financial cycle variable, and α_i are country-specific fixed effects.

The results in Figure 3 underscore the importance for emerging markets to closely monitor equity market developments, given the information content that they embody in predicting a systemic banking crisis event. This contrasts with advanced economies, where credit and property markets appear to be more informative crisis indicators. This of course does not imply that emerging markets should disregard the build-up of excesses in credit and property markets. And, indeed, it has already been shown that equity and credit, and equity and property are reasonably well (and positively) synchronized in emerging economies. Rather, it suggests that equity markets in emerging markets, notably in Asia, are a more important indicator. This is closely related to capital flow developments in times of crisis versus non-crisis. In crisis times, emerging markets are particularly vulnerable to capital flow reversals as investors seek safe havens. In non-crisis times, search for yield means that equity markets in emerging markets can be more susceptible to large capital inflows. Given the early warning properties of equity markets in emerging markets, the dynamics of global capital flow developments may suggest that the medium-term component in equity prices is an important consideration that policy makers need to monitor closely.

4.2 Financial Cycles and Business Cycles

The synchronization of financial and business cycles is an important issue for policy makers. In particular, it is important for policy makers to understand whether monetary policy and macroprudential policies are coordinated or if they offset each other. Under a

scenario of full synchronization, this would imply that monetary policy aimed at amplifying or dampening business cycles would also transmit proportionally to the financial cycle. Table 4 provides an overview of the results.

Table 4: Synchronization of Financial and Business Cycles

	Phase	Gap
<i>Latin America</i>		
Argentina	0.09	0.25
Brazil	0.55***	0.74***
Mexico	0.37**	0.15
<i>Asia</i>		
People's Republic of China	0.27	0.27*
Hong Kong, China	0.41***	0.41**
India	0.67***	0.42***
Indonesia	0.27	0.44***
Republic of Korea	0.60***	0.42***
Malaysia	0.31**	0.26**
Singapore	0.57***	0.61***
Thailand	0.68***	0.55***
<i>Eastern Europe</i>		
Czech Republic	0.30	-0.13
Hungary	0.73***	0.73***
Poland	-0.28	-0.14
Russian Federation	0.73***	0.78***
Saudi Arabia	0.89***	0.96***
South Africa	0.62***	0.66***
Turkey	0.10	-0.03
<i>Euro Area</i>		
Austria	0.73***	0.46***
Belgium	0.23	0.57***
Germany	0.50***	0.50***
Finland	0.09	0.04
France	0.42***	0.27**
Greece	0.63***	0.49***
Ireland	0.35**	0.76***
Italy	0.13	-0.08
Netherlands	0.67***	0.80***
Portugal	0.09	0.35**
Spain	0.49***	0.53***
<i>Other Advanced</i>		
Australia	0.54***	0.48***
Canada	0.31**	0.58***
Denmark	0.40***	0.16
Japan	0.71***	0.63***
Norway	0.18	0.23
Sweden	0.21	-0.06
Switzerland	0.49***	0.59***
United Kingdom	0.31**	0.30**
United States	0.49***	0.51***

Note: Table 4 reports the β coefficients as described in equation (3). For robustness, two alternative synchronization formulations are provided, following equations (1) and (2) in the methodology. The business variable cycle is constructed using the Christiano-Fitzgerald band-pass filter on real GDP for each country in the sample. Based on the previous analysis, the financial cycle is represented by the equity cycle for emerging economies and a combination of credit and property cycles for advanced economies.

The results indicate that there exists a partial synchronization between financial and business cycles. This implies that financial and business cycles should be regarded as being interdependent and containing some common component, as opposed to being regarded as independent phenomena. This result holds at the global level, and highlights the importance of ensuring that monetary and macroprudential policies are designed and implemented in a coordinated manner. More broadly, it follows that policy makers need to be particularly vigilant in monitoring excesses that build up in asset markets. The lower frequency of financial cycles can lead to complacency by policy makers in appropriately and pre-emptively addressing bubbles in asset prices, which may spill over to the real economy and lead to an amplified downturn. Indeed, as noted by Juselius et al. (2016), for monetary policy to effectively “lean against the wind,” it is of paramount importance that developments in asset markets and the financial sector are given due consideration.

4.3 The Determinants of the Financial Cycle

This section discusses the main factors driving the financial cycle. In particular, a fixed effects panel model is estimated for 38 economies over the period 1995Q4 to 2018Q3, based on equation (5). This model enables an assessment to be made of the role played by six domestic factors (real output growth, inflation, real effective exchange rate, current account/GDP, fiscal balance, and real interest rate) and three external factors (global risk aversion, regional financial spillover, US financial spillover) in affecting the financial cycle.⁷

Table 5: Determinants of the Financial Cycle

	All	Emerging Asia	Latin America	Eastern Europe	Euro Area	Other Advanced
Real output growth	0.03*	0.08*	0.06**	0.02**	0.01***	0.03***
Δ CPI inflation	0.02**	0.08*	0.01	0.05***	0.02*	0.07
Δ REER	0.04	0.01	-0.03**	0.02	0.01	-0.06
Δ Current account/GDP	-0.01	0.03	-0.02**	0.01	-0.03	-0.17
Δ Fiscal balance/GDP	-0.17*	-0.03***	-0.05*	-0.03*	— 0.01***	0.12***
Δ Real interest rate	-0.01**	-0.05*	-0.02	-0.12***	-0.03	-0.07
Global risk aversion (VIX)	-0.01	-0.15**	-0.01	-0.11**	0.08**	0.04**
Regional financial spillover (i≠j)	0.17***	0.39***	0.07***	0.04***	0.21***	0.02
US financial spillover	0.18*	0.47***	0.36***	0.23***	0.27**	0.11*
Adjusted r ²	0.34	0.42	0.47	0.28	0.52	0.38
No. of countries	38	8	3	7	11	9
No. of observations	3,496	736	276	644	1,012	828

Note: Table 5 shows the estimates from equation (5): $f_{i,t} = \alpha + \alpha_i + \beta X_{i,t-1} + \lambda S_{i,t-1} + \delta VIX_{t-1} + \mu USP_{t-1} + \varepsilon_{i,t}$ where $f_{i,t}$ denotes the preferred financial cycle variable (equity cycles for emerging economies, and a combination of credit and property cycles for advanced economies), $X_{i,t}$ represents a set of economic fundamentals, $S_{i,t}$ is the regional financial spillover defined as a GDP-weighted average of financial cycles for the region in which country i is located but excluding country i . α is a common intercept, while α_i are country-specific fixed effects. Given that a common intercept is included in the model, these fixed effects denote the country-specific deviations from the common intercept. As indicated in the table, some variables are first-differenced to account for non-stationarity, i.e., levels of CPI inflation, REER, current

⁷ The selection of domestic factors draws on the literature that examines the relationship between the financial cycle and macroeconomic fundamentals, e.g., Borio (2012); Koopman et al. (2009), while the VIX has been shown in recent studies to correlate closely with a range of asset prices and capital flows (e.g., Rey 2013).

account/GDP, fiscal balance/GDP, and real interest rate fail to reject the null of a unit root in levels, while first-differences of these variables reject the null of a unit root.

Table 5 indicates that both global and domestic factors are important drivers of the financial cycle in advanced and emerging economies. Focusing on emerging Asia, output and inflation are positively related to the cycle. In addition, government budget balances and real interest rates play an important role, with a shifting budget balance toward deficit and lower real rates stimulating aggregate demand, stoking equity markets. A similar pattern emerges in Eastern Europe and Latin America, although in the latter case, the financial cycle is also driven by exchange rate fluctuations and the current account, whereby high current account deficits fueled by net capital inflows over the sample period may lead to asset price booms. Domestic factors driving the financial cycle in advanced economies are largely attributed to real output growth and the fiscal balance. Global factors are also important; however, they are in line with the recent literature on the presence of a global financial cycle (Rey 2013). For emerging Asia and Eastern Europe, global risk aversion has a dampening effect on the financial cycle, signaling flight to safety in times of crisis. Finally, it is found that regional financial cycles in emerging markets and euro area advanced economies transmit locally and there also exists non-negligible exposure to financial spillovers from the US.

5. CONCLUSIONS AND POLICY IMPLICATIONS

This paper provides an in-depth analysis of financial and business cycles in a large sample of 38 advanced and emerging markets. Overall, while the analysis conforms with the prevailing literature on financial cycles pertaining to advanced economies, it is found that equity market cycles in emerging markets may be a more useful gauge of the financial cycle compared to cycles in credit and property markets. A possible explanation for this may relate to underlying structural differences in the financial sector in emerging compared to advanced economies (e.g., the depth of financial markets, the efficiency and effectiveness of financial intermediation, and the overall level of financial development). Similar to advanced economies, it is found that financial and business cycles are synchronized, albeit partially and with some cross-country heterogeneity. This underscores the importance for policy makers to be vigilant of interlinkages between real and financial sectors, thus pointing toward a need for carefully designed macroprudential policies. Finally, it is found that financial cycles in emerging markets in Asia, Latin America, and Eastern Europe remain vulnerable to global risk aversion in financial markets and spillovers from the US. This underscores the importance for economies in these regions to continue to strengthen domestic macroeconomic fundamentals, and in particular in developing further local financial sectors through targeted structural reforms.

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APPENDIX

Table A1: Country Coverage, Period and Bandwidth

Country	Credit	Property	Equity	GDP
Emerging Asia				
People's Republic of China	1986q1-2018q3 [32-100]	n/a	1991q1-2018q3 [32-100]	1986q1-2018q3 [32-100]
Hong Kong, China	1980q4-2018q3 [32-100]	1980q4-2018q3 [32-100]	1980q4-2018q3 [32-100]	1980q4-2018q3 [32-100]
Indonesia	1976q1-2018q3 [32-80]	2002q1-2018q3 [32-80]	1994q1-2018q3 [32-80]	1983q1-2018q3 [32-80]
India	1957q1-2018q3 [32-120]	n/a	1957q1-2018q3 [32-120]	1957q1-2018q3 [32-120]
Republic of Korea	1962q4-2018q3 [32-120]	1975q1-2018q3 [32-120]	1972q1-2018q3 [32-120]	1962q4-2018q3 [32-120]
Malaysia	1964q2-2018q3 [32-100]	1988q1-2018q3 [32-100]	1980q1-2018q3 [32-100]	1964q4-2018q3 [32-100]
Singapore	1970q4-2018q3 [32-120]	1975q1-2018q3 [32-120]	1989q4-2018q3 [32-120]	1970q4-2018q3 [32-120]
Thailand	1970q4-2018q3 [32-100]	1991q1-2018q3 [32-100]	1993q1-2018q3 [32-100]	1980q1-2018q3 [32-100]
Latin America				
Brazil	1994q1-2018q3 [32-80]	2001q1-2018q3 [32-80]	1994q1-2018q3 [32-80]	1994q1-2018q3 [32-80]
Argentina	1990q1-2018q3 [32-100]	n/a	1991q1-2018q3 [32-100]	1990q1-2018q3 [32-100]
Mexico	1981q1-2018q3 [32-120]	1981q1-2018q3 [32-120]	1981q1-2018q3 [32-120]	1981q1-2018q3 [32-120]
Eastern Europe				
Hungary	1989q4-2018q3 [32-80]	1998q1-2018q3 [32-80]	1991q1-2018q3 [32-80]	1989q4-2018q3 [32-80]
Poland	1992q1-2018q3 [32-80]	1998q1-2018q3 [32-80]	1992q1-2018q3 [32-80]	1992q1-2018q3 [32-80]
Russian Federation	1995q2-2018q3 [32-80]	n/a	1995q2-2018q3 [32-80]	1995q2-2018q3 [32-80]
Czech Republic	1993q1-2018q3 [32-80]	n/a	1993q1-2018q3 [32-80]	1993q1-2018q3 [32-80]
Turkey	1986q1-2018q3 [32-100]	1986q1-2018q3 [32-100]	1986q1-2018q3 [32-100]	1987q1-2018q3 [32-100]
South Africa	1965q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1965q1-2018q3 [32-120]	1965q1-2018q3 [32-120]
Saudi Arabia	1993q1-2018q3 [32-80]	n/a	1994q1-2018q3 [32-80]	1993q1-2018q3 [32-80]

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Table A1 *continued*

Country	Credit	Property	Equity	GDP
Euro Area				
Germany	1960q4-2018q3 [32-120]	1970q1-2018q3 [32-120]	1960q4-2018q3 [32-120]	1960q4-2018q3 [32-120]
Spain	1970q1-2018q3 [32-120]	1971q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1970q1-2018q3 [32-120]
France	1970q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1970q1-2018q3 [32-120]
Italy	1957q1-2018q3 [32-120]	1957q1-2018q3 [32-120]	1957q1-2018q3 [32-120]	1970q1-2018q3 [32-120]
Greece	1970q4-2018q3 [32-120]	1989q1-2018q3 [32-120]	1985q1-2018q3 [32-120]	1980q1-2018q3 [32-120]
Portugal	1960q4-2018q3 [32-120]	1991q1-2018q3 [32-120]	1988q2-2018q3 [32-120]	1980q1-2018q3 [32-120]
Ireland	1976q1-2018q3 [32-120]	1976q1-2018q3 [32-120]	1983q1-2018q3 [32-120]	1980q1-2018q3 [32-120]
Belgium	1970q4-2018q3 [32-120]	1970q4-2018q3 [32-120]	1970q4-2018q3 [32-120]	1980q1-2018q3 [32-120]
Netherlands	1961q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1961q1-2018q3 [32-120]	1980q1-2018q3 [32-120]
Finland	1970q4-2018q3 [32-120]	1970q4-2018q3 [32-120]	1970q4-2018q3 [32-120]	1970q4-2018q3 [32-120]
Austria	1966Q2- 2018q3 [32-120]	1966Q2- 2018q3 [32-120]	1966Q2- 2018q3 [32-120]	1980Q1- 2018q3 [32-120]
Other Advanced				
Japan	1964q4-2018q3 [32-120]	1964q4-2018q3 [32-120]	1964q4-2018q3 [32-120]	1964q4-2018q3 [32-120]
United States	1955q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1955q1-2018q3 [32-120]	1955q1-2018q3 [32-120]
United Kingdom	1963q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1963q1-2018q3 [32-120]	1963q1-2018q3 [32-120]
Canada	1957q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1957q1-2018q3 [32-120]	1957q1-2018q3 [32-120]
Australia	1960q2-2018q3 [32-120]	1960q2-2018q3 [32-120]	1970q1-2018q3 [32-120]	1980q3-2018q3 [32-120]
Norway	1960q4-2018q3 [32-120]	1970q1-2018q3 [32-120]	1969q1-2018q3 [32-120]	1978q1-2018q3 [32-120]
Sweden	1961q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1961q1-2018q3 [32-120]	1980q1-2018q3 [32-120]
Switzerland	1960q4-2018q3 [32-120]	1970q1-2018q3 [32-120]	1960q4-2018q3 [32-120]	1970q1-2018q3 [32-120]
Denmark	1970q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1970q1-2018q3 [32-120]	1970q1-2018q3 [32-120]

Note: Frequency bandwidth provided in parentheses.

Figure A1: Financial Cycles in Asia

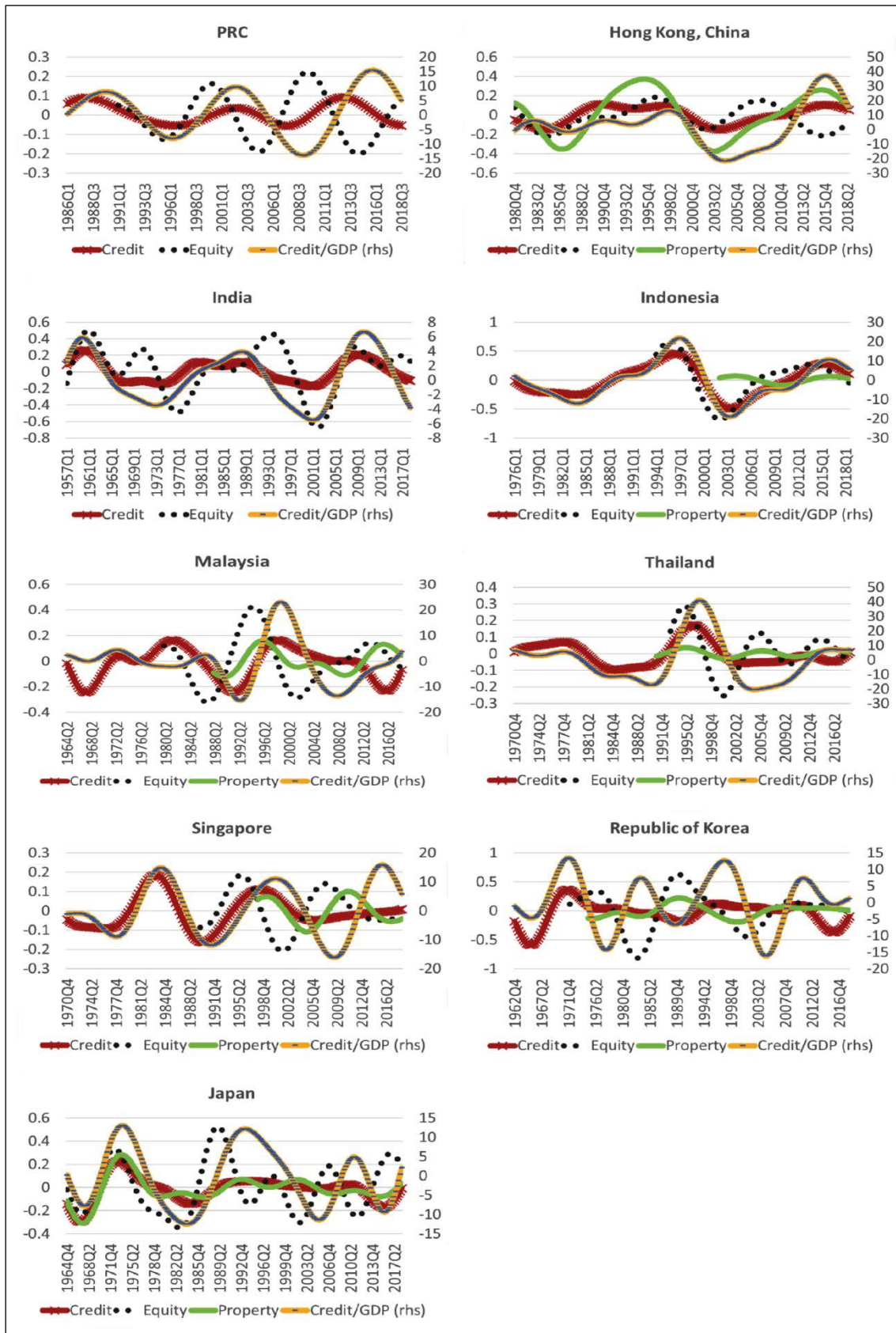


Figure A2: Financial Cycles in Latin America

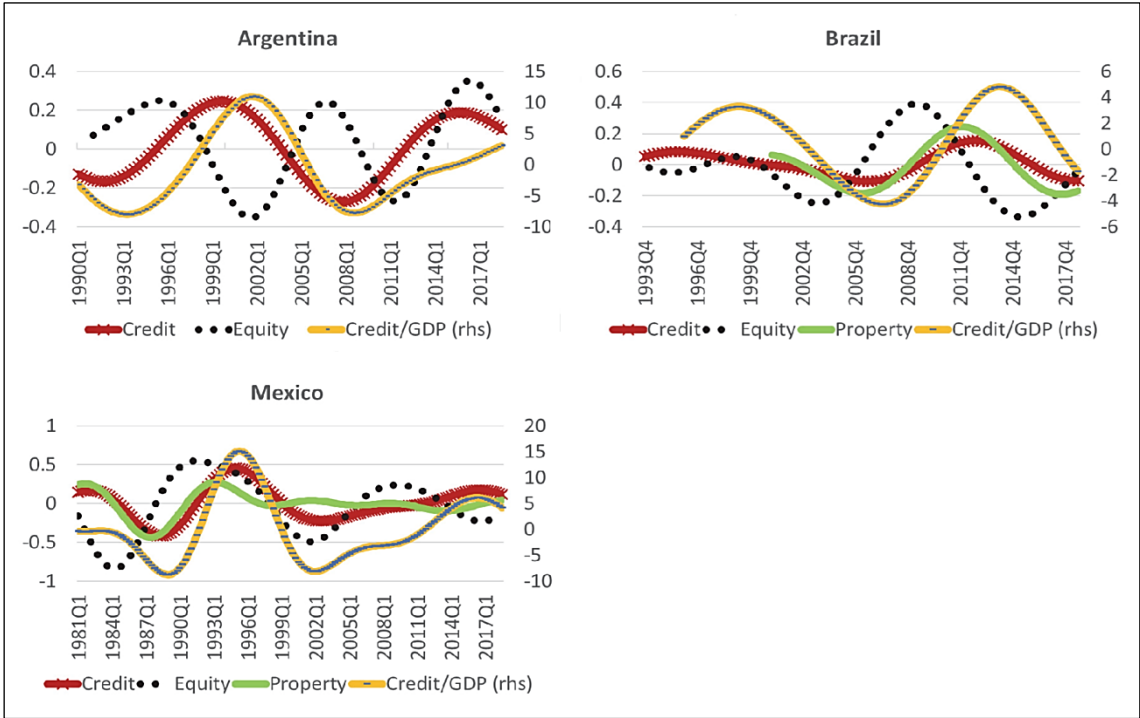


Figure A3: Financial Cycles in Eastern Europe and Other EMEs

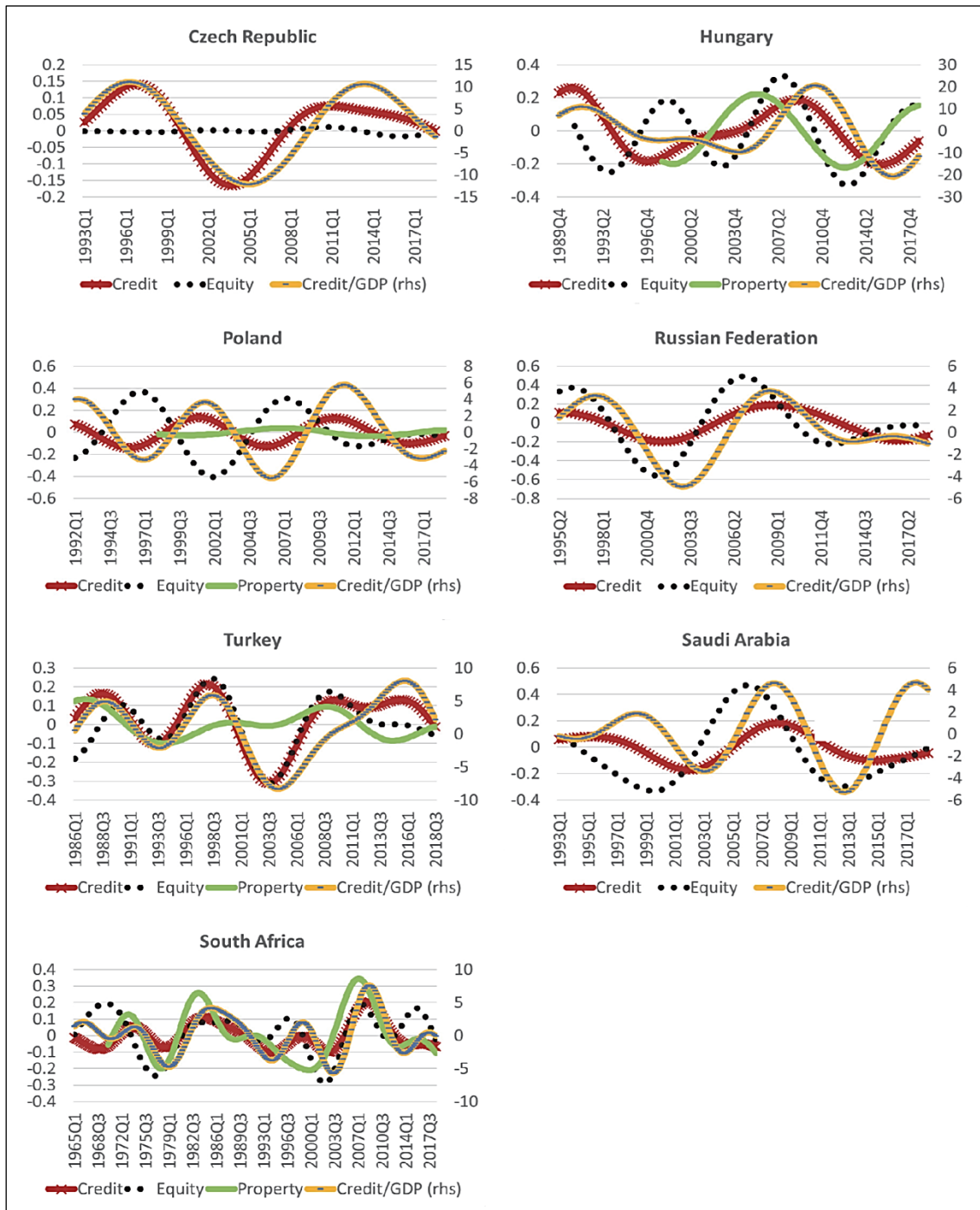
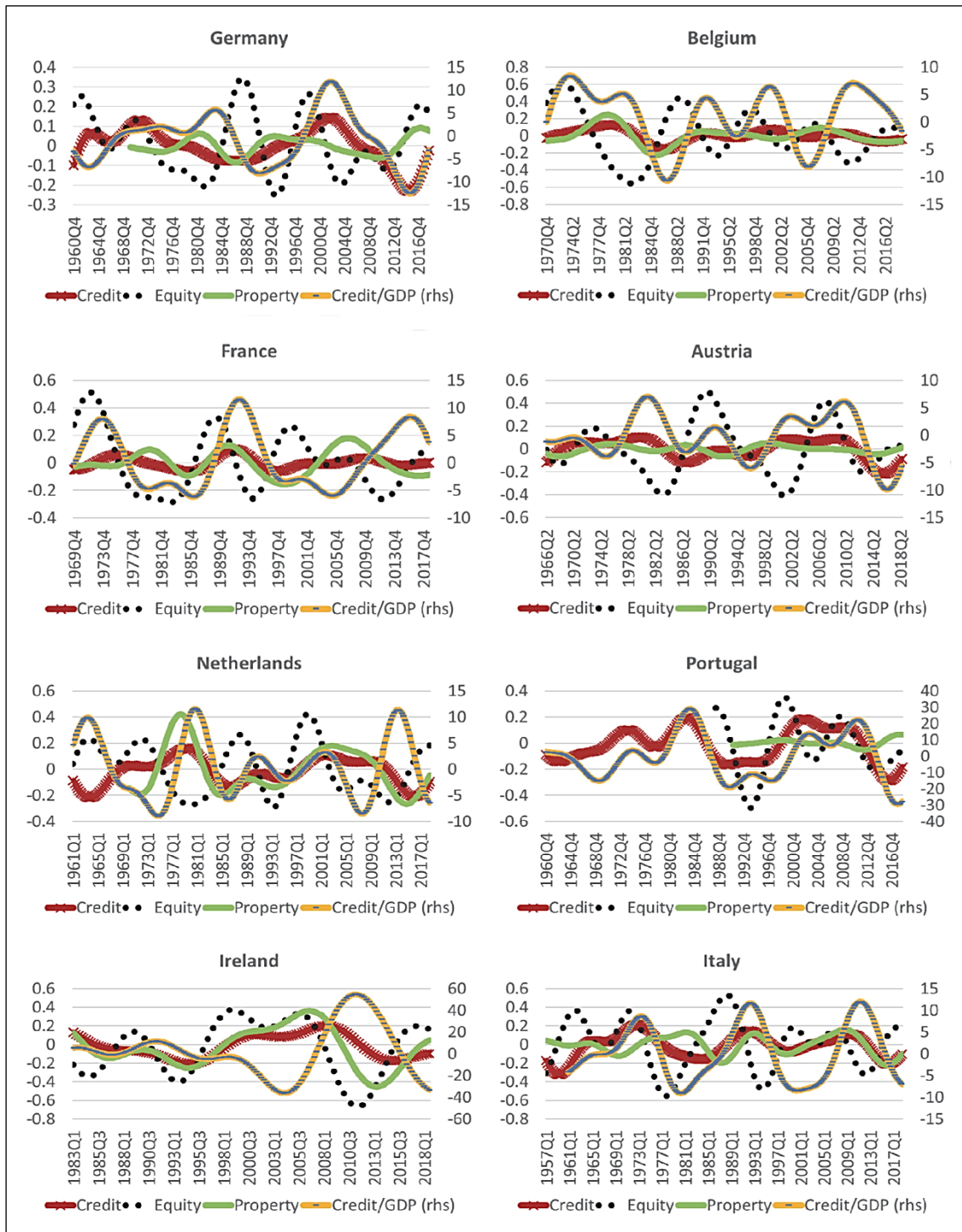


Figure A4: Financial Cycles in the Euro Area



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Figure A4 continued

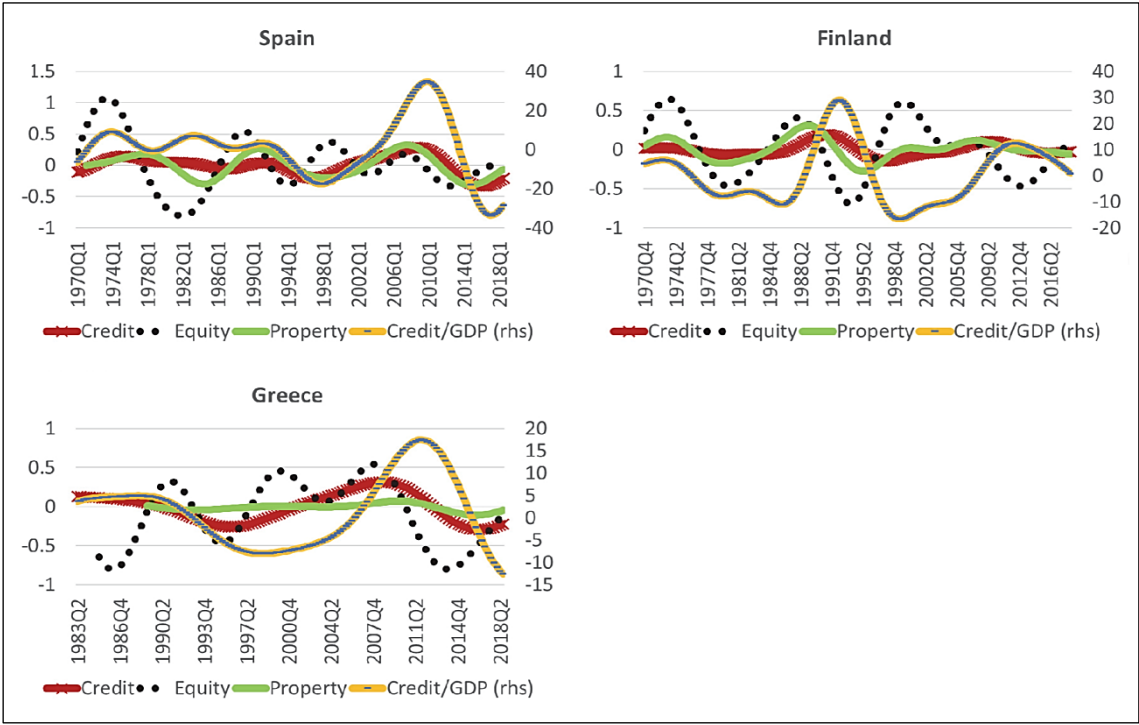


Figure A5: Financial Cycles in Other Advanced Economies

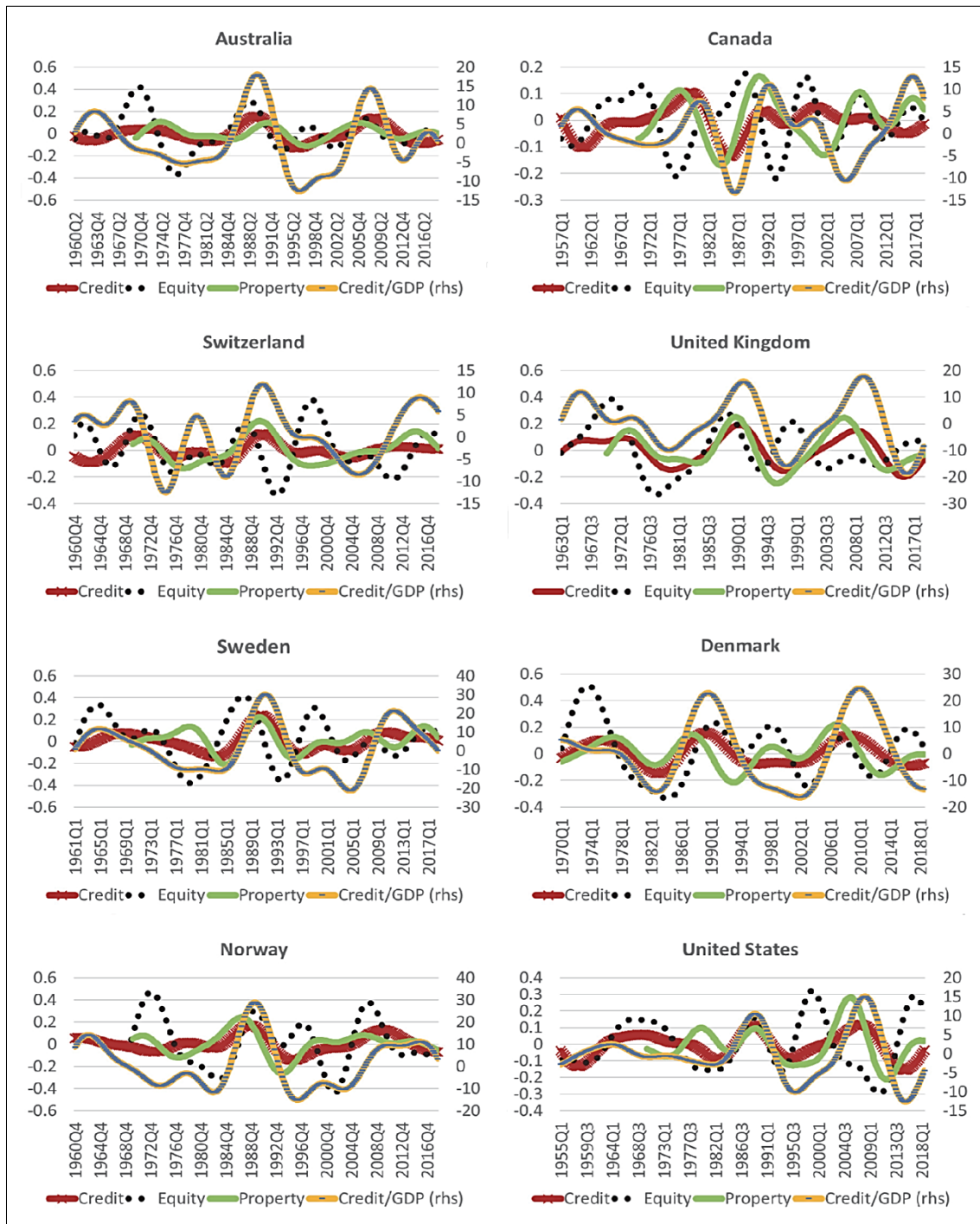


Table A2: Synchronization (Gap) across Measures of the Financial Cycle

	Credit/GDP : Credit	Credit/GDP : Equity	Credit/GDP : Property	Credit: Equity	Credit: Property	Equity: Property
Latin America						
Argentina	0.56***	-0.40**	n/a	-0.21	n/a	n/a
Brazil	0.53***	-0.45**	0.53***	0.02	0.85***	0.02
Mexico	0.95***	0.42**	0.14	0.44***	0.28	0.33*
Asia						
People's Republic of China	0.40**	-0.04	n/a	-0.27	n/a	n/a
Hong Kong, China	0.52***	-0.04	0.33**	0.33**	0.43***	0.37*
India	0.65***	0.10	n/a	0.41***	n/a	n/a
Indonesia	0.98***	0.62***	n/a	0.60***	n/a	n/a
Republic of Korea	0.29*	-0.41***	-0.30**	0.25	0.29**	0.54***
Malaysia	0.72***	-0.52***	0.04	-0.28	0.06	0.41**
Singapore	0.02	-0.73***	0.07	0.25	0.16	-0.10
Thailand	0.55***	0.20	0.18	0.16	0.41**	0.75***
Eastern Europe						
Czech Rep.	0.66***	0.09	n/a	0.43**	n/a	n/a
Hungary	0.57***	0.21	-0.46**	0.36	-0.04	-0.18
Poland	0.79***	-0.59***	-0.47**	-0.38**	-0.38**	0.65***
Russian Federation	0.65***	0.34*	n/a	0.70***	n/a	n/a
Saudi Arabia	0.48***	-0.07	n/a	0.36**	n/a	n/a
South Africa	0.84***	0.33**	0.21	0.38***	0.37***	0.21
Turkey	0.90***	0.44***	0.44***	0.50***	0.50***	0.76***
Euro Area						
Austria	0.77***	-0.05	-0.26*	0.15	-0.17	0.13
Belgium	0.80***	-0.50***	0.21	-0.30**	0.39***	-0.01
Germany	0.40***	-0.10	-0.28**	0.17	-0.12	-0.38***
Finland	0.50***	-0.28**	0.07	0.22	0.55***	0.63***
France	0.54***	-0.21	0.10	0.11	0.33**	0.00
Greece	0.73***	0.02	0.23	0.29	0.50***	0.60***
Ireland	0.44***	-0.30**	0.03	-0.02	0.34**	0.36**
Italy	0.76***	0.06	0.29**	0.02	0.35**	-0.20
Netherlands	0.78***	-0.22	0.51***	-0.17	0.55***	-0.04
Portugal	0.50***	-0.21	-0.08	0.08	0.04	0.54***
Spain	0.75***	-0.07	0.30**	0.02	0.52***	0.14
Other Advanced						
Australia	0.85***	0.24*	0.33**	0.30**	0.30**	-0.20
Canada	0.46***	-0.18	0.21	0.07	0.36***	-0.08
Denmark	-0.29**	-0.14	-0.06	0.48***	0.52***	0.42***
Japan	0.67***	0.42***	0.41***	0.58***	0.26**	0.03
Norway	0.82***	0.01	0.17	0.01	0.28**	0.24*
Sweden	0.89***	-0.12	0.21	-0.01	0.30**	-0.18
Switzerland	0.61***	0.14	0.12	0.36***	0.27*	-0.09
United Kingdom	0.84***	0.05	0.59***	0.19	0.70***	0.08
United States	0.68***	0.14	0.28*	0.42***	0.51***	0.18

Note: Table A2 reports the β coefficients as described in equation (3) using the “gap” definition as per equation (2).