wiiw

MARCH 2018

Working Paper 145

Financial Cycles Around the World

Amat Adarov

The Vienna Institute for International Economic Studies
Wiener Institut für Internationale Wirtschaftsvergleiche

Financial Cycles Around the World

AMAT ADAROV

Revised Edition

Amat Adarov is Research Economist at the Vienna Institute for International Economic Studies (wiiw).

Research for this paper was financed by the Anniversary Fund of the Oesterreichische Nationalbank (Project No. 17044). Support provided by Oesterreichische Nationalbank for this research is gratefully acknowledged.

The author is grateful to Nadya Heger (wiiw) for excellent statistical support, as well as to Michael Landesmann, Robert Stehrer and participants of the 10th FIW conference for useful comments. The views expressed are those of the author and all errors are mine also.

Abstract

The study analyzes financial cycles based on a global sample of 34 advanced and developing countries over the period 1960Q1–2015Q4. We use dynamic factor models and state-space techniques to estimate financial cycles in credit, housing, bond and equity markets, as well as aggregate financial cycles for each country in the sample using a large number of variables conveying price, quantity and risk characteristics of respective markets. The analysis reveals the highly persistent and recurring nature of financial cycles, which tend to fluctuate at frequencies much lower than business cycles, 9–15 years on average, and are indicative of major financial distress episodes. Our results point to notable intra-regional synchronization, as well as nontrivial co-movement tendencies between European, American and Asian financial cycles. We also extract global and regional financial cycles, the former closely associated with the dynamics of the US T-bill rate and the VIX index, confirming the existence of common supranational factors governing the boom-bust dynamics of financial market activity around the world.

Keywords: financial cycles, global and regional financial cycles, asset bubbles, housing prices, equity, debt securities, credit, capital markets, Kalman filter, factor models

JEL classification: E44, E50, F37, G15

Contents

TABLES AND FIGURES

Appendix

1 Introduction

The recent global financial crisis and the Great Recession highlighted the limitations of the dominant macroeconomic paradigm and gave a new impulse to the debate revisiting the role of financial factors in economic growth and business cycles. While the literature is still trying to understand better the nature of financial market instability and specific mechanisms through which fluctuations in financial market activity affect the real economy, it is clear that financial imbalances have important systemic implications and a collapse of even a narrow financial market segment may lead to devastating effects not only at the level of the national economy, but also globally. Cross-country propagation of nominal shocks carries serious risks for global economic growth and its stability in light of increasing interconnectedness of economies, continuously evolving complexity of financial systems and related difficulties to monitor and regulate systemic risks in a timely and coordinated manner.

In this regard, although the literature has been making marked advances recently in the direction of understanding regularities in asset price dynamics and financial market activity and their cyclical nature manifesting itself as "financial cycles", empirical evidence is still rather mixed and incomplete prompting additional research to support the design of appropriate policies. In this paper we intend to contribute to the debate by providing additional empirical analysis of financial cycles, in particular, identifying segment-specific financial cycles in credit, housing, debt securities and equity markets, as well as aggregate financial cycles characterizing general dynamics of national financial systems, regional cycles (North and South America, Europe and Asia) and global financial cycles.

While the importance of deep financial markets for facilitating economic growth has been well-investigated (see, for instance, Schumpeter (1911), Goldsmith (1969), McKinnon (1973) and Shaw (1973) for the earlier literature; Beck and Levine (2004), Beck et al. (2000), Beck (2008), Demetriades and Hussein (1996), King and Levine (1993), Levine (1997), Levine and Zervos (1998), Rousseau and Wachtel (2011) for more recent contributions), their role as a *source* of business cycle fluctuations has received much less attention. By contrast, more common has been the view emphasizing the role of financial factors as nominal frictions that can amplify real shocks through the financial accelerator mechanism (for related literature see Bernanke and Gertler (1989), Bernanke et al. (1999), Brunnermeier and Sannikov (2014), Carrillo and Poilly (2013), Christiano et al. (2005), Kiyotaki and Moore (1997)).

However, this perspective has been increasingly revisited recently given the failure of the established macroeconomic paradigms—both theoretical constructs and macroeconomic policy frameworks—to anticipate the recent financial crisis and recession. Along these lines, a number of scholars (for instance, Borio et al. (2013), Borio (2014), Wood-

ford (2010)) advocate the importance of studying broad cyclical movements in financial market activity related to risk perceptions and liquidity constraints, which can invoke major financial crises. The idea that financial activity in general is prone to regular boom-bust cycles is not *per se* new and goes back at least to Minsky's financial instability hypothesis and related analysis of the stages of these cycles and driving forces behind the accumulation of imbalances (Minsky (1978, 1982), Kindleberger (1978)). In the aftermath of the recent crisis these ideas are making a comeback, and a growing number of empirical studies is concerned with the estimation and analysis of financial cycles (Aikman et al, (2015), Borio (2013, 2014), Borio et al. (2013, 2014), Claessens et al. (2011, 2012), Drehmann et al. (2012), Nowotny et al. (2014), Schüler et al. (2015), Schularick and Taylor (2012), Stremmel (2015)). This strand of literature is closely related to the research focusing on the estimation of financial conditions or financial stress indexes (for a detailed review see Hatzius et al. (2010)) and the broader literature on asset bubbles (see, for instance, Claessens and Kose (2017) for a recent survey). Overall, empirical research has consistently identified cyclical patterns in asset prices and credit activity in selected countries noting a generally slow-moving nature of financial cycles and their close association with financial crisis episodes.

In light of the growing economic interdependence between countries, the hypothesis of cross-country spillovers of financial cycles and existence of a global financial cycle has also gained popularity among scholars recently. The existence of a global financial cycle driven by the monetary conditions in systemically important economies along with changes in global risk perceptions has been noted in Bekaert et al. (2012), Bruno and Shin (2014), Cerutti et al. (2017), Miranda-Agrippino and Rey (2015). In particular, an important contribution by Miranda-Agrippino and Rey (2015) attributes to a common unobserved global factor about a quarter of risky asset price variation examined for a broad sample of countries. In Rey (2015) this latent factor is shown to follow closely the dynamics of the CBOE Volatility Index VIX and in Gerko and Rey (2017) it is further linked to the impact of cross-border spillovers of US monetary policy shocks. In a similar vein, the critical role of financial markets and monetary policy in systemic economies is noted in Adrian and Shin (2010), Bekaert et al. (2012), Bruno and Shin (2014, 2015), as well as the general significance of cross-country spillovers of financial shocks is reported in Aizenman et al. (2015), Backe et al. (2013), Calvo et al. (1996), Eichengreen and Portes (1987), Nier et al. (2014), Obstfeld (2012), Obstfeld and Rogoff (2010), Reinhart and Reinhart (2009).

In the present paper we use dynamic factor models and state-space techniques to estimate segment-specific financial cycles in credit, housing, bond and equity markets, as well as national aggregate financial cycles for each country in the global sample based on a large number of variables conveying price, quantity and risk characteristics of respective financial markets. We then identify their turning points, assess cyclical properties and

cross-country synchronicity, as well as estimate and analyze supranational regional and global financial cycles. Our study contributes to the literature along several dimensions related to the scope of financial sectors examined, country coverage and methodology. First, while empirical research on financial cycles focuses in most cases on advanced economies or individual countries, we analyze financial cycles for the global sample of 34 advanced and developing countries over the period 1960Q1–2015Q4, which provides a broader basis for inference about financial cycles. Our sample is rather diverse comprising advanced and developing countries in different geographic regions with financial markets at different levels of depth and development[1]. This also allows us to estimate regional and global financial cycles, essentially aggregating information from across all countries in our global sample and their key financial market segments, thereby contributing to the scarce literature on these phenomena, which so far has mostly focused on evidence from international capital flows or a particular asset class.

Second, we identify segment-specific cycles (credit, housing, equity and debt securities markets) and aggregate financial cycles, thereby covering all key financial segments in our analysis. Most studies limit their analysis to credit cycles (for instance, Aikman et al. (2015), Dell'Arriccia et al. (2012), Schularick and Taylor (2012)), and more recently indicators of private credit dynamics (in most cases credit to the private non-financial sector as a share of GDP) have been combined with housing prices to arrive at an aggregate measure of financial cycles[2]. At the same time, other financial market segments usually fall under the radar of empirical analysis and are often not taken into account in the construction of aggregate financial cycle measures.

Third, our estimation strategy makes use of variation in a large number of relevant financial variables characterizing market activity, in contrast to studies that use a single or several indicators as proxy variables (e.g., Claessens et al. (2012)). To this end we construct dynamic factor models for each country-segment under consideration—an approach superior to static factor models in light of the expected persistent and self-reinforcing nature of financial cycles.[3] For each model we make every effort to include variables pertaining to key market characteristics (grouped in "Price", "Quantity" and "Risk" pillars) that we believe have particularly high relevance for signaling unsustainable market developments. At the same time, these signal variables are included in respective models in a balanced manner to avoid overrepresentation of a particular group and

[1] In particular, we include countries with market-based financial systems (in which capital markets play an important role in channeling savings to investments along with banks) and bank-based financial systems (relying more on traditional forms of financial intermediation).

[2] In particular, Borio (2014) argues that credit and housing price dynamics jointly represent the most parsimonious description of financial cycles.

[3] The benefits of dynamic factor models allowing to explicitly specify the dynamic structure of the latent factor(s) have been recognized in other recent empirical works, e.g. in Hatzius et al. (2010) and Ng (2011). However, the focus of these studies is on monetary conditions, while our scope is broader, spanning both credit dynamics and asset bubbles in housing and capital markets.

standardized to mitigate the impact of the differences in variable scale and historical volatility. This should altogether result in a higher quality of estimates.

Finally, our approach avoids imposing *a priori* constraints on the estimation and filtering procedures that can alter the properties of financial cycle estimates. In this regard, importantly, we do not assume any symmetry or regularity in cycles and phases, and thus refrain from restrictions on the frequency and duration of cycles commonly practiced in the empirical literature on financial cycles, i.e. the slow-moving dynamics of financial cycles are forced by their construction methodology via low-pass statistical filters.

Indeed, our estimation results based on the global sample of advanced and developing countries confirm that activity in financial markets, whether it is individual market segments or national financial systems in general, is prone to repeated boom-bust patterns that can be summarized by means of a single common factor constituting our financial cycle index. We extract financial cycles at different levels of hierarchy in three consecutive steps, each involving a formulation of a dynamic factor model in a state-space form and its estimation via the Kalman filter and smoother: (i) estimation of segment-specific financial cycles separately for credit, housing, bond and equity market segments using relevant observable input variables pertaining to risk, quantity and price characteristics of respective markets; (ii) derivation of aggregate national financial cycles for each country in the sample by summarizing common variation in the estimated national segment-specific cycles; (iii) extraction of regional and global financial cycles based on the national aggregate financial cycles.

Financial cycles appear to have a highly persistent nature with the fitted autoregressive parameter generally very high (above 0.8–0.9), which is however consistent with the expectations about the self-reinforcing dynamics of financial cycles conveying accumulation of financial market imbalances followed by corrections back to equilibrium levels. Persistent cyclical patterns are observed for all segment-specific cycles, as well as at the national and supranational levels. These financial cycles are closely associated with major financial distress episodes specific to particular financial market segments or systemic in the national and global contexts. We also find that financial cycles tend to have a slightly asymmetric "sawtooth" shape with relatively more prolonged expansions and faster contraction phases.

Our estimation results suggest that financial cycles have an average peak-to-peak and trough-to-trough duration of 12 years, in most cases falling into the range of 9–15 years.[4] This is shorter than the average cycle duration estimates in Borio et al. (2012) and Drehman et al. (2012)—16 years—which are based on the methodology explicitly filtering out a slow-moving component from the private credit and the housing price

[4] These are the results for the financial cycles smoothed via the Hodrick-Prescott filter; unsmoothed financial cycles picking up transitory shocks have yet higher average frequency of 8 years.

series, along with a turning-point algorithm.

The analysis of cross-country synchronization of national aggregate financial cycles using phase concordance indexes and simple correlations reveals high intra-regional synchronicity of financial cycles within the Asian and European country groups, as well as nontrivial tendencies for *positive* co-movement between European and American cycles and *negative* synchronization between Asian and European cycles.

Estimation of supranational financial cycles further confirms the existence of common regional and global factors governing the financial markets dynamics across countries and financial market segments. The estimated global financial cycle reflecting the interplay between global liquidity conditions, risk perceptions and increasing financial interconnectedness is found to be (negatively) correlated with the VIX index and is strikingly synchronized with the dynamics of the 3-month US Treasury Bill rate, which is consistent with the ultimate safe haven asset status of the US T-Bill and the paramount role of the US financial markets and monetary policy in the world economy.

Heuristic analysis of the regularities in the financial cycles points at a range of countries and their financial market segments that appear to be especially prone to the risks of either sharp downward corrections or prolonged bear markets in the near future as respective financial cycles reach their peaks and enter the contraction phase (Section 5). More importantly, combined evidence from the expected dynamics of the global financial cycle and the USA segment-specific and aggregate financial cycles point at the elevated risks of a possible broad-based financial market contraction in the world economy that could start in the next 1–3 years, provided that the same recurrent patterns observed to date in the respective financial cycles continue to hold in the future.

The rest of the paper is organized as follows. Section 2 provides the definition and conceptual remarks regarding our approach to financial cycles. Section 3 presents our estimation methodology and the data. Section 4 discusses empirical results. Section 5 reviews policy implications of our analysis. Section 6 concludes.

2 Definition of financial cycles and taxonomy

In the context of the study by financial cycles we mean cyclical movements in financial markets associated with persistent build-ups of imbalances manifesting in excessive risk-taking behavior, booming market activity and unsustainable acceleration of asset prices, followed by market activity contractions and corrections back to equilibrium levels.

At the moment there is no consensus about the definition of financial cycles and the literature offers varying interpretations, in many cases by financial cycles assuming only credit cycles and changes in general monetary conditions, or, in more recent studies, also taking into account the dynamics of housing prices. So far the description of financial cycles offered in Borio (2014) as "self reinforcing interactions between perceptions of

value and risk, attitudes towards risk and financing constraints, which translate into booms followed by busts" came closest to being the most widely accepted in the recent literature. Our definition, while being consistent with the description offered by Borio, is more generic given our focus on multiple financial market segments and is agnostic about the specific drivers of cycles, rather emphasizing the resulting manifestation of interactions between a variety of unspecified demand and supply factors not necessarily limited to perceptions of risk and value. In defining the financial cycle phenomena and estimation methodology we do not assume any particular duration, frequency, symmetry or other regularities in financial cycles beyond their overall boom-bust nature.

At the national level we focus on four segment-specific financial cycles and aggregate financial cycles summarizing dynamics across the four financial market segments of a given country (a country ISO3 code is denoted by superscript I; market segments are indexed by subscripts CR, H, B, EQ)[5], which are then used to derive aggregate financial cycles at the supranational—regional and global—levels:

- **National segment-specific financial cycles:**
  - **Credit market cycle FC^I_{CR}:** captures activity in the banking sector and overall monetary conditions conveyed by such variables as private credit volume (relative to GDP and year-on-year growth rates), short-run and long-run interest rates, monetary aggregates, the volume of financial deposits and banking system assets, interest rate spreads (maturity, lending-deposit, etc.).
  - **Housing market cycle FC^I_H:** reflects residential property price and mortgage dynamics, price-to-rent and price-to-income ratios.
  - **Bond market cycle FC^I_B:** conveys general dynamics in national debt securities markets (government and corporate bonds), including yields and spreads, amounts outstanding (as a share of GDP and year-on-year growth rates).
  - **Equity market cycle FC^I_{EQ}:** captures equity market conditions as conveyed by national benchmark stock market indexes, returns on the indexes and their volatility, stock market capitalization and turnover ratios.
- **National aggregate financial cycle FC^I_{AG}:** a broad-based index reflecting the overall dynamics of national financial markets based on common variation across the four segments listed above.
- **Regional aggregate financial cycles FC^{AME}_{AG}, FC^{ASI}_{AG}, FC^{EUR}_{AG}:** indexes summarizing idiosyncratic (unexplained by the global financial cycle) common dynamics of national aggregate financial cycles within the following geographic regions: North and South America (AME), Asia (ASI) and Europe (EUR).
- **Global aggregate financial cycle FC^{GL}_{AG}:** an index capturing the common component in the variation across all national aggregate financial cycles of the countries in our global sample.

[5] Hence, our aggregate financial cycle measure does not incorporate all financial segments (for instance, derivatives, foreign exchange, commodity markets are not included), but rather focuses on the four key financial segments that have been historically most important and have longer statistical data available. It is however likely that broad dynamics of market activity in structured finance and other omitted market niches are correlated with conventional credit and capital markets. Yet, the aggregate financial cycle index that we construct is the most complete the literature has offered so far.

As discussed in greater detail in the methodology section, we derive financial cycles using a dynamic factor model incorporating a possibly large number of variables reflecting the key market characteristics that we believe are important for detecting boom-bust dynamics in any of the financial market segments concerned, which we group in three pillars: *Price–Quantity–Risk*. The market attribute labeled as *"Price"* combines various measures of asset prices in absolute or relative terms (e.g. price-to-income ratios in the case of housing markets, in addition to real housing prices), interest rates, yields and returns on a particular asset class. The *"Quantity"* pillar combines various nominal measures of the volume of market activity in the particular financial segment, e.g. amounts outstanding of debt securities, stock market capitalization, volume traded, claims on the private sector by banks, and other indicators, expressed in nominal values, year-on-year growth rates, or as a share of GDP. The *"Risk"* category combines variables reflecting risk perceptions and volatility in respective markets, including interest rate spreads, volatility of stock market returns.

The three broad market characteristics should provide sufficient information to capture unsustainable developments in each financial market segment. In particular, financial cycle expansions are associated with rapid credit volume growth, rising asset prices and compressing spreads, triggered by rational or irrational optimism of economic agents about general macroeconomic conditions or future prospects of a particular asset class leading to excessive risk undertaking, which can be further stimulated by ample domestic liquidity, foreign capital flows or structural changes, e.g. financial innovation and liberalization of financial markets. The build-up of imbalances may then become a self-reinforcing process as expectations of higher asset prices stimulate their demand translating to further asset price and value increases thereby boosting wealth and collateral value, which facilitates yet more credit growth and overleveraging. After unsustainable expansion reaches its peak and the bubble bursts, the financial cycle enters a contraction phase characterized by dropping asset prices, decreasing credit activity, rising spreads and market volatility, possibly accompanied by flight of investors to safe assets, bank runs, fire sales of overpriced assets, interbank contagion, the feedback loop from the asset prices and values to credit working now in the opposite direction, further aggravating balance sheet problems of affected economic agents (see also Claessens et al. (2011), Claessens and Kose (2013), Kaminsky and Reinhart (1999), Reinhart and Rogoff (2009, 2011) for a comprehensive discussion of the financial crisis phenomena and related literature).

Along these lines, financial cycles can then be quantified by means of a single indicator capturing systematic correlated patterns that the variables pertaining to these three market characteristics exhibit during expansion and contraction phases. In this respect our approach comes close to Jones (2014) proposing that asset bubble detection strategy should take into account the "pricing" and "quantities" pillars. We extend the argument further and also distinguish a "risk" pillar as it may help better convey the dynamics as-

sociated with changing risk perceptions and speculative rather than fundamental drivers of financial market activity. Taking advantage of information content across a large number of financial variables organized around these three "pillars" and undertaking a case-by-case approach to modeling each financial segment and country should allow us to arrive at more precise estimates of financial cycles, thereby complementing empirical studies that rely on a single or several proxy variables as a measure of financial cycles which may not fully capture relevant market developments or entirely omit some financial segments.[6] At the same time, recognizing explicitly these three pillars also allows us to arrive whenever possible at more balanced combinations of variables pertaining to different market characteristics in dynamic factor models (ideally, an equal number of variables per each pillar), in contrasts to studies that resort to a similar factor-based approach, but incorporate a possibly large number of variables disregarding the market properties they convey.[7] This however has not been always feasible owing to data constraints.

3 Methodology

3.1 State-space model for financial cycle derivation

Our estimation strategy largely follows the approach of Adarov (2017) for the identification of national financial cycles with individual state-space models constructed for each country-segment. We further extend the framework to allow for the derivation of regional and global financial cycles, and hence the modeling and estimation routine involves several levels of hierarchy: (1) estimation of four segment-specific financial cycles using observable input variables for each segment; (2) estimation of national aggregate financial cycles using segment-specific financial cycles derived in step 1; (3) estimation of regional and global financial cycles using national aggregate financial cycles from step 2.

In line with the conjecture that a financial cycle is a single latent factor driving overall financial market activity (activity in the market segment in the case of *segment-specific* financial cycles or activity across all financial market segments of a given country in the case of *aggregate* financial cycles) and manifesting itself as regular correlated cyclical patterns in the dynamics of observable financial variables, we estimate financial cycles by means of dynamic factor models.[8] We construct several versions of dynamic factor

[6] For instance, private credit to GDP ratio does not explicitly capture risk perceptions and interest rates, and is entirely agnostic about conditions in capital markets. Likewise, evolution of asset prices may only indirectly convey risk and volume developments.

[7] This may result, for example, in an aggregate synthetic index conveying only or mostly asset price dynamics at the expense of other market characteristics; or indexes *de facto* having very different information content for countries with low and high data availability.

[8] Similar approach relying on extraction of common factors using static principal components or dynamic factor models was used in Brave and Butters (2011), Eickmeier et al. (2014), English et al. (2005), Hatzius et al. (2010). Other methods used in the literature involve turning point dating algorithms applied to selected proxy variables (Claessens et al. (2011), Drehman et al. (2012)), frequency-based

models for each financial market segment of each country in the sample to derive a financial cycle index as a common unobservable factor from a possibly large number of observable signal financial variables characterizing the market stance and indicating formation and correction of imbalances in that segment.

Dynamic factor models, originally introduced in Geweke (1977) and Sargent and Sims (1977)[9], rest on the idea that covariance between a wide range of observable variables can be spanned by a smaller number of unobserved orthogonal "common factors". Applying to our context, in the case of segment-specific financial cycle estimations, the vector of observable (or measurement/signal) variables $\mathbf{y}_t = [y_{1t} \ ... \ y_{Nt}]'$ for $t = 1...T$, is modeled as the sum of unobservable common factors ($k \times 1$ vector $\mathbf{f}_t$, s.t. $k < N$) and idiosyncratic shocks ($\mathbf{v_t}$) with the following general state-space form:

$$\begin{cases} \mathbf{f}_t = \mathbf{A} \times \mathbf{f}_{t-1} + \mathbf{e_t} \\ \mathbf{y}_t = \mathbf{B} \times \mathbf{f}_t + \mathbf{v_t} \end{cases} \tag{1}$$

Under this approach $\mathbf{f}_t$ follows a dynamic process determined by the coefficient matrix $\mathbf{A}_{k \times k}$. The matrix of factor loadings $\mathbf{B}_{N \times k}$ (or observation matrix) links N observable input financial variables to the common factors. The the $N \times 1$ vector $\mathbf{y}_t$ consists of segment-specific input signal variables conveying market characteristics along the lines of the *Price–Quantity–Risk* pillars discussed in Section 2 above. Vectors $\mathbf{e_t}$ and $\mathbf{v_t}$ are the *i.i.d.* error terms with the covariance matrices $cov(\mathbf{e_t}) = \mathbf{Q}$, $cov(\mathbf{v_t}) = \mathbf{R}$, $cov(\mathbf{e_t}, \mathbf{v_t}) = 0$.

We further adjust the general formulation of the dynamic factor model to our needs. In particular, following the logic that a financial cycle is a single latent factor driving activity in a given financial market segment, $\mathbf{f}_t$ consists of one factor[10]. Furthermore, we model the latent factor as a dynamic AR(1) process in Equation 1 to capture its persistence given our conjecture that the financial cycle is a persistent self-reinforcing process.[11]

Differencing the data to ensure stationarity may erode meaningful information contained in the level series (also noted in Angelopoulou et al. (2014) and English et al. (2005)). Therefore, in addition to the conventional stationary versions of dynamic factor

statistical filters (Borio (2014), Drehmann et al. (2012)), spectral analysis (Strohsal et al. (2015), Schüler et al. (2015)), wavelet-based analysis (Voutilainen (2017)).

[9] For the discussion of the methodology and economic applications see also Stock and Watson (2011).

[10] While multiple factors included in the specification would jointly explain more variation in the data, our objective is to identify a single factor that explains most of covariance. In addition, the dynamic factor model serves as a dimension-reduction method to shrink financial market information contained in multiple series, which calls for a more parsimonious specification.

[11] Other lag order models (up to four lags) were checked for the sample of systemic economies; however, a simple AR(1) representation delivers the best results along with the estimation efficiency. The historical data is rather short for many countries in the sample requiring that the most parsimonious approach is used or additional *a priori* constraints are imposed on the model, which we try to avoid rather letting the data speak for itself.

models, for robustness we also estimate non-stationary versions using the data in levels. The input signal variables are transformed before entering a respective state-space model as follows: (i) for the "stationary" versions of the model we difference the data (year-on-year change or percentage change, depending on the nature of a variable)[12]; (ii) all variables are standardized (demeaned and divided by their sample standard deviation), which ensures that the variances of individual variables contribute to the variance of the estimated latent factor symmetrically, and the differences in their measurement scale and historical country-specific magnitudes do not bias the estimates.

Following the formulation of state-space models, we resort to the Kalman filter and smoother with maximum likelihood estimation for stationary models or the diffuse Kalman filter with quasi-maximum likelihood in line with De Jong (1988, 1991) for non-stationary versions of the model to estimate the latent factors.[13] The Kalman filter is a recursive algorithm to derive log-likelihood of the observed variables conditional on their past values and form linear predictions of the current underlying unobserved state values (see Hamilton (1994) for a detailed description of recursions and other technical aspects). The Kalman filter is particularly useful for the estimation of dynamic factor models as it allows to handle missing observations (recursions proceed by estimating the state based only on the actually available data for that period) and can be applied to non-stationary models.

It is well known that the parameters of the dynamic factor model in the general state space formulation above are under-identified in the absence of additional constraints (see Harvey(1989) and Hamilton(1994)), and the set of parameter values for any particular value of the likelihood function used in the Kalman filtering process is not unique.[14] Therefore, to deal with this issue we constrain $\mathbf{Q}$ to be the identity matrix and $\mathbf{R}$ to be a diagonal matrix with equal variances along the main diagonal. As all input signal variables are standardized prior to entering the model and the scale of the estimated common factor does not itself have a direct economic interpretation (what matters is the relative magnitude and direction of movements), such approach should be safe to use.

[12] In most cases this ensures stationarity of the transformed variable (Augmented Dickey-Fuller and Phillips-Perron unit root test results are not reported here for brevity, but are available in the companion paper Adarov (2018)). However, in some cases the differenced variable still remains non-stationary or only weakly stationary for some country-segments. In such cases we still use it in the model with quasi-maximum likelihood estimation applied, so that to the extent possible a similar set of variables with identical transformations are used consistently across all countries in the global sample. Second-differencing to ensure strict stationarity is also inferior from the standpoint of economic interpretation of factor loadings.

[13] It is shown in Hamilton(1994) that the quasi-maximum likelihood estimator for models violating the normality and stationarity assumptions (needed for the conventional Kalman filter) is still consistent and asymptotically normal.

[14] In particular, the model formulated in Equation 1 can be transformed using any non-singular matrix $\Psi_{k\times k}$ to an equivalent model as follows: $\mathbf{B}^* = \mathbf{B}\Psi^{-1}$, $\mathbf{A}^* = \mathbf{A}\Psi^{-1}$, $\mathbf{f}_t^* = \Psi\mathbf{f}_t$. The latent factor estimate with the opposite sign and flipped factor loading signs would capture common variation across measurement variables equally well.

To aid interpretation of the estimated factor at least to some extent also in terms of the magnitudes of fluctuations, we standardize the estimated financial cycle measure so that its magnitudes could be interpreted in terms of standard deviations from the sample mean (yet specific to the country and segment) and use the notation FC_{CR}, FC_H, FC_B and FC_{EQ} to denote the (standardized) financial cycles as discussed in the previous section, thereby also distinguishing them from the raw model factors.

The remaining issue of factor sign indeterminacy is addressed by rotating the financial cycle estimates so that the reference segment-specific observable variable has a positive factor loading (on the factor) in the respective estimated model. To this end we use variables that are typically examined when analyzing a corresponding financial market segment: the ratio of private credit to GDP for FC_{CR} and FC_{AG}; real housing price index for FC_H; yield on benchmark government debt securities for FC_B; national stock market index for FC_{EQ}. In this regard, it is important to note that a care should be taken in interpreting the dynamics of each segment-specific financial cycle in the context of imbalances and bubble formation. In particular, our estimated bond market financial cycles in line with this approach tend to move in the direction opposite to the implied bond price level as the latter is inverse to its yield. Financial cycles for the equity and housing markets however by construction tend to co-move with their respective general price levels, while credit cycle expansions tend to reflect credit growth.

National *aggregate* financial cycles that summarize common dynamics across all four financial market segments of a given country are estimated using two approaches: (i) version 1, denoted as $FC_{AG}^{(1)}$, similarly to the segment-specific cycles, is estimated using a dynamic factor model incorporating standardized and transformed observable financial variables used in the benchmark versions of segment-specific cycles; (ii) version 2, $FC_{AG}^{(2)}$, is estimated using a dynamic factor model incorporating the four estimated segment-specific financial cycles FC_{CR}, FC_H, FC_B, FC_{EQ} as input variables instead of observable financial variables. $FC_{AG}^{(2)}$ is the preferred indicator of national aggregate financial cycles as by construction it treats each financial segment symmetrically, i.e. does not tend to be biased towards reflecting the dynamics of the credit market, for which more variables are available and incorporated in the model for $FC_{AG}^{(1)}$ estimation. However, both approaches yield almost identical results and therefore we further focus on aggregate financial cycles estimated via version 2 as the baseline (unless otherwise stated) dropping the superscript.

3.2 Estimation of global and regional financial cycles

Using the estimated aggregate financial cycles for individual countries we then estimate the global aggregate financial cycle by means of a dynamic factor model in the following state-space form:

$$\begin{cases} g_t^{GL} = \beta^{GL} \times g_{t\text{-}1}^{GL} + \epsilon_t^{GL} \\ \mathbf{f}_t = \mathbf{C} \times g_t^{GL} + \mathbf{u}_t \end{cases} \tag{2}$$

Similarly to the estimation framework for national aggregate financial cycles, this model attributes common variation across 34 national financial cycles constituting the vector $\mathbf{f}_t$ to a single common global factor g_t^{GL} that evolves as an AR(1) process with the parameter β^{GL}. $\mathbf{C}$ is the matrix of factor loadings; ϵ_t^{GL} and $\mathbf{u}_t$ are the state and measurement error terms, respectively. Likewise, the global financial cycle is obtained via the Kalman smoother and standardized. The USA aggregate financial cycle is used as a reference cycle to correctly rotate the global factor.

In addition to the specification involving only the global financial cycle, we also estimate a model with two levels of hierarchy—global and regional cycles—in the same system of equations:

$$\begin{cases} \left.\begin{array}{l} g_t^{GLR} = \beta^{GLR} \times g_{t\text{-}1}^{GLR} + \epsilon_t^{GLR} \end{array}\right\} & \textit{state block: global cycle} \\ \left.\begin{array}{l} r_t^{AME} = \beta^{AME} \times r_{t\text{-}1}^{AME} + \epsilon_t^{AME} \\ r_t^{ASI} = \beta^{ASI} \times r_{t\text{-}1}^{ASI} + \epsilon_t^{ASI} \\ r_t^{EUR} = \beta^{EUR} \times r_{t\text{-}1}^{EUR} + \epsilon_t^{EUR} \end{array}\right\} & \textit{state block: regional cycles} \\ \left.\begin{array}{l} \mathbf{f}_t^{\mathbf{AME}} = \mathbf{B}^{\mathbf{AME}} \times r_t^{AME} + \mathbf{C}^{\mathbf{AME}} \times g_t^{GLR} + \mathbf{u}_t^{\mathbf{AME}} \\ \mathbf{f}_t^{\mathbf{ASI}} = \mathbf{B}^{\mathbf{ASI}} \times r_t^{ASI} + \mathbf{C}^{\mathbf{ASI}} \times g_t^{GLR} + \mathbf{u}_t^{\mathbf{ASI}} \\ \mathbf{f}_t^{\mathbf{EUR}} = \mathbf{B}^{\mathbf{EUR}} \times r_t^{EUR} + \mathbf{C}^{\mathbf{EUR}} \times g_t^{GLR} + \mathbf{u}_t^{\mathbf{EUR}} \end{array}\right\} & \textit{measurement block} \end{cases} \tag{3}$$

In addition to the global financial cycle g_t^{GLR} (GLR index is used to distinguish this estimate from the global financial cycle estimate based on Equation 2 and indexed by GL), this specification incorporates latent factors r_t^{AME}, r_t^{ASI} and r_t^{EUR} that capture common variation within the regions of North and South America (AME), Asia (ASI) and Europe (EUR) based on national aggregate financial cycles $\mathbf{f}_t$ used as input variables in the measurement equation block partitioned by the corresponding regions. The country composition per each regional group is outlined in the subsection below describing the data and country coverage. In line with the specification, regional financial cycles capture common variation across country-level financial cycles in the corresponding region that is not explained by the global financial cycle, i.e. idiosyncratic region-specific latent factor and *not* gross common variation between national financial cycles in the region. Observation matrices $\mathbf{B}$ and $\mathbf{C}$ relate the national aggregate financial cycles to the regional and global factors, respectively; ϵ_t and $\mathbf{u}_t$ are the state and measurement error terms.

Global and regional estimated factors are rotated so that the aggregate financial cycle of the reference country has a positive factor loading. Systemic economies are used

as benchmarks for this purpose: the USA for the global financial cycle and regional American financial cycle, Japan for the regional Asian financial cycle, Germany for the regional European financial cycle. Standardized factors then are referred to as global and regional financial cycle indexes or simply cycles, rather than factors, and denoted by FC_{AG}^{AME}, FC_{AG}^{ASI}, FC_{AG}^{EUR}, FC_{AG}^{GL} and FC_{AG}^{GLR} in line with the taxonomy introduced in the previous section.

3.3 Smoothing and trend-gap decomposition of financial cycles

In addition to financial cycles estimated via the dynamic factor models as discussed above we also analyze their smoothed counterparts that reduce the impact of transitory shocks and allow to focus on longer run cyclical dynamics at lower frequencies, which could be particularly useful for the assessment of more volatile financial segments, e.g. equity markets. In order to obtain smoothed versions of financial cycles we apply the conventional Hodrick-Prescott (HP) filter to the estimated financial cycles as follows:

$$\min_{\eta} L = \sum_{t=1}^{T} \left[\frac{(FC_t - \eta_t)^2}{\sigma_0^2} + \frac{(\Delta\eta_{t+1} - \Delta\eta_t)^2}{\sigma_1^2} \right], \text{ where } \lambda = \sigma_0^2/\sigma_1^2 = \begin{cases} \text{(a) } 1600 & \text{for medium-term cycle} \\ \text{(b) } 400000 & \text{for long-term trend} \end{cases} \quad (4)$$

The signal-to-noise ratio λ=1600 (Case a) is the standard choice used for quarterly data (for instance, in the analysis of business cycles); the value of λ=400000 (Case b) is chosen to estimate long-run time-varying trends by simple smoothing[15].

To distinguish between the two HP-filtered versions we denote the cycles obtained via Equation 4 Case (a) as "smoothed" cycles indexed by the superscript (*), i.e. FC_{CR}^{*}, FC_{EQ}^{*}, FC_{B}^{*}, FC_{H}^{*}, FC_{AG}^{*}. In a similar fashion, the time-varying "long-run trend" series estimated via Case (b) are denoted as $\overline{FC_i}$ for i = CR, H, B, EQ, AG.

We then compute the "gap" versions of financial cycles, i.e. financial cycles expressed as deviations from their respective long-run trends, for the raw (unsmoothed) financial cycle estimates: $\widehat{FC}_i = FC_i - \overline{FC_i}$, as well as for their smoothed counterparts: $\widehat{FC}_i^{*} = FC_i^{*} - \overline{FC_i}$. This serves a practical purpose of helping to better identify the cyclical component of financial cycle indexes, as well as addresses possible conceptual and technical issues, as assuming a flat constant trend for financial cycles is not plausible in light of their high persistence (in fact, close to a random walk), inclusion in some cases of non-stationary or weakly stationary input signal variables in the model, continued evolution of financial systems and hence likely changing equilibrium trend levels over the lengthy period we examine (1960–2015).

[15] Other λ values provide similar trend dynamics, which matters little in the end as the deviations of financial cycles from the trend are of similar magnitudes after standardization.

3.4 Identification of turning points and synchronicity of cycles

In order to analyze expansion and contraction episodes and other cyclical properties of the estimated financial cycles we resort to the BBQ turning point identification algorithm widely used in the business cycle literature. The BBQ algorithm was introduced in Harding and Pagan (2002) for quarterly data ("Q") based on the Bry and Boschan (1971) technique ("BB") developed originally for dating turning points in time series at a monthly frequency. In brief, the algorithm is a search procedure for local peaks and troughs with user-specified constraints on the search window and minimum duration of cycles or phases, also ensuring that peaks and troughs alternate.

In the context of our application a peak (a trough) is identified at a date $t = \tilde{t}$ if the value of the variable (financial cycle measure) at this date is a local maximum (minimum) in the moving search window of $[\tilde{t} - k;\ \tilde{t} + k]$, $k = 9$ quarters. We impose additional constraints on the search algorithm by restricting the minimum phase duration to 3 quarters and the minimum cycle duration to 6 quarters, so that the turning points (*tp* dummy) are identified as follows:

$$tp = 1 \text{ (peak) at } t = \tilde{t} \text{ if: } \begin{cases} \Delta FC_{\tilde{t}} > 0; \Delta FC_{\tilde{t}-1} > 0; \Delta FC_{\tilde{t}-2} > 0 \\ \Delta FC_{\tilde{t}+1} < 0; \Delta FC_{\tilde{t}+2} < 0; \Delta FC_{\tilde{t}+3} < 0 \\ \min |\tilde{t}_{peak} - t_{trough}| \geqslant 3 \text{ quarters} \end{cases} \tag{5}$$

$$tp = \text{-1 (trough) at } t = \tilde{t} \text{ if: } \begin{cases} \Delta FC_{\tilde{t}} < 0; \Delta FC_{\tilde{t}-1} < 0; \Delta FC_{\tilde{t}-2} < 0 \\ \Delta FC_{\tilde{t}+1} > 0; \Delta FC_{\tilde{t}+2} > 0; \Delta FC_{\tilde{t}+3} > 0 \\ \min |\tilde{t}_{peak} - t_{trough}| \geqslant 3 \text{ quarters} \end{cases} \tag{6}$$

Identical turning point search procedure is applied to all estimated financial cycles for all countries to ensure global consistency of results. While we checked alternative constraints for robustness, we report the results based on the least constrained set of BBQ parameters outlined in Equations 5–6 which allow for cycles moving at both higher and lower frequencies thereby avoiding biases towards long-run movements in cycles.

Using the identified turning points we then compute a bilateral phase concordance index CI for any pair of financial cycles i and j following Avouyi-Dovi and Matheron (2005) and Claessens et al. (2011):

$$CI_{ij} = \frac{1}{T} \sum_{t=1}^{T} \left[\phi_{FC_i,t} \phi_{FC_j,t} + (1 - \phi_{FC_i,t})(1 - \phi_{FC_j,t}) \right] \tag{7}$$

where $\phi_{FC_i,t}$ and $\phi_{FC_j,t}$ are binary phase indicators for financial cycles i and j that dissect a financial cycle index into alternating periods of expansion (from a trough to the following peak) and contraction (from a peak to the following trough) as follows:

$$\phi_{FC_i,t} \text{ (or } \phi_{FC_j,t}) = \begin{cases} 1 \text{ if } FC_i \text{ (or } FC_j) \text{ is in the "expansion" phase in } t \\ 0 \text{ if } FC_i \text{ (or } FC_j) \text{ is in the "contraction" phase in } t \end{cases} \quad (8)$$

By construction $CI_{ij} = 1$ if cycles i and j are perfectly aligned in terms of their phases over the joint history of observations and $CI_{ij} = 0$ if they are always in the opposite phases. Whereas the concordance index is a more relevant measure to gauge the similarity of financial cycles, we also report conventional Pearson correlations for financial cycle indexes in levels and first-differences to complement the analysis of cross-country financial cycle synchronicity.

3.5 Data and country coverage

We compile a large quarterly dataset spanning a global sample of 34 advanced and developing countries over the period 1960Q1–2015Q4 (or the longest subperiod available for a given country and its particular financial market segment). The sample includes the following countries grouped by region, with the associated ISO3 codes as used throughout the study:

i) Advanced: Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Finland (FIN), France (FRA), Germany (DEU), Italy (ITA), Japan (JPN), Netherlands (NLD), Norway (NOR), South Korea (KOR), Spain (ESP), Sweden (SWE), Switzerland (CHE), UK (GBR), USA (USA);

ii) Developing: Brazil (BRA), Chile (CHL), China (CHN), Czech Republic (CZE), Estonia (EST), Hungary (HUN), Indonesia (IDN), Latvia (LVA), Lithuania (LTU), Malaysia (MYS), Mexico (MEX), Philippines (PHL), Poland (POL), Russia (RUS), Singapore (SGP), Slovakia (SVK), Thailand (THA).

For the purposes of regional financial cycle estimations, we group the countries by geographic region as follows (region code in parenthesis):

i) North and South America (AME): Brazil (BRA), Canada (CAN), Chile (CHL), Mexico (MEX), USA (USA);

ii) Asia (ASI): Australia (AUS), China (CHN), Indonesia (IDN), Japan (JPN), Malaysia (MYS), Philippines (PHL), Singapore (SGP), South Korea (KOR), Thailand (THA);

iii) Europe (EUR): Austria (AUT), Belgium (BEL), Czech Republic (CZE), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Hungary (HUN), Italy (ITA), Latvia (LVA), Lithuania (LTU), Netherlands (NLD), Norway (NOR), Poland (POL), Russia (RUS), Slovakia (SVK), Spain (ESP), Sweden (SWE), Switzerland (CHE), UK (GBR).

For each country we source a possibly large number of financial variables describing credit, housing and capital markets from the following databases:

- BIS financial and housing market databases: credit to households, non-financial corporations, private non-financial sector; debt securities data (amounts outstanding), housing prices.

- IMF International Financial Statistics (IFS): private credit, interest rates and spreads, financial system deposits, deposit money bank assets, monetary aggregates in absolute and relative terms, government bond yields.

- OECD Main Economic Indicators and Housing Statistics: interest rates and spreads, volume of residential mortgages, real property prices, housing price to rent and price to income ratios, stock market index data, monetary aggregates.

- Federal Reserve Economic Data database (FRED): household mortgage rates, government and corporate bond yields and spreads, stock market index data.

- World Bank's Global Financial Development Database (GFDD): bank credit to deposit ratios, private credit, amounts outstanding of private and public debt securities, stock market capitalization, stock market turnover and volume traded, stock price volatility.

- Investing.com and Yahoo Finance data: daily benchmark stock market index values.

- Haver Analytics (databases for financial indicators of emerging markets and advanced economies of Asia, Europe, Latin America, North America): mortgage rates and loans to households, yields on debt securities, monetary aggregates, other series on a country-by-country basis lacking in the other databases.

- National data from monetary authorities and statistical agencies for some countries to complement missing or incomplete series from other databases.

Detailed variable composition and transformations for baseline financial cycles are reported in Appendix A; information for alternative additional versions of financial cycles (non-stationary versions; financial cycles involving a greater number of input signal variables) is made available in the companion paper Adarov (2018).

Nominal variables are taken in local currency units and as a percentage of GDP. While most of the data is already available at the quarterly frequency with seasonal adjustment (when needed), certain series have been transformed to a quarterly frequency from higher or lower frequencies. In particular, daily closing values of national benchmark stock market indexes are used to compute average daily returns and their volatility over the respective quarters. The variables reported at a monthly or weekly frequencies are aggregated to quarterly series by averaging over the respective 3-month period. Annual data on financial structure from the World Bank's GFDD database are converted to quarterly series via cubic spline interpolation and checked against proxy variables available

at a quarterly frequency over the same period and/or equivalent variables available only for a shorter period of time to ensure the validity of the method.

Breaks encountered in certain series are also addressed whenever possible. The IMF IFS series associated with the identical/similar concept, but reported in the database under different codes for different periods are merged (for instance, private credit by banks variable was constructed from the IMF IFS data reported under codes *line 22d* and *FOSAOP*; depositary corporations claims on domestic private sector—*line32d* and *FDSAOP*; deposit money banks' assets—as the sum of *line22a* (or *FOSAG* if missing), *line22b* (or *FOSAOG* if missing) and *line22c* (or *FOSAON* if missing), financial system deposits—as the sum of *line24* (or *FOST* if missing) and *line24* (or *FOSD* if missing). The nominal data for the Euro Area countries for the period prior to the introduction of euro are converted to euro-fixed series using the appropriate conversion rates.

Real interest rates are computed using their nominal counterparts and GDP deflators or CPI inflation rates, depending on which price series has longer available historical data. Depending on *de facto* availability for a particular country, various interest rates are used, including interbank rates at different maturities, money market rates, lending and deposit rates, mortgage rates, as well as spreads are computed: lending/deposit rates, government/corporate bond yields, short/long maturity. When deciding which variables to include in the model, besides the guiding criteria related to the market characteristics, the preference is given to the series with the longest data.

4 Empirical results

4.1 Estimated segment-specific financial cycles

Estimation of financial cycles is hindered by the availability of sufficiently long historical series, which is particularly binding for the transition economies of Europe included in the sample and for the housing sector of many advanced and developing countries. Therefore, inclusion of multiple input variables typically results in shorter length of financial cycle estimates, which makes it difficult to elicit general inference in light of the slow-moving nature of financial cycles.

To mitigate the problem associated with such a trade-off between the length of financial cycle estimates and the number of input signal variables entering a model we estimate several versions of financial cycles per each country-segment. In particular, for segment-specific cycles versions $v = 1$ and $v = 2$ correspond to, respectively, stationary and non-stationary versions of financial cycles that have a longer time span and a smaller number of input signal variables (in rare cases, when the data is especially scarce, we use a standardized reference proxy variable as a replacement for a synthetic financial cycle—see factor loadings in Appendix A); vice versa, versions $v = 3$ and $v = 4$ correspond to

stationary and non-stationary cycles that are based on a broader set of input variables, which however comes at the expense of a shorter length of the resulting financial cycle estimates.

Different versions of financial cycles however exhibit rather similar dynamics after time-varying trends are removed in the case of non-stationary cycles. Therefore, for brevity in the paper we document only the first version of financial cycles, which we then use as baseline estimates in further analysis of cross-country synchronicity and supranational cycles. For reference we report all versions of financial cycles and related factor loadings for the USA only in Appendix C; information on the other countries in the sample is made available in the companion paper Adarov (2018), documenting also turning points, unit root tests and other additional details about the data and estimations.

As noted in the methodology section, to aid inference financial cycle estimates are standardized so that their amplitude can be interpreted in terms of standard deviations from the sample mean[16], which yet also means that the scale is specific to a particular country-segment and comparison of magnitudes across countries is hindered. Detrended and standardized segment-specific baseline financial cycles, unsmoothed and HP-smoothed variants, are shown in Figures 1–3. For the ease of navigation the results are grouped by region in the following order: North and South America, Asia, Europe and sorted alphabetically by country ISO3 within each region.

Factor loadings and autoregressive coefficients associated with each dynamic factor model for the benchmark cycles are reported in Appendix A and raw financial cycle estimates are plotted in Appendix B. Overall, across all financial market segments and countries estimated financial cycles demonstrate rather high persistence with the autoregressive parameter in many cases reaching values above 0.8–0.9, signifying almost a random walk process. This is however fully in line with the prior expectations about the nature of financial cycles being a persistent self-reinforcing process of the accumulation of financial market imbalances.

The signs of factor loadings are generally consistent with the economic intuition behind our grouping of input signal variables into the *Price–Quantity–Risk* categories: risk and volatility measures tend to bear a negative sign, while price and quantity measures tend to have positive factor loadings, which signifies that the contraction of activity in financial markets as picked up by financial cycles is associated with higher market volatility, slowdown of market activity and dropping asset prices, while the boom phase related to the build-up of financial imbalances is accompanied by a decline in risk perceptions as conveyed by compressing spread, rising asset prices and volume of market activity.

[16] For instance, in the case of credit cycles this implies that an increase of the standardized credit financial cycle index above unity is associated with the loosening of monetary and credit conditions by one standard deviation relative to the historical average for that country-segment.

Visual inspection of financial cycles and turning points obtained via the BBQ algorithm suggests that all financial market segments tend to move in strongly cyclical long-run patterns. Naturally, the BBQ algorithm detects additional transitory shocks in the case of unsmoothed cycles, whereas its application to the smoothed cycles yields a lower count of turning points emphasizing the "big picture". The estimated average duration of smoothed financial cycles is 13 years for credit and housing markets (7 years for their unsmoothed variants) and 10 years for debt securities and equity cycles (6 years for their unsmoothed versions).

One should however take note of the dispersion in phase and cycle duration across countries (see Figure 7), which is wider for the credit and housing cycles, while financial cycles in capital markets exhibit tighter distribution of values. The duration of financial cycles across all segments and countries however mostly tends to fall into the range of 9–15 years (6–8 for unsmoothed financial cycles).

Another interesting feature related to the turning point and phase sequencing is the slight asymmetry between the expansion and contraction phases of financial cycles observed for all segments as expansions tend to be up to one year longer on average than contractions. Such tendency towards a sawtooth pattern rather than a symmetric sine wave shape is characteristic of the buildup of financial imbalances being a gradual albeit persistent process and corrections occurring in a relatively sharper and more disorderly manner, often amounting to market "crashes". HP-smoothing of cycles tends produce more symmetric cycles due to the nature of the filtering algorithm and thereby also may shift the turning point dates relative to their counterparts in the unsmoothed cycle versions. Such loss of precision however does not alter much the overall inference.

Financial cycles pertaining to different market segments exhibit co-movement tendencies, especially during periods of major crises and recoveries. At the same time, synchronization is often not contemporaneous, and the credit cycles in many cases tend to lag behind other cycles and particularly the equity cycles.[17]

[17] For a formal assessment of dynamic spillovers between segment-specific financial cycles for the sample of systemic economies see also Adarov(2017).

Figure 1: Segment-specific financial cycles: North and South America (AME)

Note: The figure shows unsmoothed segment-specific benchmark financial cycles $\widehat{FC}_i$ and their smoothed counterparts $\widehat{FC}_i^*$ $(i = CR, H, B, EQ)$, expressed in gaps (deviations from the long-run trend) and standardized.

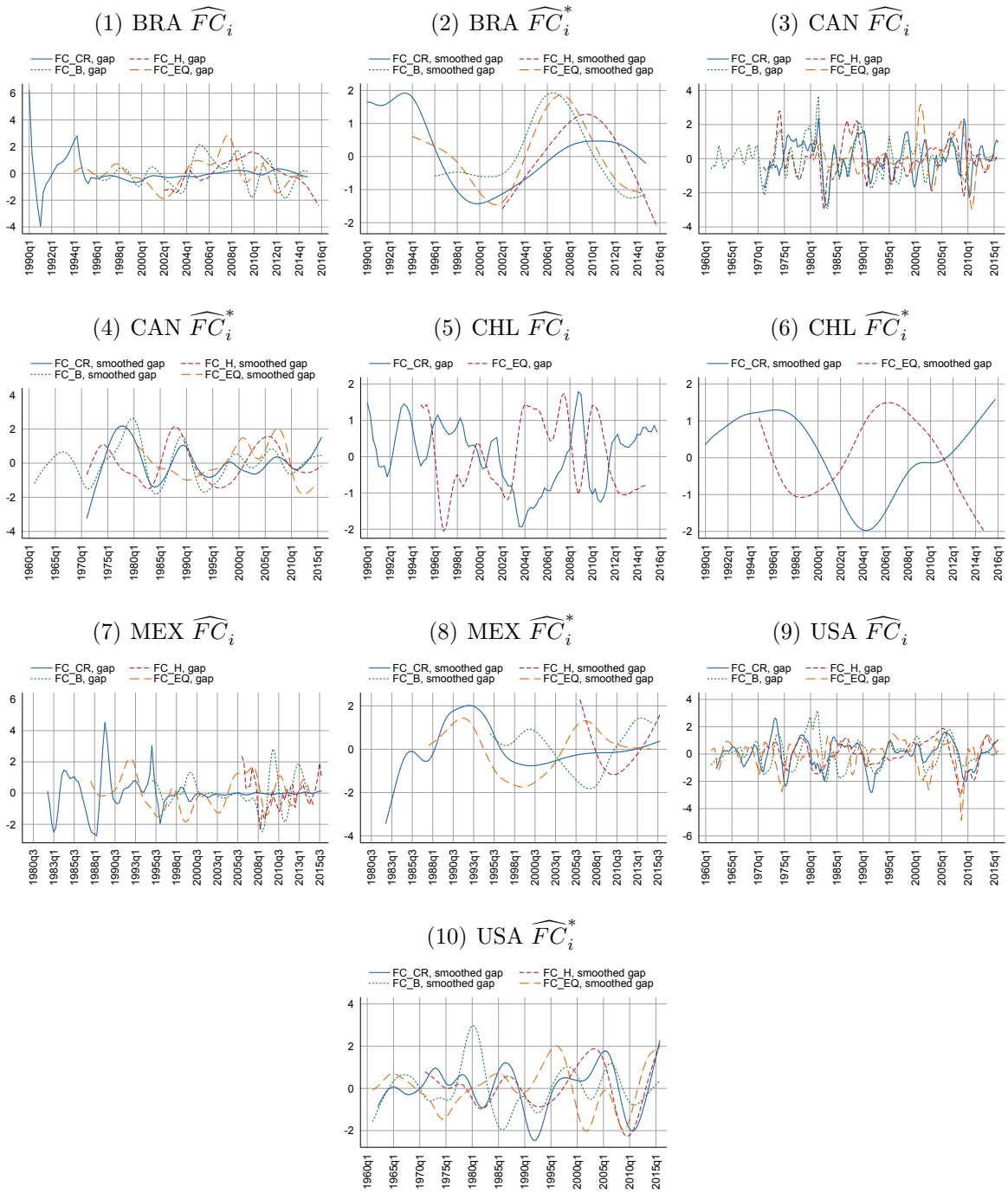


Figure 2: Segment-specific financial cycles: Asia (ASI)

Note: The figure shows unsmoothed segment-specific benchmark financial cycles $\widehat{FC}_i$ and their smoothed counterparts $\widehat{FC}_i^*$ $(i = CR, H, B, EQ)$, expressed in gaps (deviations from the long-run trend) and standardized.

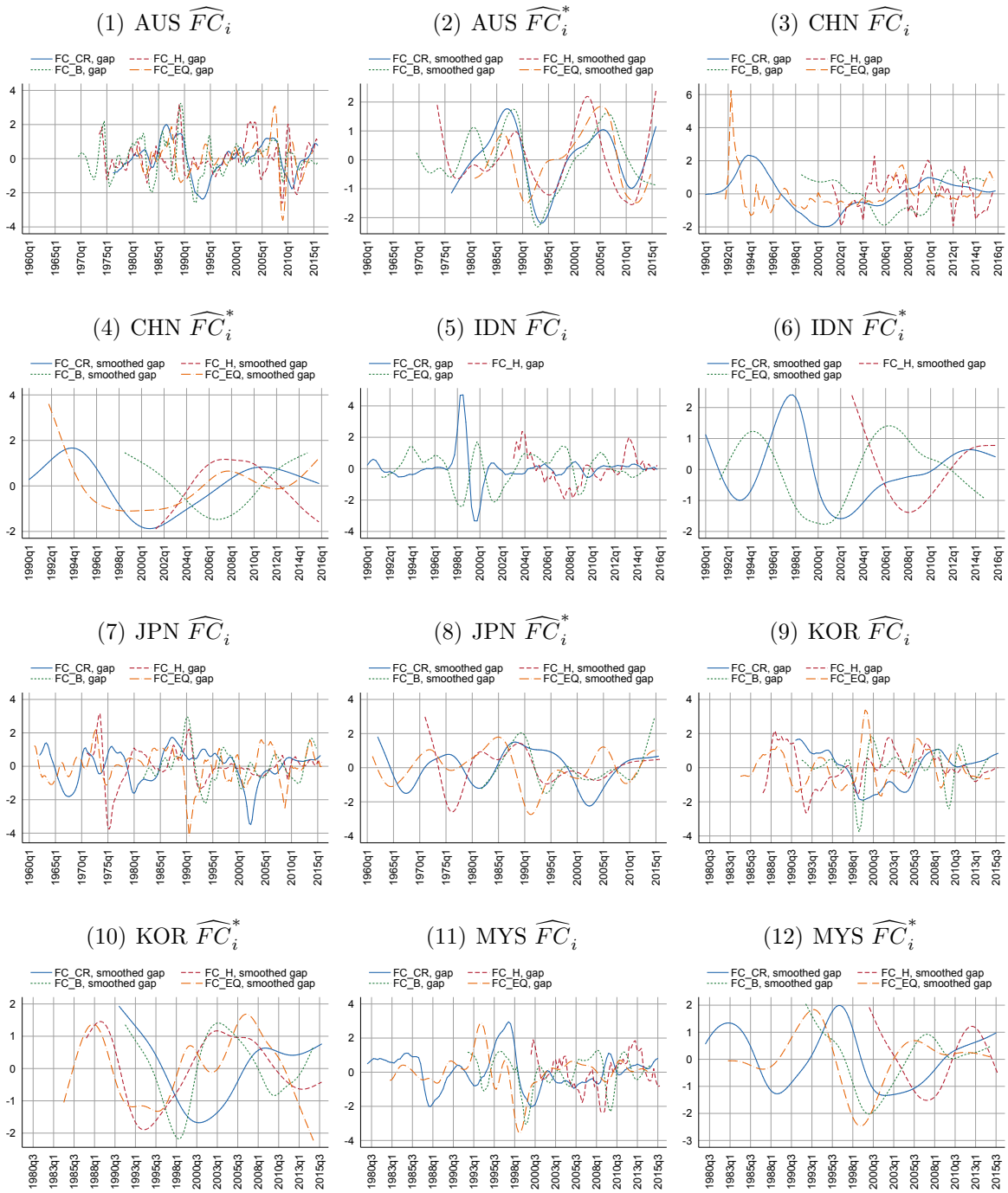


Figure 2 (cont.): Segment-specific benchmark financial cycles: Asia

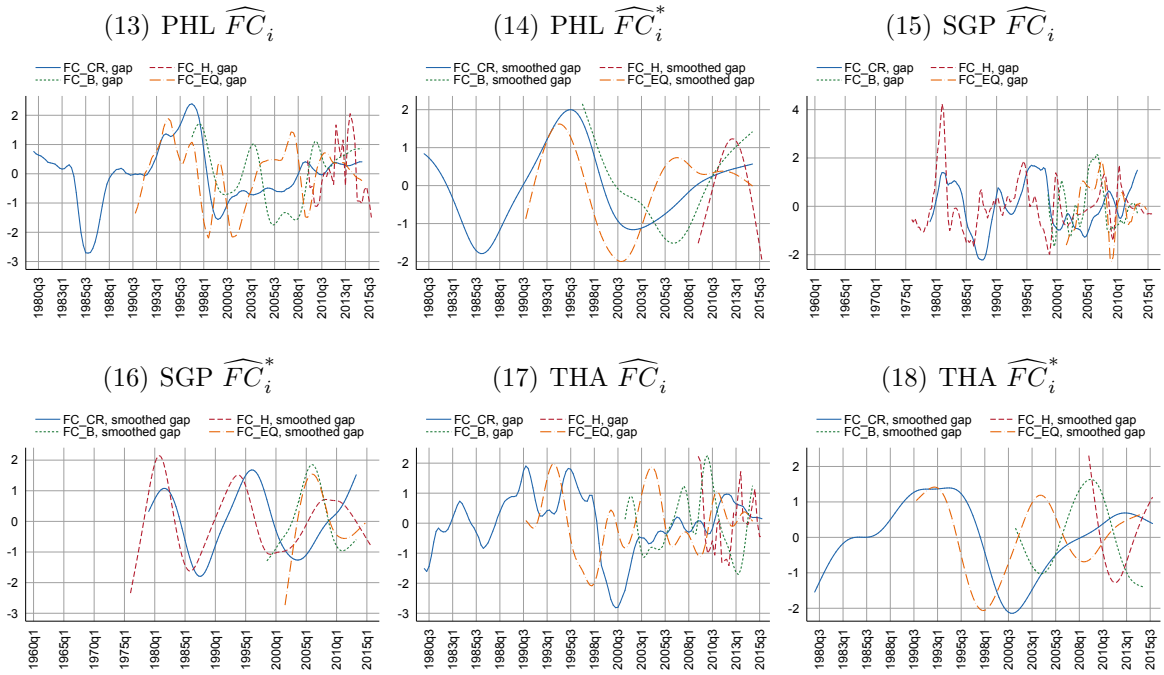


Figure 3: Segment-specific financial cycles: Europe (EUR)

Note: The figure shows unsmoothed segment-specific benchmark financial cycles $\widehat{FC}_i$ and their smoothed counterparts $\widehat{FC}_i^*$ $(i = CR, H, B, EQ)$, expressed in gaps (deviations from the long-run trend) and standardized.

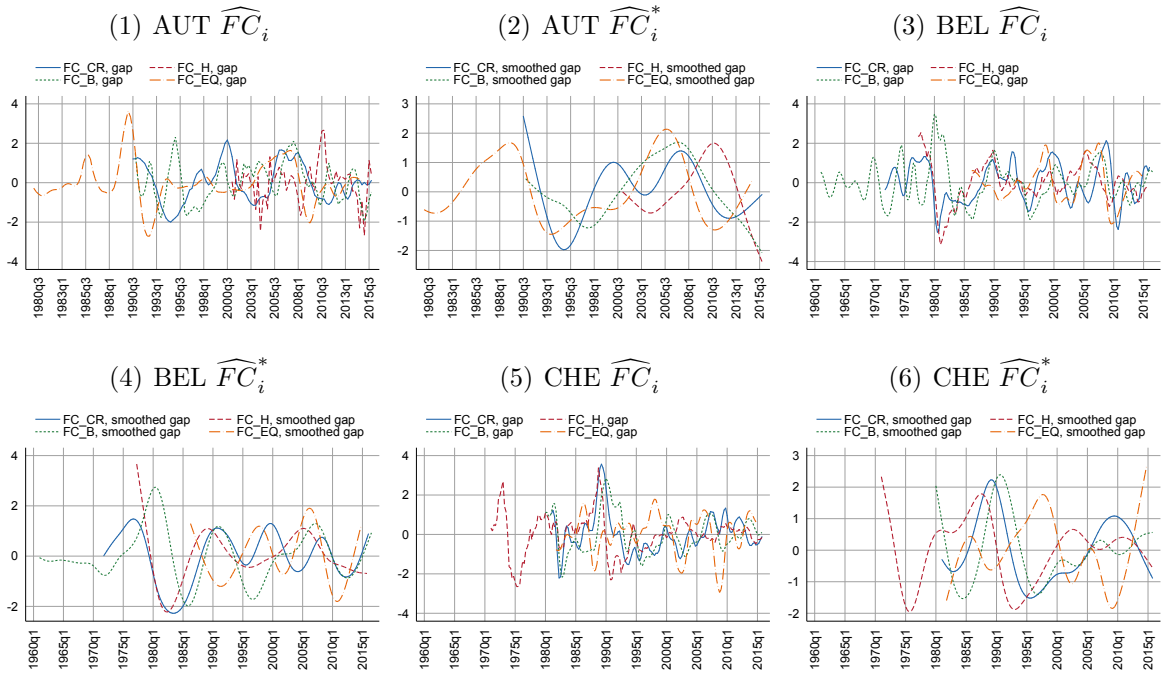
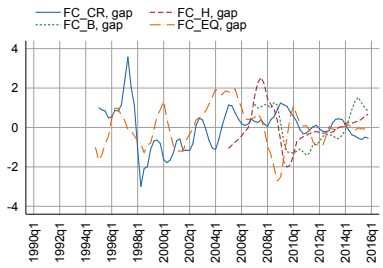
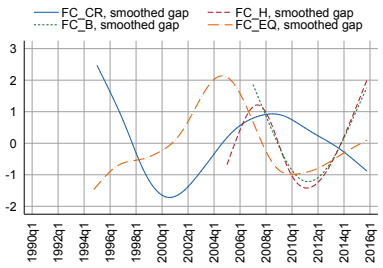


Figure 3 (cont.): Segment-specific financial cycles: Europe (EUR)

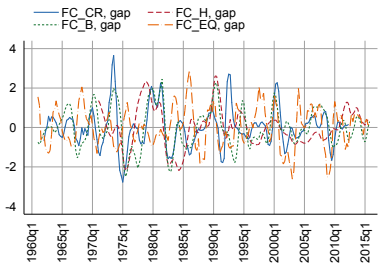
(7) CZE $\widehat{FC}_i$



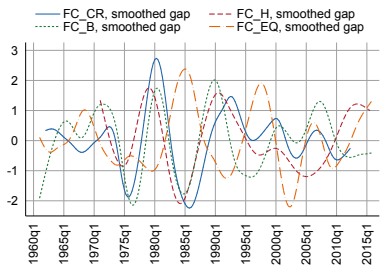
(8) CZE $\widehat{FC}_i^*$



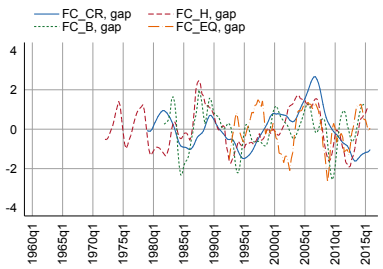
(9) DEU $\widehat{FC}_i$



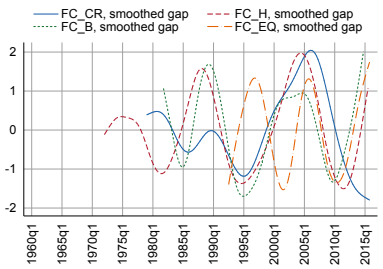
(10) DEU $\widehat{FC}_i^*$



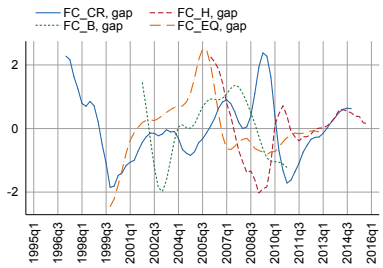
(11) ESP $\widehat{FC}_i$



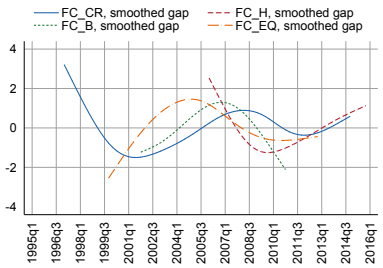
(12) ESP $\widehat{FC}_i^*$



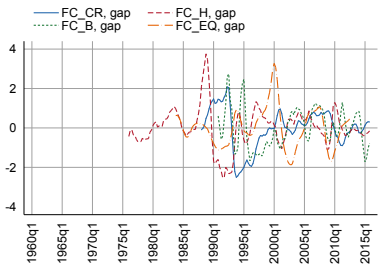
(13) EST $\widehat{FC}_i$



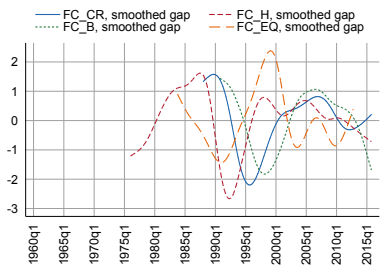
(14) EST $\widehat{FC}_i^*$



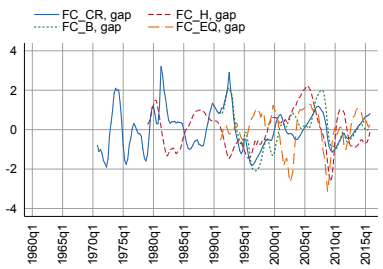
(15) FIN $\widehat{FC}_i$



(16) FIN $\widehat{FC}_i^*$



(17) FRA $\widehat{FC}_i$



(18) FRA $\widehat{FC}_i^*$

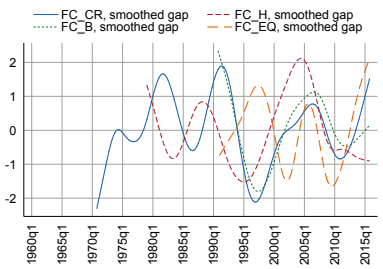
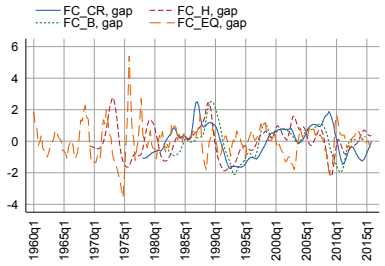
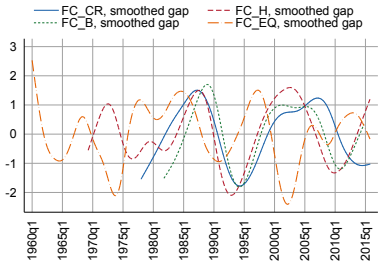


Figure 3 (cont.): Segment-specific benchmark financial cycles: Europe

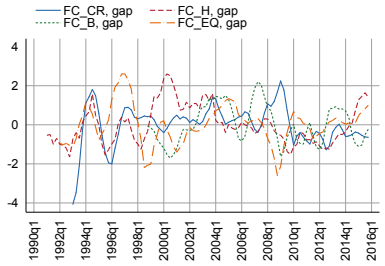
(19) GBR $\widehat{FC}_i$



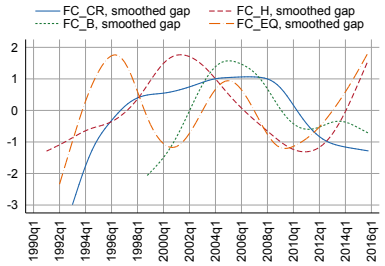
(20) GBR $\widehat{FC}_i^*$



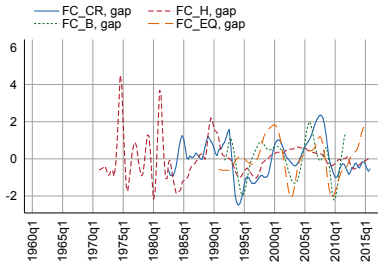
(21) HUN $\widehat{FC}_i$



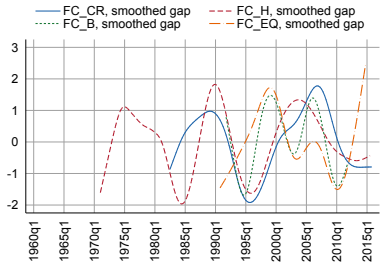
(22) HUN $\widehat{FC}_i^*$



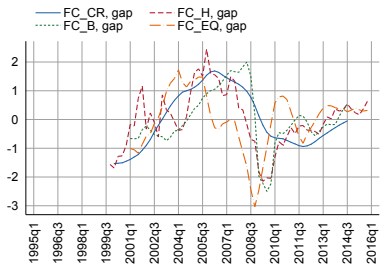
(23) ITA $\widehat{FC}_i$



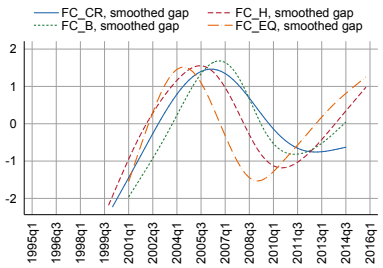
(24) ITA $\widehat{FC}_i^*$



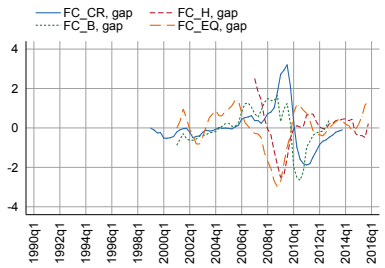
(25) LTU $\widehat{FC}_i$



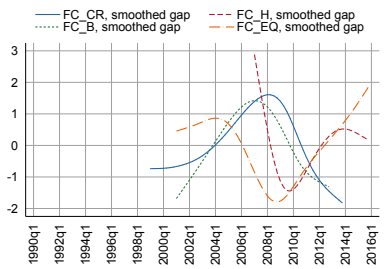
(26) LTU $\widehat{FC}_i^*$



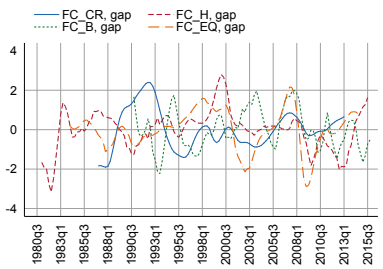
(27) LVA $\widehat{FC}_i$



(28) LVA $\widehat{FC}_i^*$



(29) NLD $\widehat{FC}_i$



(30) NLD $\widehat{FC}_i^*$

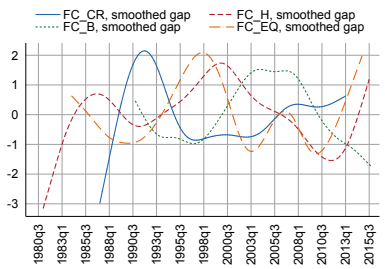
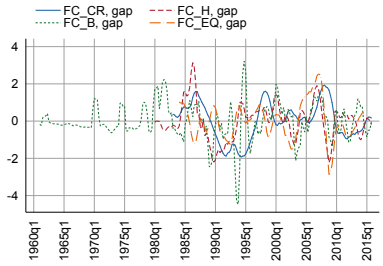
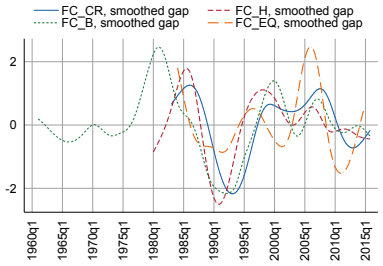


Figure 3 (cont.): Segment-specific benchmark financial cycles: Europe

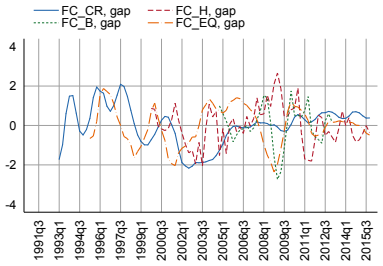
(31) NOR $\widehat{FC}_i$



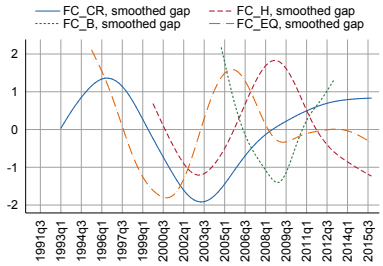
(32) NOR $\widehat{FC}_i^*$



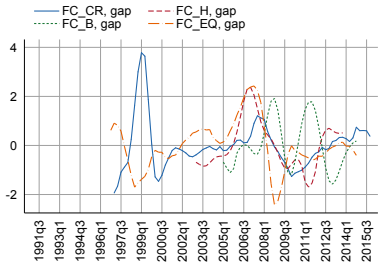
(33) POL $\widehat{FC}_i$



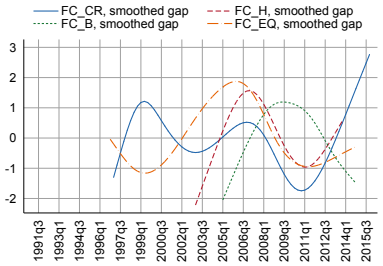
(34) POL $\widehat{FC}_i^*$



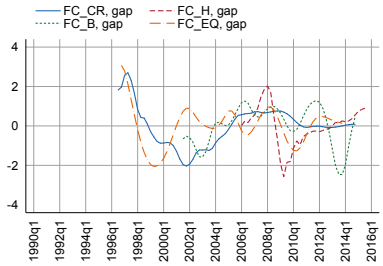
(35) RUS $\widehat{FC}_i$



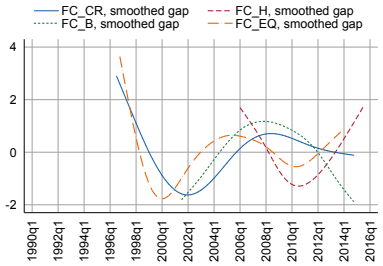
(36) RUS $\widehat{FC}_i^*$



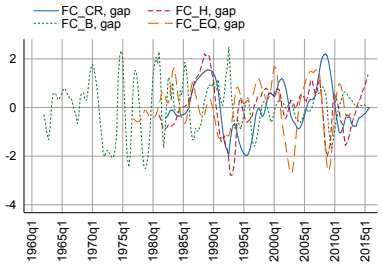
(37) SVK $\widehat{FC}_i$



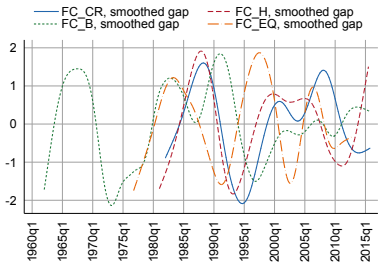
(38) SVK $\widehat{FC}_i^*$



(39) SWE $\widehat{FC}_i$



(40) SWE $\widehat{FC}_i^*$



4.2 Aggregate financial cycles

Next, we estimate aggregate financial cycles that summarize common dynamics across the four financial market segments of a given country. Two versions of aggregate financial cycles are estimated for each country in the sample: $FC_{AG}^{(1)}$ is based on the dynamic factor model combining observable input signal variables that were used to estimate the four benchmark segment-specific financial cycles; $FC_{AG}^{(2)}$ is based on the dynamic factor model incorporating the estimated segment-specific cycles rather than observable variables. For some countries, when the length of certain segment-specific cycles is especially short we replace that cycle with a proxy variable (the reference variable that was used to rotate the cycle) or, in the cases when the proxy variable is also too short, the segment is dropped from the model. That should not adversely impact the aggregate cycle estimates as the issue typically emerges for countries in which the problematic financial market segment is not well developed anyway to be of systemic importance. Input signal variable composition behind each estimated national aggregate financial cycle along with factor loadings and autoregressive parameter values can be reviewed in Appendix A.

Both versions yield nearly identical estimates as can be seen in the figures plotting $FC_{AG}^{(1)}$ next to $FC_{AG}^{(2)}$ for each country (Appendix B). Therefore in further analysis we focus only on $FC_{AG}^{(2)}$ as the baseline national aggregate financial cycles as the estimation methodology in this case treats all financial market segments equally as opposed to version $v = 1$, where the balance of input signal variables is skewed towards the credit market for which more data is available. The detrended and standardized baseline aggregate financial cycles are reported in Figures 4–6.

Similar to segment-specific cycles, aggregate financial cycles are characterized by high persistence with the autoregressive parameter in the range of [0.82; 0.99] and recurring low-frequency dynamics signifying boom-bust cycles at the national level. The average cycle duration is 12 years for smoothed aggregate financial cycles and 8 years for their unsmoothed counterparts.

Comparison of expansion and contraction phases also suggests that aggregate financial cycles tend to have an asymmetric "sawtooth" shape with relatively more prolonged expansions and faster contractions. On average, expansions tend to last a year longer relative to contraction phases (in the case of the smoothed aggregate cycles, 6.8 years versus 5.6 years, respectively), albeit there is also much variation across countries (see Figure 7).

Figure 4: Aggregate financial cycles: North and South America (AME)

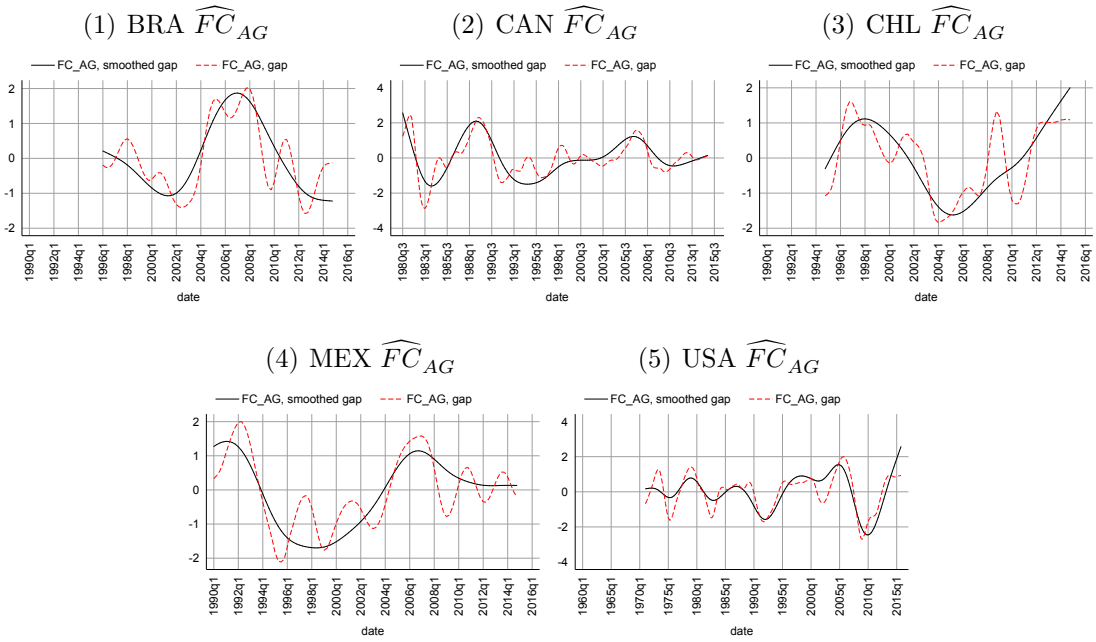


Figure 5: Aggregate financial cycles: Asia (ASI)

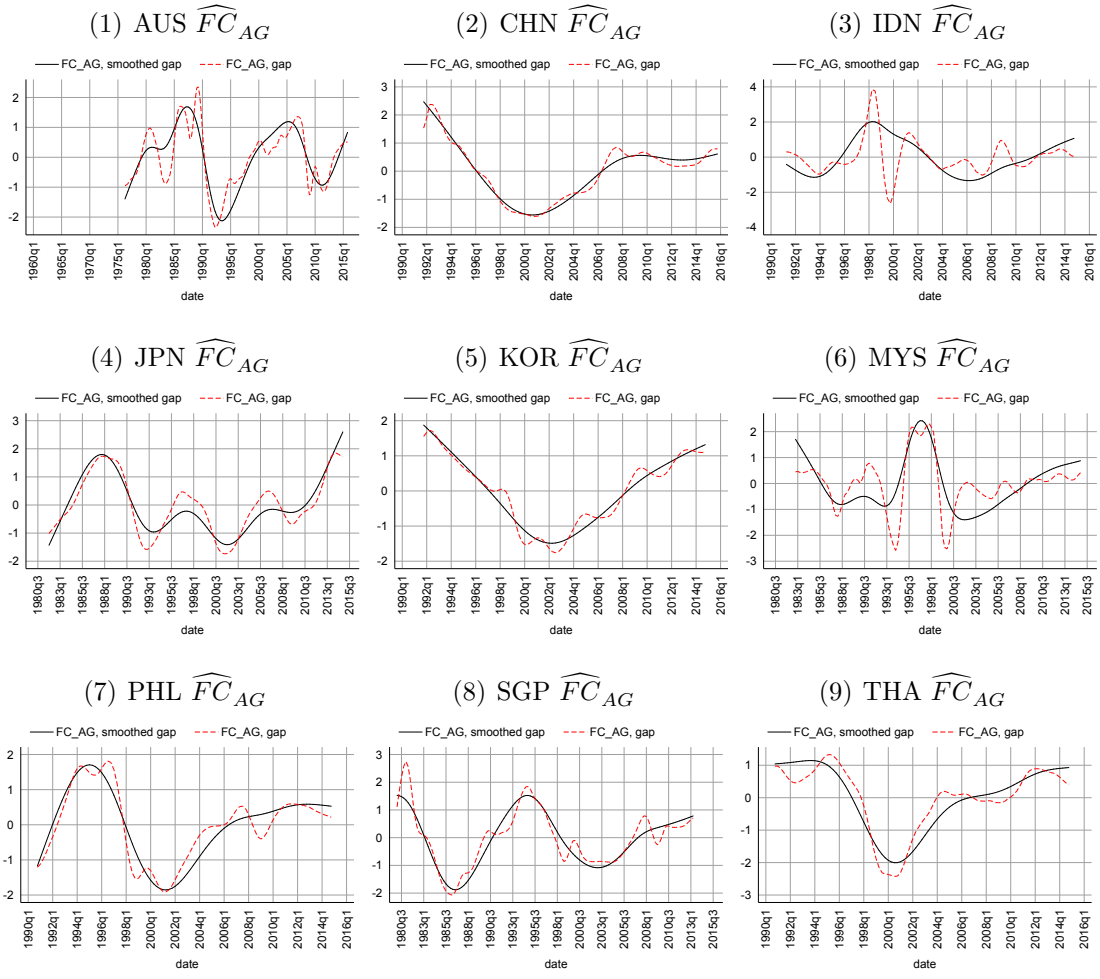


Figure 6: Aggregate financial cycles: Europe (EUR)

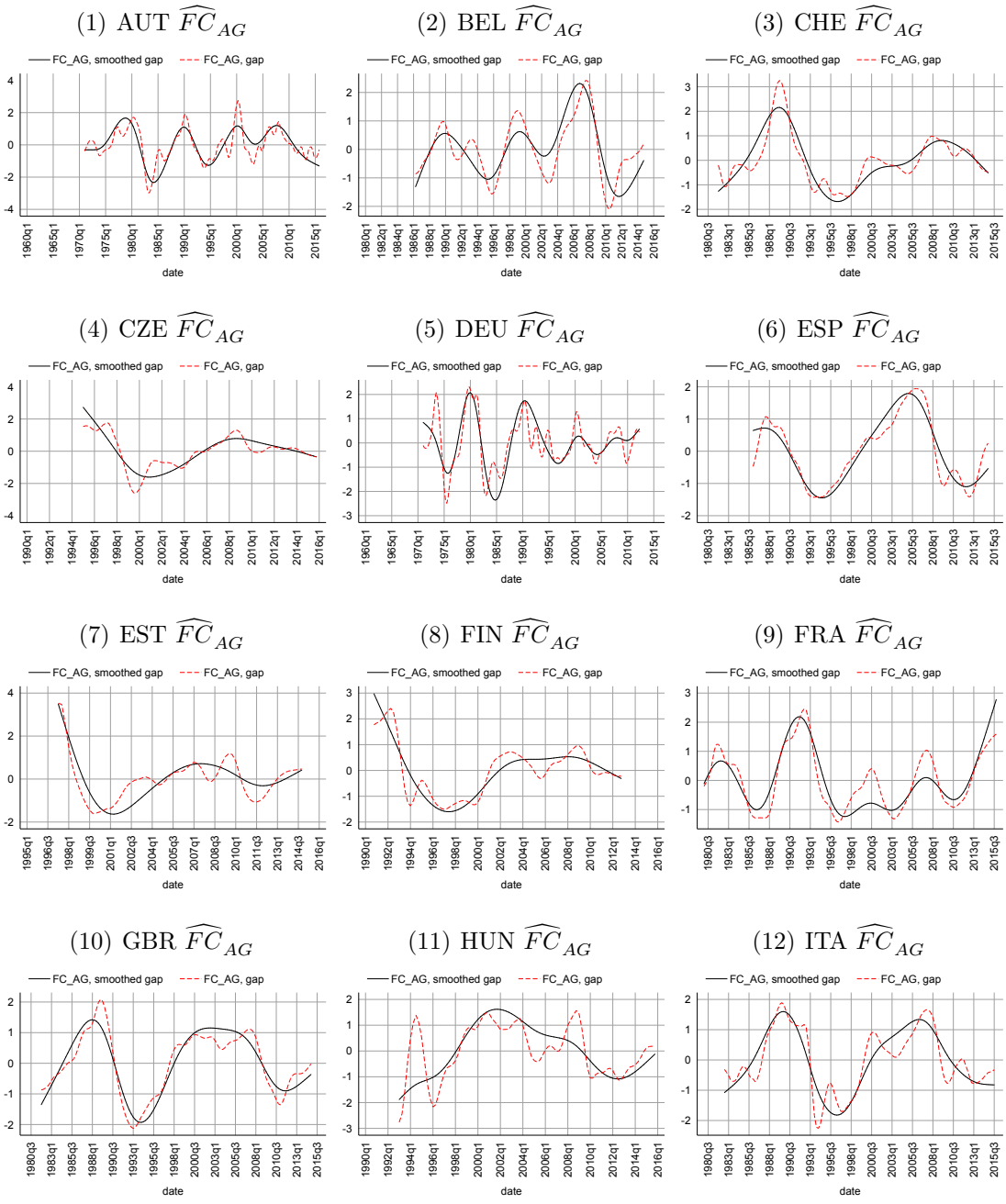
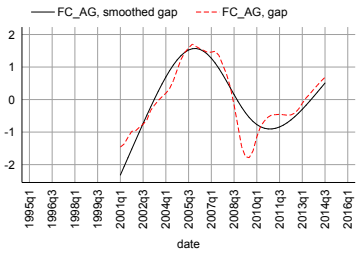
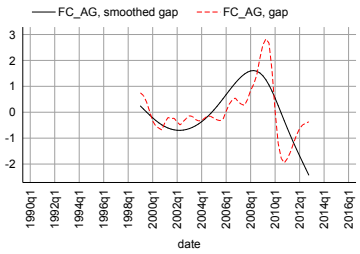


Figure 6 (cont.): Aggregate financial cycles: Europe (EUR)

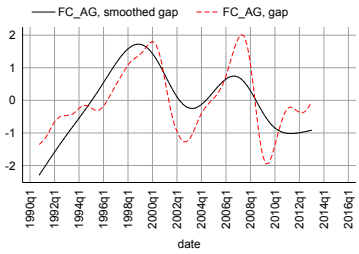
(13) LTU $\widehat{FC}_{AG}$



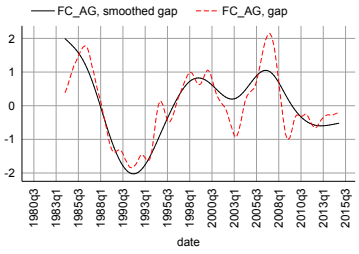
(14) LVA $\widehat{FC}_{AG}$



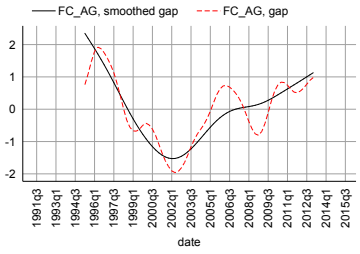
(15) NLD $\widehat{FC}_{AG}$



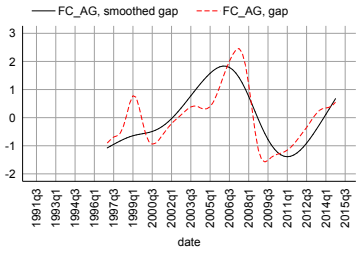
(16) NOR $\widehat{FC}_{AG}$



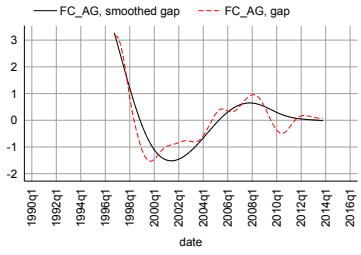
(17) POL $\widehat{FC}_{AG}$



(18) RUS $\widehat{FC}_{AG}$



(19) SVK $\widehat{FC}_{AG}$



(20) SWE $\widehat{FC}_{AG}$

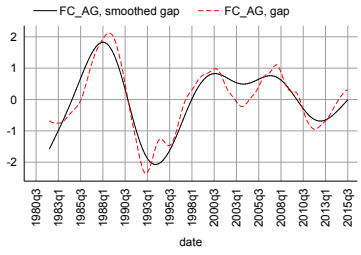
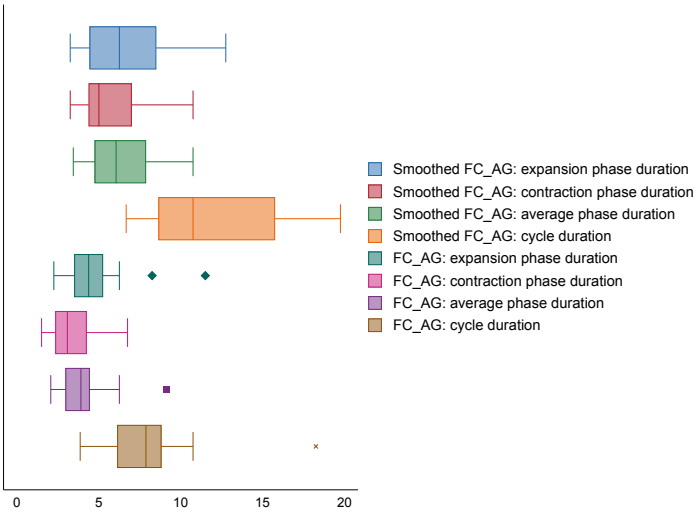


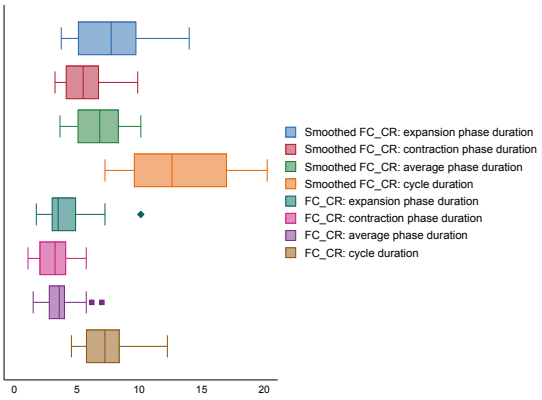
Figure 7: Phase and cycle duration of financial cycles, years

Note: The figure shows boxplot charts of expansion and contraction phase duration, average phase duration and peak-to-peak and trough-to-trough cycle duration for the global sample of countries, including smoothed and unsmoothed aggregate and segment-specific financial cycles.

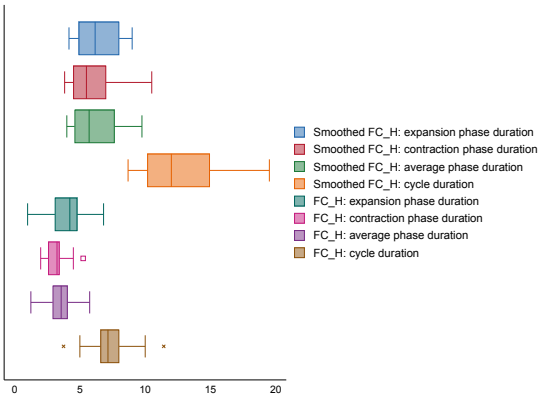
(1) Aggregate financial cycle



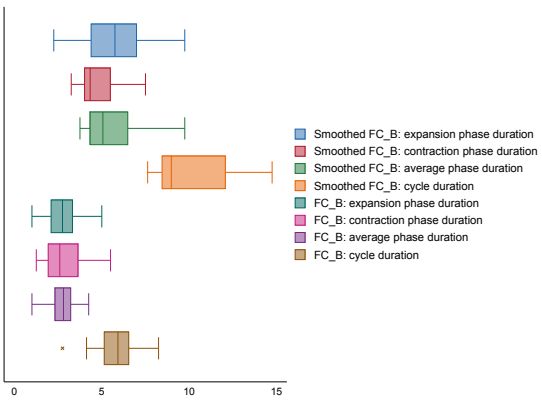
(2) Credit market cycle



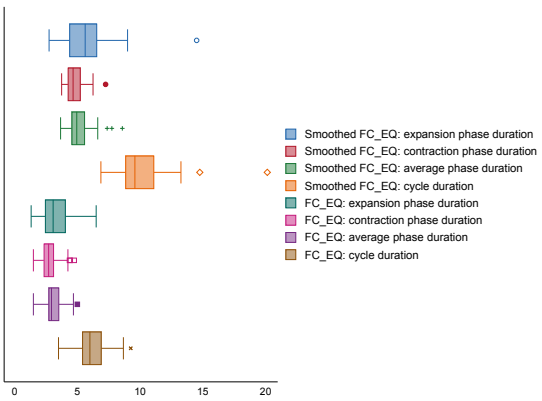
(3) Housing market cycle



(4) Bond market cycle



(5) Equity market cycle



As smoothed cycles exhibit more gradual dynamics, the BBQ algorithm yields a lower count of turning points, which are nevertheless consistent with the results for the unsmoothed estimates, and emphasizes the cyclical dynamics at lower frequency picking up only major episodes of systemic financial market distress. Overall, combining evidence from aggregate and segment-specific financial cycles, broad movements in financial cycles have strong correspondence with national or segment-specific crisis events, which are well-documented in the literature (see, for instance, Laeven and Valencia (2013), Claessens and Kose (2013), Reinhart and Rogoff (2014)). Yet not all fluctuations in the financial cycle indexes and related identified turning points are necessarily associated with financial crisis episodes as classified in the literature, and may rather reflect transitory developments with lower amplitudes of phases/cycles or protracted smooth bear markets, in contrast to sharper corrections.

4.3 Cross-country synchronicity of aggregate financial cycles

Figure 8 summarizes concordance and correlations between national aggregate financial cycles partitioned into three geographic regions (AME, ASI, EUR). The concordance index is computed for unsmoothed and HP-smoothed aggregate financial cycles[18] and the Pearson's correlations are reported for the unsmoothed financial cycles in levels and in first differences. Importantly, the synchronicity measures should be interpreted taking into account the actual length of the series under consideration (the number of observations N is listed for each country in the figure), as by construction shorter series with smaller number of turning points and phases would tend to yield higher synchronicity values. That is particularly evident for the transition economies of Europe, for which the data span is relatively short and in most cases encompasses only one full financial cycle culminating in the late-2000s Great Recession, which resulted in synchronized financial market downturns across many countries thus yielding high observed synchronicity.

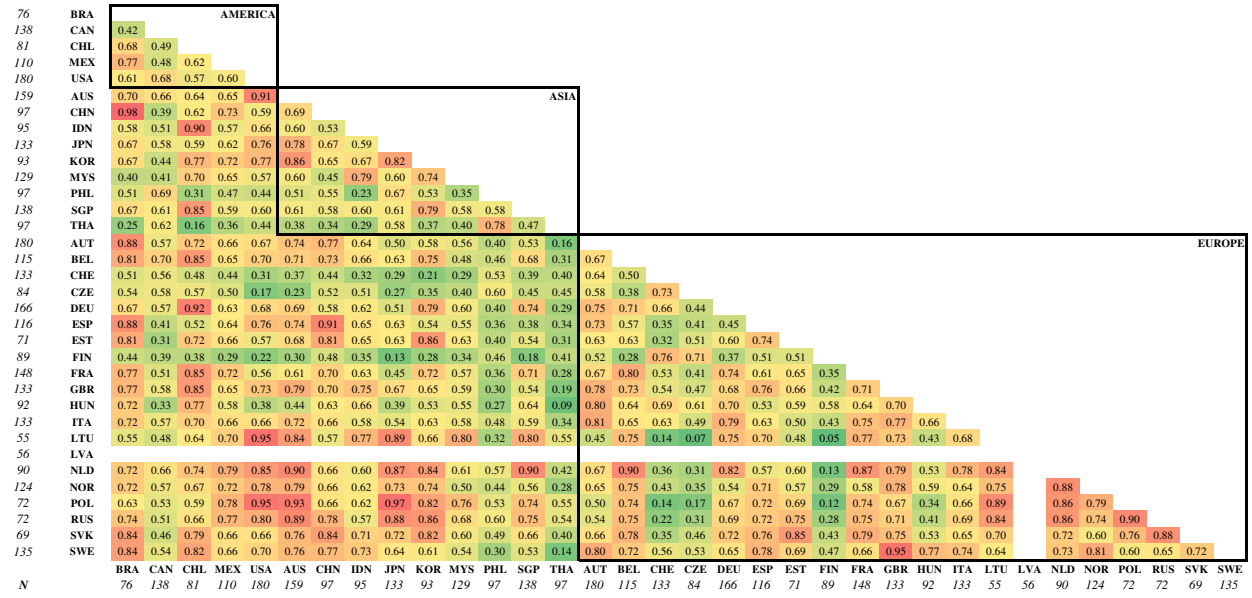
The concordance index is especially well-suited to measuring financial cycle synchronicity as it explicitly tracks phase sequencing. Nevertheless, both synchronicity metrics we use are mutually consistent and lead to similar conclusions (by construction the concordance index varies in the [0; 1] interval with the values above and below 0.5 corresponding to positive and negative correlation, respectively). In particular, empirical evidence from correlations and phase concordance indexes suggests that aggregate financial cycles tend to be much more synchronized within the same geographic region with the exception of the North and South American region, for which the results are mixed, while the sample is comprised of only five countries.

[18] In some cases the concordance index could not be computed for technical reasons, including insufficient length of the estimated financial cycle index or lack of robustly identified turning points.

Figure 8: Synchronicity of national aggregate financial cycles

Notes: The figure shows concordance (top two panels) and correlation coefficient (bottom panels) between national aggregate financial cycle indexes. The colorscale reflects the degree of co-movement from red (highly positive) to green (highly negative). The countries are grouped by regions (North and South America, Asia, Europe). In the correlation tables, the bold font indicates the level of statistical significance of at least 10%. N denotes the number of observations for the country. Blank cells indicate cases when the BBQ algorithm could not identify turning points.

(1) Concordance index: unsmoothed cycles



(2) Concordance index: smoothed cycles

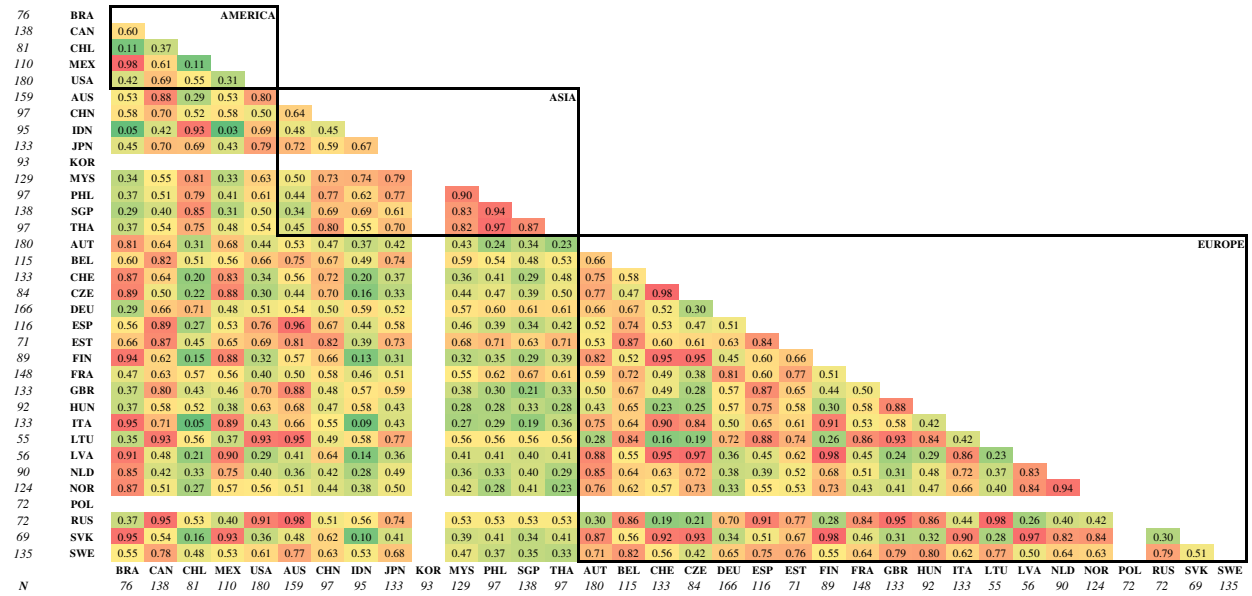
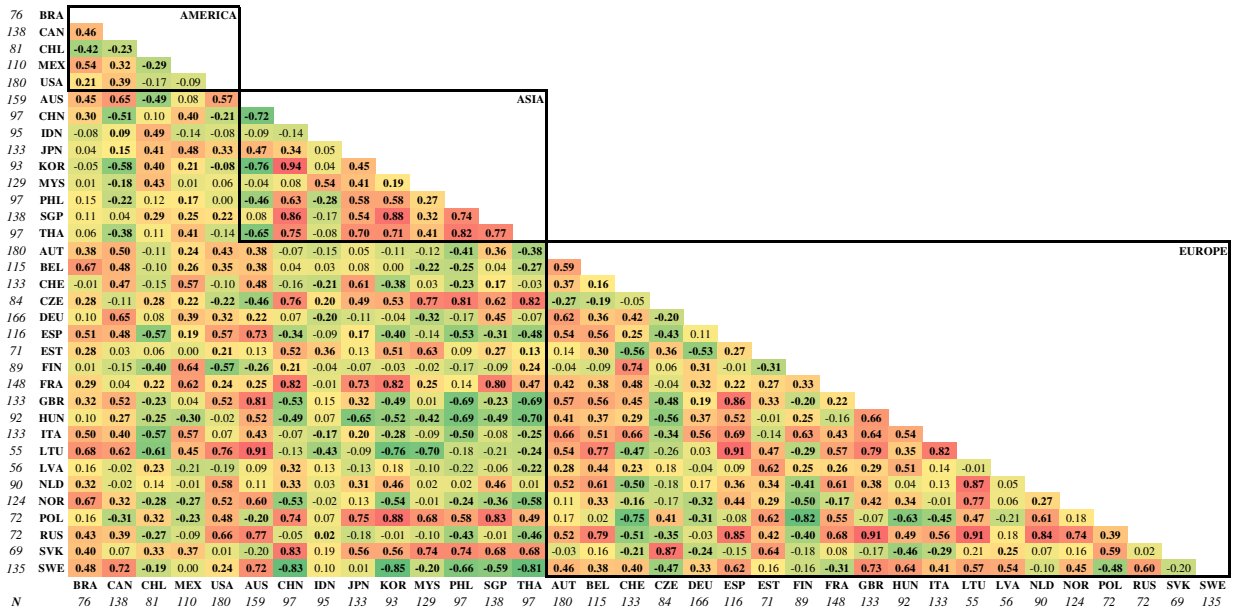


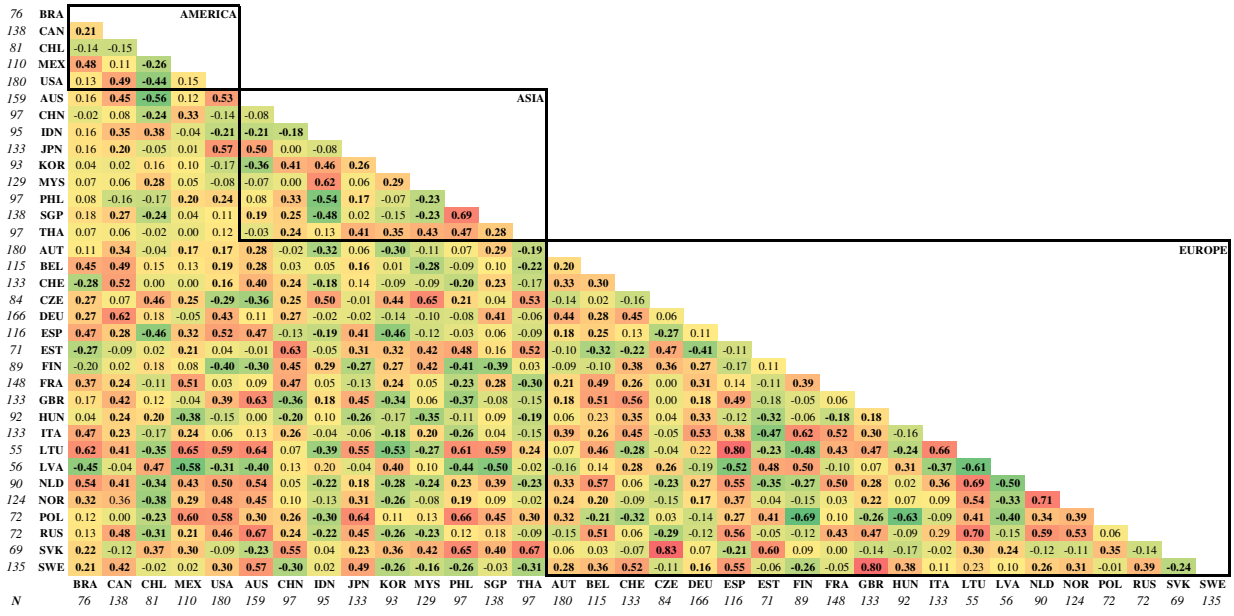
Figure 8 (cont.): Synchronicity of national aggregate financial cycles

(3) Pearson's correlation (levels)



		BRA	CAN	CHL	MEX	USA	AUS	CHN	IDN	JPN	KOR	MYS	PHL	SGP	THA	AUT	BEL	CHE	CZE	DEU	ESP	EST	FIN	FRA	GBR	HUN	ITA	LTU	LVA	NLD	NOR	POL	RUS	SVK	SWE
76	BRA																																		
138	CAN	0.46																																	
81	CHL	-0.42	-0.23																																
110	MEX	0.54	0.32	-0.29																															
180	USA	0.21	0.39	-0.17	-0.09																														
159	AUS	0.45	0.65	-0.49	0.08	0.57																													
97	CHN	0.30	-0.51	0.10	0.40	-0.21	-0.72																												
95	IDN	-0.08	0.09	0.49	-0.14	-0.08	-0.09	-0.14																											
133	JPN	0.04	0.15	0.41	0.48	0.33	0.47	0.34	0.05																										
93	KOR	-0.05	-0.58	0.40	0.21	-0.08	-0.76	0.94	0.04	0.45																									
129	MYS	0.01	-0.18	0.43	0.01	0.06	-0.04	0.08	0.54	0.41	0.19																								
97	PHL	0.15	-0.22	0.12	0.17	0.00	-0.46	0.63	-0.28	0.58	0.58	0.27																							
138	SGP	0.11	0.04	0.29	0.25	0.22	0.08	0.86	-0.17	0.54	0.88	0.32	0.74																						
97	THA	0.06	-0.38	0.11	0.41	-0.14	-0.65	0.75	-0.08	0.70	0.71	0.41	0.82	0.77																					
180	AUT	0.38	0.50	-0.11	0.24	0.43	0.38	-0.07	-0.15	0.05	-0.11	-0.12	-0.41	0.36	-0.38																				
115	BEL	0.67	0.48	-0.10	0.26	0.35	0.38	0.04	0.03	0.08	0.00	-0.22	-0.25	0.04	-0.27	0.59																			
133	CHE	-0.01	0.47	-0.15	0.57	-0.10	0.48	-0.16	-0.21	0.61	-0.38	0.03	-0.23	0.17	-0.03	0.37	0.16																		
84	CZE	0.28	-0.11	0.28	0.22	-0.22	-0.46	0.76	0.20	0.49	0.53	0.77	0.81	0.62	0.82	-0.27	-0.19	-0.05																	
166	DEU	0.10	0.65	0.08	0.39	0.32	0.22	0.07	-0.20	-0.11	-0.04	-0.32	-0.17	0.45	-0.07	0.62	0.36	0.42	-0.20																
116	ESP	0.51	0.48	-0.57	0.19	0.57	0.73	-0.34	-0.09	0.17	-0.40	-0.14	-0.53	-0.31	-0.48	0.54	0.56	0.25	-0.43	0.11															
71	EST	0.28	0.03	0.06	0.00	0.21	0.13	0.52	0.36	0.13	0.51	0.63	0.09	0.27	0.13	0.14	0.30	-0.56	0.36	-0.53	0.27														
89	FIN	0.01	-0.15	-0.40	0.64	-0.57	-0.26	0.21	-0.04	-0.07	-0.03	-0.02	-0.17	-0.09	0.24	-0.04	-0.09	0.74	0.06	0.31	-0.01	-0.31													
148	FRA	0.29	0.04	0.22	0.62	0.24	0.25	0.82	-0.01	0.73	0.82	0.25	0.14	0.80	0.47	0.42	0.38	0.48	-0.04	0.32	0.22	0.27	0.33												
133	GBR	0.32	0.52	-0.23	0.04	0.52	0.81	-0.53	0.15	0.32	-0.49	0.01	-0.69	-0.23	-0.69	0.57	0.56	0.45	-0.48	0.19	0.86	0.33	-0.20	0.22											
92	HUN	0.10	0.27	-0.25	-0.30	-0.02	0.52	-0.49	0.07	-0.65	-0.52	-0.42	-0.69	-0.49	-0.70	0.41	0.37	0.29	-0.56	0.37	0.52	-0.01	0.25	-0.16	0.66										
133	ITA	0.50	0.40	-0.57	0.57	0.07	0.43	-0.07	-0.17	0.20	-0.28	-0.09	-0.50	-0.08	-0.25	0.66	0.51	0.66	-0.34	0.56	0.69	-0.14	0.63	0.43	0.64	0.54									
55	LTU	0.68	0.62	-0.61	0.45	0.76	0.91	-0.13	-0.43	-0.09	-0.76	-0.70	-0.18	-0.21	-0.24	0.54	0.77	-0.47	-0.26	0.03	0.91	0.47	-0.29	0.57	0.79	0.35	0.82								
56	LVA	0.16	-0.02	0.23	-0.21	-0.19	0.09	0.32	0.13	-0.13	0.18	-0.10	-0.22	-0.06	-0.22	0.28	0.44	0.23	0.18	-0.04	0.09	0.62	0.25	0.26	0.29	0.51	0.14	-0.01							
90	NLD	0.32	-0.02	0.14	-0.01	0.58	0.11	0.33	0.03	0.31	0.46	0.02	0.02	0.46	0.01	0.52	0.61	-0.50	-0.18	0.17	0.36	0.34	-0.41	0.61	0.38	0.04	0.13	0.87	0.05						
124	NOR	0.67	0.32	-0.28	-0.27	0.52	0.60	-0.53	-0.02	0.13	-0.54	-0.01	-0.24	-0.36	-0.58	0.11	0.33	-0.16	-0.17	-0.32	0.44	0.29	-0.50	-0.17	0.42	0.34	-0.01	0.77	0.06	0.27					
72	POL	0.16	-0.31	0.32	-0.23	0.48	-0.20	0.74	0.07	0.75	0.88	0.68	0.58	0.83	0.49	0.17	0.02	-0.75	0.41	-0.31	-0.08	0.62	-0.82	0.55	-0.07	-0.63	-0.45	0.47	-0.21	0.61	0.18				
72	RUS	0.43	0.39	-0.27	-0.09	0.66	0.77	-0.05	0.02	-0.18	-0.01	-0.10	-0.43	-0.01	-0.46	0.52	0.79	-0.51	-0.35	-0.03	0.85	0.42	-0.40	0.68	0.91	0.49	0.56	0.91	0.18	0.84	0.74	0.39			
69	SVK	0.40	0.07	0.33	0.37	0.01	-0.20	0.83	0.19	0.56	0.56	0.74	0.74	0.68	0.68	-0.03	0.16	-0.21	0.87	-0.24	-0.15	0.64	-0.18	0.08	-0.17	-0.46	-0.29	0.21	0.25	0.07	0.16	0.59	0.02		
135	SWE	0.48	0.72	-0.19	0.00	0.24	0.72	-0.83	0.10	0.01	-0.85	-0.20	-0.66	-0.59	-0.81	0.46	0.38	0.40	-0.47	0.33	0.62	0.16	-0.16	-0.31	0.73	0.64	0.41	0.57	0.54	-0.10	0.45	-0.48	0.60	-0.20	
		BRA	CAN	CHL	MEX	USA	AUS	CHN	IDN	JPN	KOR	MYS	PHL	SGP	THA	AUT	BEL	CHE	CZE	DEU	ESP	EST	FIN	FRA	GBR	HUN	ITA	LTU	LVA	NLD	NOR	POL	RUS	SVK	SWE
N		76	138	81	110	180	159	97	95	133	93	129	97	138	97	180	115	133	84	166	116	71	89	148	133	92	133	55	56	90	124	72	72	69	135

(4) Pearson's correlation (first differences)



		BRA	CAN	CHL	MEX	USA	AUS	CHN	IDN	JPN	KOR	MYS	PHL	SGP	THA	AUT	BEL	CHE	CZE	DEU	ESP	EST	FIN	FRA	GBR	HUN	ITA	LTU	LVA	NLD	NOR	POL	RUS	SVK	SWE
76	BRA																																		
138	CAN	0.21																																	
81	CHL	-0.14	-0.15																																
110	MEX	0.48	0.11	-0.26																															
180	USA	0.13	0.49	-0.44	0.15																														
159	AUS	0.16	0.45	-0.56	0.12	0.53																													
97	CHN	-0.02	0.08	-0.24	0.33	-0.14	-0.08																												
95	IDN	0.16	0.35	0.38	-0.04	-0.21	-0.21	-0.18																											
133	JPN	0.16	0.20	-0.05	0.01	0.57	0.50	0.00	-0.08																										
93	KOR	0.04	0.02	0.16	0.10	-0.17	-0.36	0.41	0.46	0.26																									
129	MYS	0.07	0.06	0.28	0.05	-0.08	-0.07	0.00	0.62	0.06	0.29																								
97	PHL	0.08	-0.16	-0.17	0.20	0.24	0.08	0.33	-0.54	0.17	-0.07	-0.23																							
138	SGP	0.18	0.27	-0.24	0.04	0.11	0.19	0.25	-0.48	0.02	-0.15	-0.23	0.69																						
97	THA	0.07	0.06	-0.02	0.00	0.12	-0.03	0.24	0.13	0.41	0.35	0.43	0.47	0.28																					
180	AUT	0.11	0.34	-0.04	0.17	0.17	0.28	-0.02	-0.32	0.06	-0.30	-0.11	0.07	0.29	-0.19																				
115	BEL	0.45	0.49	0.15	0.13	0.19	0.28	0.03	0.05	0.16	0.01	-0.28	-0.09	0.10	-0.22	0.20																			
133	CHE	-0.28	0.52	0.00	0.00	0.16	0.40	0.24	-0.18	0.14	-0.09	-0.09	-0.20	0.23	-0.17	0.33	0.30																		
84	CZE	0.27	0.07	0.46	0.25	-0.29	-0.36	0.25	0.50	-0.01	0.44	0.65	0.21	0.04	0.53	-0.14	0.02	-0.16																	
166	DEU	0.27	0.62	0.18	-0.05	0.43	0.11	0.27	-0.02	-0.02	-0.14	-0.10	-0.08	0.41	-0.06	0.44	0.28	0.45	0.06																
116	ESP	0.47	0.28	-0.46	0.32	0.52	0.47	-0.13	-0.19	0.41	-0.46	-0.12	-0.03	0.06	-0.09	0.18	0.25	0.13	-0.27	0.11															
71	EST	-0.27	-0.09	0.02	0.21	0.04	-0.01	0.63	-0.05	0.31	0.32	0.42	0.48	0.16	0.52	-0.10	-0.32	-0.22	0.47	-0.41	-0.11														
89	FIN	-0.20	0.02	0.18	0.08	-0.40	-0.30	0.45	0.29	-0.27	0.27	0.42	-0.41	-0.39	0.03	-0.09	-0.10	0.38	0.36	0.27	-0.17	0.11													
148	FRA	0.37	0.24	-0.11	0.51	0.03	0.09	0.47	0.05	-0.13	0.24	0.05	-0.23	0.28	-0.30	0.21	0.49	0.26	0.00	0.31	0.14	-0.11	0.39												
133	GBR	0.17	0.42	0.12	-0.04	0.39	0.63	-0.36	0.18	0.45	-0.34	0.06	-0.37	-0.08	-0.15	0.18	0.51	0.56	0.00	0.18	0.49	-0.18	-0.05	0.06											
92	HUN	0.04	0.24	0.20	-0.38	-0.15	0.00	-0.20	0.10	-0.26	-0.17	-0.35	-0.11	0.09	-0.19	0.06	0.23	0.35	0.04	0.33	-0.12	-0.32	-0.06	-0.18	0.18										
133	ITA	0.47	0.23	-0.17	0.24	0.06	0.13	0.26	-0.04	-0.06	-0.18	0.20	-0.26	0.04	-0.15	0.39	0.26	0.45	-0.05	0.53	0.38	-0.47	0.62	0.52	0.30	-0.16									
55	LTU	0.62	0.41	-0.35	0.65	0.59	0.64	0.07	-0.39	0.55	-0.53	-0.27	0.61	0.59	0.24	0.07	0.46	-0.28	-0.04	0.22	0.80	-0.23	-0.48	0.43	0.47	-0.24	0.66								
56	LVA	-0.45	-0.04	0.47	-0.58	-0.31	-0.40	0.13	0.20	-0.04	0.40	0.10	-0.44	-0.50	-0.02	-0.16	0.14	0.28	0.26	-0.19	-0.52	0.48	0.50	-0.10	0.07	0.31	-0.37	-0.61							
90	NLD	0.54	0.41	-0.34	0.43	0.50	0.54	0.05	-0.22	0.18	-0.28	-0.24	0.23	0.39	-0.23	0.33	0.57	0.06	-0.23	0.27	0.55	-0.35	-0.27	0.50	0.28	0.02	0.36	0.69	-0.50						
124	NOR	0.32	0.36	-0.38	0.29	0.48	0.45	0.10	-0.13	0.31	-0.26	-0.08	0.19	0.09	-0.02	0.24	0.20	-0.09	-0.15	0.17	0.37	-0.04	-0.15	0.03	0.22	0.07	0.09	0.54	-0.33	0.71					
72	POL	0.12	0.00	-0.23	0.60	0.58	0.30	0.26	-0.30	0.64	0.11	0.13	0.66	0.45	0.30	0.32	-0.21	-0.32	0.03	-0.14	0.27	0.41	-0.69	0.10	-0.26	-0.63	-0.09	0.41	-0.40	0.34	0.39				
72	RUS	0.13	0.48	-0.31	0.21	0.46	0.67	0.24	-0.22	0.45	-0.26	-0.23	0.12	0.18	-0.09	-0.15	0.51	0.06	-0.29	-0.12	0.56	-0.05	-0.12	0.43	0.47	-0.09	0.29	0.70	-0.15	0.59	0.53	0.06			
69	SVK	0.22	-0.12	0.37	0.30	-0.09	-0.23	0.55	0.04	0.23	0.36	0.42	0.65	0.40	0.67	0.06	0.03	-0.07	0.83	0.07	-0.21	0.60	0.09	0.00	-0.14	-0.17	-0.02	0.30	0.24	-0.12	-0.11	0.35	-0.14		
135	SWE	0.21	0.42	-0.02	0.02	0.30	0.57	-0.30	0.02	0.49	-0.26	-0.16	-0.26	-0.03	-0.31	0.28	0.36	0.52	-0.11	0.16	0.55	-0.06	-0.26	-0.05	0.80	0.38	0.11	0.23	0.10	0.26	0.31	-0.01	0.39	-0.24	
		BRA	CAN	CHL	MEX	USA	AUS	CHN	IDN	JPN	KOR	MYS	PHL	SGP	THA	AUT	BEL	CHE	CZE	DEU	ESP	EST	FIN	FRA	GBR	HUN	ITA	LTU	LVA	NLD	NOR	POL	RUS	SVK	SWE
N		76	138	81	110	180	159	97	95	133	93	129	97	138	97	180	115	133	84	166	116	71	89	148	133	92	133	55	56	90	124	72	72	69	135

In fact, within the European and Asian regional groups in many instances concordance reaches levels above 0.8–0.9 even for the pairs of countries that have at least 100 quarterly observations, implying that their financial cycles have been moving in sync over 80–90% of time over the span of decades. A case in point are the following dyads: SGP–MYS, SWE–BEL, ITA–CHE, ESP–GBR, FRA–DEU, GBR–SWE.

Comparison of synchronicity patterns between regions reveals a tendency for *positive* co-movement between national aggregate financial cycles of Europe and America and *negative* synchronization between Asian and European aggregate financial cycles. Co-movement is especially strong for some groups of countries: for instance, looking at the concordance of smoothed aggregate financial cycles of countries with the observation count exceeding 100, the following clusters have especially high degree of synchronicity (0.8 or above): ESP–CAN–AUS–GBR–BEL–SWE; ITA–MEX–CHE. There are many more countries with strong synchronization of financial cycles if one looks at the countries with shorter historical data, however, as noted above, these metrics are often based only on several detected phases.

4.4 Global and regional financial cycles

As a final step of the analysis we derive global and regional financial cycles based on the national aggregate financial cycles estimated for the countries in the global sample. Since the available length of national financial cycle indexes differs significantly and for some countries is especially short, we estimate several versions of the global financial cycle for subsamples of countries setting progressively decreasing thresholds for the number of observations and thereby allowing more countries to enter the respective dynamic factor model. Figure 9, Panel 1 shows results for the versions of global aggregate financial cycle $FC_{GL}^{(v)}$ with different thresholds $\overline{N}$ set in quarters: [v=1] $\overline{N}$ =133 (the sample comprises 12 countries, the estimated global cycle spans the period 1980–2012); [v=2] $\overline{N}$=90 (22 countries, the time span is 1993–2012); [v=3] $\overline{N}$ =55 (all 34 countries, the time span is 2001–2012).

Even in the most restrictive case ($\overline{N}$=133) all systemic economies are included in the sample and each regional group is represented by at least two countries (the sample includes USA, AUT, SWE, DEU, AUS, FRA, CAN, SGP, JPN, CHE, GBR, ITA). However, the estimated global financial cycle is robust to the threshold level and different versions yield similar results as can be seen in the figure.

As noted above, global financial cycles are estimated using two dynamic factor model specifications—a model involving only a global financial cycle and a model allowing for orthogonal regional factors in addition to a common global factor. The former allows for a greater estimation efficiency, while the latter simultaneously estimates regional factors net of common variation attributed to the global factor. Joint estimation of a common

global cycle and three regional cycles is also more demanding in terms of data length, and we estimate two versions with the thresholds $\overline{N}$=133 observations (12 countries) and $\overline{N}$=90 observations (22 countries)—see Figure 9, Panel 3. Both samples include all systemic economies (DEU, GBR, JPN, USA), as well as other advanced economies for each of the three regions under consideration (see Table 37 for country composition), while estimations with additional countries included produce similar results and therefore it is safe to focus on the first version of the cycles to take advantage of its longer time span. In fact, specifications with and without regional factors yield almost identical global financial cycle estimates (see FC_{AG}^{GL} and FC_{AG}^{GLR} in Panel 4).

The factor loadings associated with the global and regional financial cycle estimation models are reported in Appendix Tables 36 and 37 for the specifications with and without the regional factors, correspondingly. The loadings are well-balanced across the national aggregate financial cycles and are mostly significant. Notably, financial cycles of Asian countries (with the exception of Japan and Australia) tend to have a negative sign of loadings on the global factor, which is however consistent with the evidence from the cross-country synchronicity analysis.

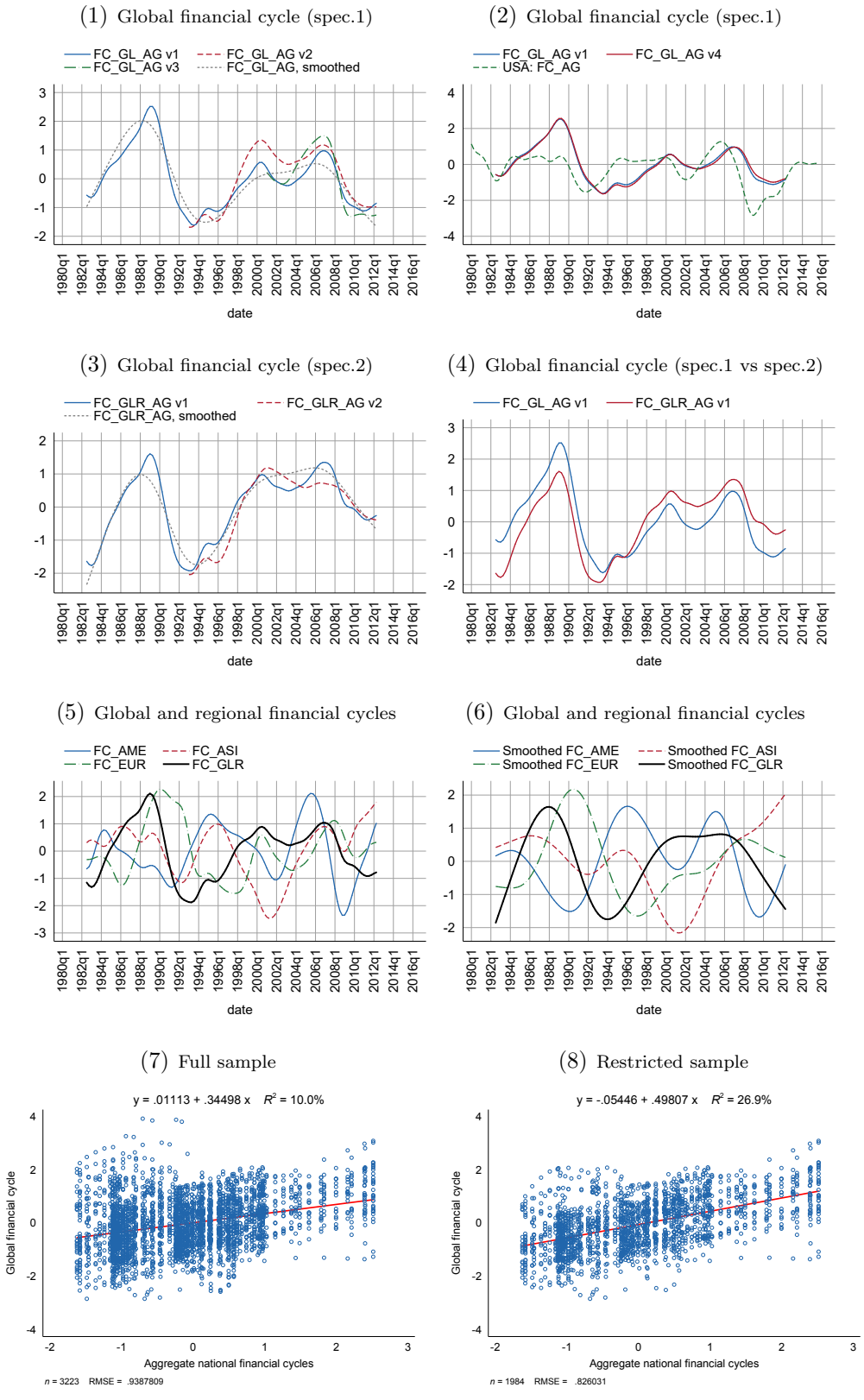
The global and regional financial cycles also exhibit very high persistence and slow-moving recurring dynamics. Over the period 1982–2012 we could identify only two full cycles in the dynamics of the global financial cycle index (for the smoothed version, application of the HP filter also smooths out the turning points associated with the crisis of the early 2000s thereby leaving only one full cycle), which is certainly not sufficient for robust inference about the regularities in the global and regional financial cycles. Nevertheless, it is apparent that the global financial cycle has a very slow-moving nature with each cycle taking around a decade (or yet longer, if judging by the smoothed global cycle). In particular, the BBQ algorithm identifies the following turning points for the unsmoothed global financial cycle: 1989Q1 [peak], 1993Q3 [trough], 2000Q3 [peak], 2003Q1 [trough], 2006Q4 [peak]; for the HP-smoothed version: 1988Q2 [peak], 1994Q4 [trough], 2006Q1[peak]. Hence, all major episodes of global financial turmoil are picked up by the global financial cycle index, including the global financial crisis of the late 2000s, the dot-com bubble crisis of the early 2000s and the crises of the late 1980s–early 1990s. Similarly to national financial cycles, the global cycles appear to follow a slightly asymmetric "sawtooth" shape.

Overall, the general dynamics of our derived global financial cycle are consistent with the estimates of Miranda-Agrippino and Rey (2012), which are based on a common factor extracted from a global pool of 858 risky asset prices. Our evidence therefore supports the conjecture that there exists a single cyclical common factor behind financial markets activity across the world economy and across different financial market segments—including, in addition to risky assets, also private credit and housing markets.

Visual inspection of regional cycles (Figure 9, Panels 5–6) suggests that the American

Figure 9: Global and regional financial cycles

Notes: The figure shows global and regional financial cycles estimated with different thresholds $\overline{N}$. Panels (1) and (2) show results based on the dynamic factor model specification 1 involving only the global factor; Panels (3)–(6) show estimation results using the dynamic factor model specification 2 incorporating both regional and global factors. Panels (7)–(8) show national financial cycles plotted against the global financial cycle for the full sample and the restricted sample ($N \geqslant 100$).



regional aggregate financial cycle tends to lead the global cycle, while the European regional financial cycle tends to lag behind the American and the global cycles over the history of observations, and the Asian regional financial cycle either co-moves or lags behind the American cycle. Removing the US aggregate financial cycle from the sample—global cycle $FC_{AG}^{GL(4)}$ in Panel 2 of Figure 9—does not alter the dynamics of the global financial cycle. At the same time, the US financial cycle tends to either lead or co-move with the global cycle, hinting at likely systemic importance of the US financial markets in the global context, also discussed in the next section.

Overall, for our global sample of countries, the global financial cycle (FC_{AG}^{GL}) accounts for about 10% of total variance in aggregate national cycles, while jointly the regional and global cycles (FC_{AG}^{GLR}, FC_{AG}^{AME}, FC_{AG}^{ASI}, FC_{AG}^{EUR}) explain 15% of variation in the data (see also scatterplots in Figure 9).[19] These results however are to some extent compromised by countries that have a very short span of historical data available. For the restricted sample comprising only countries with the number of observations $N \geqslant 100$ (17 countries), the proportion of variance explained by the global factor reaches 27% and variance share jointly explained by the global and respective regional factors is 31%. At the same time, there is much dispersion across countries in terms of the proportion of variance explained by the supranational financial cycles. As an example of the extreme cases for countries with $N \geqslant 100$, the global factor explains over 80% of variation in national aggregate financial cycle of Switzerland, while in the case of Spain the share is only 5%.

5 Policy implications

Our paper offers additional empirical evidence that could be helpful for informing policy discussions focusing on the issues of macroprudential regulation, capital flow management, and general monetary and financial market policies. In particular, the analysis supports the view that financial markets are prone to persistent cyclical movements and financial cycles are much longer in terms of their duration compared to business cycles, with each phase lasting years rather than quarters. The results are thus consistent with the arguments put forward in the important contribution by Borio (2014) that financial cycles have a much longer duration than business cycles, and extends empirical evidence to more broad-based financial cycles incorporating, in addition to credit and housing, also capital markets, as well as expanding the scope of the analysis to 34 advanced and developing economies and to the estimation of global and regional financial cycles. Our

[19] The results are based on adjusted R-squared from fixed effects regressions of national cycles on the supranational cycles with robust standard errors; specifications allowing for errors clustered by country and adjusted for possible autocorrelations yield similar results. In addition to panel data estimations, we run regressions on a country-by-country basis with (i) only the global and (ii) the global and respective regional cycles as explanatory variables.

approach also yields financial cycles that have a somewhat higher frequency—around 12 years on average for smoothed cycles (mostly falling into the range of 9–15 years) as opposed to 16 years suggested in Borio et al. (2012) and Drehman et al. (2012).

The recurring cyclical pattern is observed for all segment-specific cycles—credit, housing, bond and equity, as well as at the aggregate national and supranational levels. Financial cycles are closely associated with the episodes of major financial distress, specific to particular financial market segments or systemic in the national and global contexts. In contrast to the Great Moderation arguments put forward before the recent recession, financial cycles appear not only to be well and alive, but constitute an important driver of business cycle fluctuations. The macroeconomic paradigm that dominated in the pre-crisis years allowed for a rather limited role of the financial sector in business cycle fluctuations, reducing it to the idea of nominal frictions that may alter the magnitude and the speed of corrections to equilibrium after real shocks. In light of the new empirical evidence, it is thus important to revisit the general macroeconomic approach both in theoretical frameworks and applied policy domains to allow for a more prominent role of financial factors, which appear to have persistent cyclical dynamics, as well as strong supranational components as picked up by the estimated global and regional financial cycles.

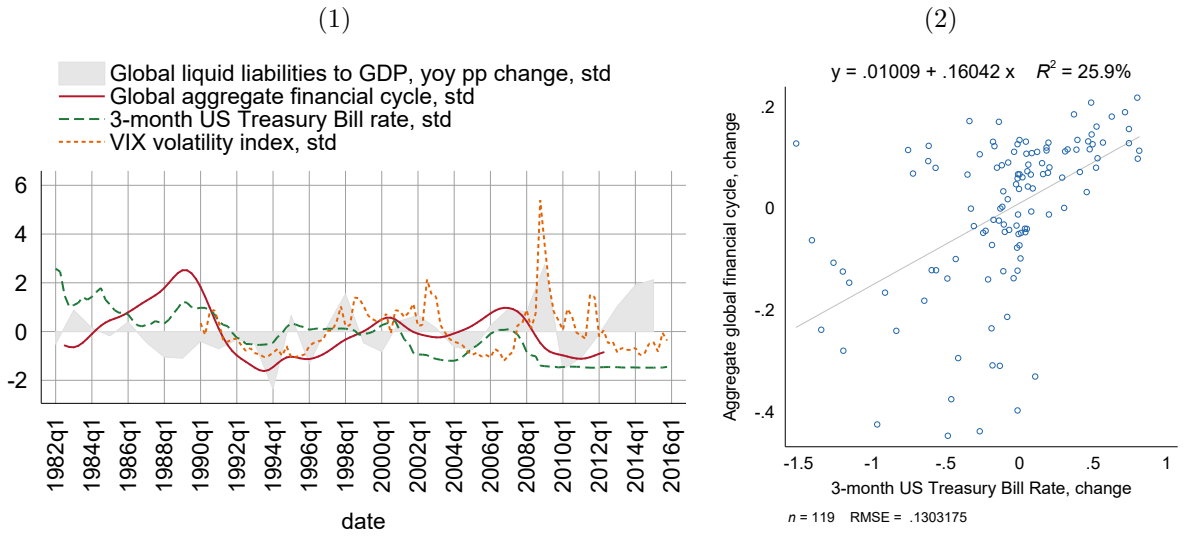
In this regard, our study is supportive of the related research by the Bank for International Settlements (*inter alia*, Borio (2013, 2014), Borio et al. (2013, 2014)), arguing for a more pro-active use of monetary and macroprudential policies to reduce systemic vulnerabilities associated with the financial system and its procyclicality, as well as suggesting to take into account financial variables in measures of economic slack guiding general macroeconomic policies[20].

In light of the evidence on cyclical fluctuations in financial markets at the level of segments, national economies and the global scale, it is important to monitor unsustainable developments across all financial market segments, including not only traditional forms of intermediation and capital markets, but also rapidly evolving structured finance and innovative instruments which are not yet fully understood from the perspective of their systemic risk implications. In this respect the present study offers a straightforward data-driven approach to gauge the buildup of financial imbalances based on statistical aggregation of information from a range of relevant variables measuring price, quantity and risk properties of financial markets. The estimation method via the dynamic factor model and the Kalman filter that we employ is also useful from the practical perspective as it allows to take advantage of the information content across a wide range of variables serving as a dimension-reduction tool. At the same time, *a priori* constraints on the

[20] The so-called "finance-neutral" output gaps, as opposed to conventional output gap estimation techniques incorporating only consumer price inflation in addition to real variables. For additional discussion see, for instance, Borio et al. (2013), Grintzalis et al. (2017), Juselius et al. (2017).

Figure 10: Global financial cycle, risk and liquidity

Notes: The left panel shows the global financial cycle plotted along with the key variables measuring global risk and liquidity conditions, including the 3-month secondary market US Treasury Bill rate, the CBOE VIX volatility index, global liquid liabilities as a share of world GDP (year-on-year percentage point change); the variables are standardized for the ease of comparability. The scatterplot in the right panel shows the relationship between the 3-month US Treasury Bill rate and the global financial cycle, in first-differences. The variables are sourced from the FRED database.



frequency of the cycles are kept at the minimum allowing the data to speak for itself,[21] while occasional gaps in the data and the "jagged edge" problems typical for nowcasting and forecasting exercises due to data publication lags and other issues can be effectively tackled by the Kalman filter as discussed in the methodology section.

As a related matter, in light of the limited data availability encountered for many of the needed financial market indicators, more efforts should be put to producing quality data at least at a quarterly frequency to measure the evolution of different financial market segments and asset classes, especially for the new potentially fragile financial instruments, to allow for timely diagnostics of unsustainable dynamics and policy responses.

Finally, the phenomena of global and regional financial cycles needs to be understood much better. We derive and offer basic analysis of the global financial cycle, but the nature of its cyclical dynamics, driving factors and impacts need to be further assessed empirically and formalized in a theoretical framework. We interpret the global financial cycle phenomena and its recurrent dynamics as an interplay between global liquidity conditions, risk perceptions and increasing financial interconnectedness giving rise to capital flows and spillovers from systemic economies to the rest of the world—an interpretation in line with Rey (2015). In attempt to relate the latent global cycle to more conventional

[21] The state-space framework however allows to model the data generating process in more complicated ways than done in the study, e.g. introducing more complex lag structures or behavioral relationships between the modeled measurement and state variables.

observable measures, in Figure 10 the global financial cycle is plotted along with selected measures of global risk and liquidity. As can be seen, the dynamics of the global financial cycle is indeed tends to be negatively correlated with the VIX index[22], a widely accepted measure of global risk and uncertainty, and the buildup of global financial imbalances are accompanied by diminishing risk perceptions, while contractions of the global financial cycle are associated with spiking volatility. This observation is however based largely on two prolonged episodes of the global cycle contraction, while the dynamics of the 1990s do not quite fit this narrative.

More striking is the highly synchronized co-movement of the global financial cycle with the 3-month US Treasury Bill rate throughout the period we analyze (phase concordance is 0.76), especially when one examines the largely overlapping turning points. A simple scatterplot juxtaposing the global cycle against the T-Bill rate (Panel 2) implies that a 1 pp change in the T-bill rate is associated with the change in the global cycle by 0.16 standard deviations. The US T-Bill rate thus appears to serve well as a single proxy variable for the global financial cycle and may constitute an important factor behind its dynamics, which is not surprising given the systemic importance of the USA financial market in the global context and the role of the the US Treasury Bill as an ultimate safe have asset, although more research is needed to uncover the exact causality and transmission channels.

Overall, these results are consistent with the growing evidence in the empirical literature that financial market developments and monetary policy actions of systemically important countries induce significant repercussions on the rest of the world. The existence of a latent global financial cycle that we document in the present study is also supportive of this view, vouching for the need to take into account spillover effects when designing financial and monetary policies at the national level, especially in systemic economies, and facilitate global coordination of policies relevant for monitoring and mitigating systemic risks at the regional and global levels, as well as to enhance related capital flow management and macroprudential toolkits.

Taking into account the discovered properties of financial cycles and extrapolating the chronology of phase sequencing into the future, it appears that as of the beginning of 2018 the world economy faces elevated risks of a broad-based financial market contraction that could start in the next 1–3 years should the historical patterns of financial cycles persist into the future. More specifically, our estimates suggest that financial cycles across many countries in 2015—the last year of our analysis—were already well on the way to reaching their respective peaks, and given that similar expansionary tendencies prevailed in the following years, it is likely that the peak will be achieved soon to be

[22] See also the discussion on the relationship between the VIX and the global cycles in capital flows in Forbes and Warnock (2012), Bruno and Shin (2015); the VIX and the global cycle in risky asset returns in Rey (2015).

followed by the contraction phase. In this regard, turning to evidence on segment-specific cycles, certain country-segments appear to have experienced a continued build-up of unsustainable dynamics in the recent years and are thus especially prone to the risks of either sharp downward corrections or prolonged bear markets: this includes, for instance, housing markets in Australia, Hungary, Germany, Japan, Lithuania, Netherlands, Spain, the UK; equity markets in China, France, Italy, Netherlands, Spain, Switzerland; credit markets in Australia, France, Spain, Singapore and other Asian countries in the sample, to name a few with more clear patterns.

What is however more alarming is the expected contraction in financial cycles across the board in the USA—the four segment-specific cycles and the aggregate financial cycle—given its systemic economy status, and an expected downward movement of the global financial cycle, which may happen in the span of the next several years. The latter is a rather speculative judgment based on the past relatively short history of phase sequencing in the global cycle and assuming it is indeed subject to more or less stable duration of cycles. At the same time, evidence from the expected contraction of the US aggregate financial cycle, which tends to co-move or lead the global cycle, as well as the dynamics pf aggregate financial cycles of many other countries comprising our global sample is also supportive of this conjecture. What is even less clear is the extent to which the world is prepared for such an event and its consequences as policymakers nowadays surely have fewer tools at disposal after the Great Recession.

6 Concluding remarks

Estimates of segment-specific and aggregate financial cycles suggest that activity in financial markets is subject to highly persistent and recurring dynamics associated with the buildup of imbalances followed by their corrections. This holds true for all countries examined in the global sample regardless of their level of economic and financial development, type of financial system (bank-based and market-based) or geographic location. In light of the implications financial cycles have for national economies and in the global contexts it is thus important to understand better the driving forces behind the cycles and the self-reinforcing amplification mechanisms that appear to share similarities across countries. Analysis of cross-country synchronicity reveals co-movements among national financial cycles, particularly within the same region, which is further attributed to an estimated slow-moving global financial cycle and regional cycles. Taking into account ever-increasing financial integration across countries and deepening of financial markets, the dynamics of imbalances in specific financial segments and national economies in general will remain an important topic in the years to come. Of particular importance is further in-depth empirical analysis and theoretical formalization of the spillovers between countries, specific transmission mechanisms and analysis of common exposures to global

and regional factors that could explain such synchronization, which should also help inform policy discussion as the need to devise effective instruments to monitor systemic risks in the national and global contexts, defuse financial bubbles in a timely manner, as well as minimize the negative impacts of financial crises still remains among the key challenges facing policymakers nowadays.

Online appendix

Appendix A: Tables

Table 1: Duration of aggregate financial cycles, quarters

Notes: The table shows average duration of phases (**Avg. phase**) and cycles (**Avg. cycle**) for national aggregate financial cycles, smoothed and unsmoothed. The countries are listed by ISO3 code in alphabetic order with systemic economies listed first. **Obs.** indicates the number of observations; **Exp. phase** and **Cont. phase** denote expansion and contraction phases; **TP count** denotes the number of turning points identified. Duration in quarters rounded to the whole numbers.

Country	Obs	Smoothed					Unsmoothed				
		Exp. Phase	Cont. phase	Avg phase	Avg cycle	TP count	Exp. Phase	Cont. phase	Avg phase	Avg cycle	TP count
USA	180	17	18	17	35	9	20	13	16	33	10
DEU	166	18	16	17	35	9	19	14	16	35	10
GBR	133	34	30	31	64	4	21	15	18	36	6
JPN	133	18	17	17	35	6	17	18	17	35	6
AUS	159	33	18	24	53	6	25	10	16	35	8
AUT	180	21	18	19	39	7	25	13	19	38	8
BEL	115	17	18	17	33	6	13	11	12	25	8
BRA	76	23		23		2	21	19	20	40	3
CAN	138	34	21	27	60	5	14	12	13	25	10
CHE	133	51	28	40	79	3	12	26	19	35	5
CHL	81		29	29		2	19	8	12	27	4
CHN	97	35	13	24	48	3	25		25		2
CZE	84	32		32		2	14	9	12	21	5
ESP	116	42	28	35	70	3	46	27	37	73	3
EST	71	25	18	22	43	3	18	6	12	24	5
FIN	89	42		42		2	19	10	16	29	4
FRA	148	17	16	16	33	8	16	17	17	33	8
HUN	92		43	43		2	14	17	16	31	4
IDN	95	19	32	26	51	3	9	8	8	15	9
ITA	133	40	26	33	66	3	16	12	14	28	9
KOR	93						10	8	9	18	5
LTU	55		19	19		2		15	15		2
LVA	56						15		15		2
MEX	110	33	30	32	63	3	10	8	9	18	10
MYS	129	13	15	14	27	5	11	9	10	20	9
NLD	90	14	18	16	32	3	18	8	12	27	6
NOR	124	22	15	20	37	4	19	12	15	30	8
PHL	97		25	25		2	19	17	18	34	5
POL	72						11	11	11	22	4
RUS	72		20	20		2	25	15	20	40	3
SGP	138	33	31	32	64	3	13	18	15	32	7
SVK	69	25		25		2	33	10	22	43	3
SWE	135	19	20	20	37	6	24	15	18	38	6
THA	97		27	27		2	15	17	15	32	4
avg	*110*	*27*	*22*	*25*	*48*	*4*	*18*	*13*	*16*	*31*	*6*
min	*55*	*13*	*13*	*14*	*27*	*2*	*9*	*6*	*8*	*15*	*2*
max	*180*	*51*	*43*	*43*	*79*	*9*	*46*	*27*	*37*	*73*	*10*

Table 2: Factor loadings and autoregressive coefficients: AUS

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

AUS $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.02)		
Total credit to private non-financial sector, % of GDP	0.24***	(0.07)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.26***	(0.02)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.06	(0.07)	$std\Delta yoy$	P
Money market interest rate, % pa	0.06	(0.06)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	-0.09	(0.07)	std	R
Spread between money market interest rate and short-term treasury bond rate	0.17***	(0.04)	std	R
AUS $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.87***	(0.04)		
Price to rent ratio	0.47***	(0.03)	$std\Delta yoy$	P
Price to income ratio	0.48***	(0.03)	$std\Delta yoy$	P
Real house price index	0.48***	(0.03)	$stdyoy$	P
AUS $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.83***	(0.04)		
10Y-3M government bond spread	-0.43***	(0.04)	std	R
Short-term Government Bonds Interest Rate, % pa	0.48***	(0.05)	$std\Delta yoy$	P
AUS $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.04)		
Stock market capitalization to GDP (%)	0.40***	(0.06)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.42***	(0.05)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.32***	(0.08)	$std\Delta yoy$	Q
AUS Share prices: S&P/ASX 200 index	0.25***	(0.07)	$stdyoy$	P
AUS $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.04)		
Stock market capitalization to GDP (%)	0.19	(0.14)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.23**	(0.11)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.17	(0.12)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.29***	(0.09)	std	R
Total credit to private non-financial sector, % of GDP	0.32***	(0.04)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.29***	(0.07)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.13	(0.10)	$std\Delta yoy$	P
CBS, Monetary Base, LCU	-0.03	(0.05)	$stdyoy$	Q
Short-term Government Bonds Interest Rate, % pa	0.32***	(0.07)	$std\Delta yoy$	P
Money market interest rate, % pa	0.11	(0.10)	$std\Delta yoy$	P
Price to rent ratio	0.33**	(0.15)	$std\Delta yoy$	P
Price to income ratio	0.31**	(0.13)	$std\Delta yoy$	P
Real house price index, sa	0.33***	(0.12)	$stdyoy$	P
AUS Share prices: S&P/ASX 200 index	0.13	(0.08)	$stdyoy$	P
Spread between lending and deposit interest rate	-0.02	(0.07)	std	R
Spread between lending interest rate and 3-month interbank rates	-0.15**	(0.07)	std	R
Spread between money market interest rate and short-term treasury bond rate	0.09	(0.12)	std	R
AUS $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.02)		
AUS Share prices: S&P/ASX 200 index	0.11**	(0.05)	$stdyoy$	P
$FC^{(1)}_{CR}$	0.32***	(0.02)	std	C
$FC^{(1)}_{B}$	0.27***	(0.05)	std	C
$FC^{(1)}_{H}$	0.12*	(0.07)	std	C

Table 3: Factor loadings and autoregressive coefficients: AUT

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

AUT $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Total credit to private non-financial sector, % of GDP	0.27***	(0.10)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.29***	(0.04)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.11	(0.10)	$std\Delta yoy$	P
Money market interest rate, % pa	0.10	(0.06)	$std\Delta yoy$	P
Spread between 3-month interbank interest rate and government bond rate	0.18***	(0.05)	std	R
Spread between money market and 3-month interbank interest rate	-0.03	(0.07)	std	R
AUT $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.63***	(0.11)		
Price to rent ratio	0.71***	(0.09)	$std\Delta yoy$	P
Price to income ratio	0.72***	(0.09)	$std\Delta yoy$	P
Real house price index, sa	0.74***	(0.10)	$stdyoy$	P
AUT $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
$F_t - 1$	0.83***	(0.05)		
International debt securities by all issuers, amt outstanding, mln USD	0.12***	(0.02)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.48***	(0.05)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	0.35***	(0.06)	$std\Delta yoy$	P
AUT $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
$F_t - 1$	0.89***	(0.04)		
Stock market capitalization to GDP (%)	0.28***	(0.06)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.35***	(0.04)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.31***	(0.08)	$std\Delta yoy$	Q
AUT Share prices: VSE WBI index	0.38***	(0.07)	$stdyoy$	P
AUT $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
$F_t - 1$	0.93***	(0.03)		
Stock market capitalization to GDP (%)	0.38***	(0.14)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.27***	(0.03)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.04***	(0.01)	$std\Delta yoy$	Q
International debt securities by all issuers, amt outstanding, mln USD	0.07***	(0.02)	$stdyoy$	Q
Total credit to private non-financial sector, % of GDP	0.04	(0.06)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.14**	(0.06)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.18***	(0.04)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.16***	(0.06)	$std\Delta yoy$	P
Government Bonds Interest Rate, % pa	0.09***	(0.03)	$std\Delta yoy$	P
Money market interest rate, % pa	0.10***	(0.04)	$std\Delta yoy$	P
Price to rent ratio	-0.11	(0.07)	$std\Delta yoy$	P
Price to income ratio	-0.20***	(0.05)	$std\Delta yoy$	P
Real house price index, sa	-0.16***	(0.06)	$stdyoy$	P
AUT Share prices: VSE WBI index	0.18*	(0.10)	$stdyoy$	P
Spread between 3-month interbank interest rate and government bond rate	0.14***	(0.03)	std	R
Spread between money market and 3-month interbank interest rate	0.22*	(0.13)	std	R
AUT $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
$F_t - 1$	0.93***	(0.02)		
Total credit to private non-financial sector, % of GDP	0.29***	(0.05)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.31***	(0.02)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	0.19***	(0.05)	$std\Delta yoy$	P
AUT Share prices: VSE WBI index	0.02	(0.06)	$stdyoy$	P

Table 4: Factor loadings and autoregressive coefficients: BEL

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

BEL $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.87***	(0.03)		
Total credit to private non-financial sector, % of GDP	0.35***	(0.06)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.40***	(0.03)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.09	(0.11)	$std\Delta yoy$	P
Spread between 3-month interbank rates and treasury bill rate	-0.10	(0.10)	std	R
BEL $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Price to rent ratio	0.28***	(0.02)	$std\Delta yoy$	P
Price to income ratio	0.27***	(0.02)	$std\Delta yoy$	P
Real house price index, sa	0.27***	(0.02)	$stdyoy$	P
BEL $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.03)		
10Y-3M government bond spread	-0.36***	(0.04)	std	R
Long-Term Government Bond Yields: 10-year	0.33***	(0.04)	$std\Delta yoy$	P
BEL $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.02)		
Stock market capitalization to GDP (%)	0.27*	(0.14)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.38***	(0.05)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.27***	(0.10)	$std\Delta yoy$	Q
BEL Share prices: All Shares index	0.20*	(0.12)	$stdyoy$	P
BEL $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.03)		
Stock market capitalization to GDP (%)	0.18	(0.32)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.37***	(0.04)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.30*	(0.17)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.13	(0.11)	std	R
Total credit to private non-financial sector, % of GDP	0.08	(0.28)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.12	(0.21)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.04	(0.03)	$std\Delta yoy$	P
Long-Term Government Bond Yields: 10-year	0.00	(0.08)	$std\Delta yoy$	P
Price to rent ratio	0.14**	(0.07)	$std\Delta yoy$	P
Price to income ratio	0.09	(0.11)	$std\Delta yoy$	P
Real house price index, sa	0.11**	(0.05)	$stdyoy$	P
BEL Share prices: All Shares index	0.12	(0.27)	$stdyoy$	P
Spread between 3-month interbank rates and treasury bill rate	-0.00	(0.04)	std	R
BEL $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.02)		
$FC^{(1)}_{CR}$	0.22***	(0.08)	std	C
$FC^{(1)}_{B}$	0.19***	(0.06)	std	C
$FC^{(1)}_{EQ}$	0.26***	(0.09)	std	C
$FC^{(1)}_{H}$	0.09**	(0.05)	std	C

Table 5: Factor loadings and autoregressive coefficients: BRA

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

BRA $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.68**	(0.32)		
Private credit by deposit money banks to GDP (%)	0.59***	(0.12)	$std\Delta yoy$	Q
Deposit interest rate, %	0.48	(0.69)	$std\Delta yoy$	P
Money market interest rate, % pa	0.47	(0.73)	$std\Delta yoy$	P
Private credit by banks, LCU	0.57***	(0.18)	*stdyoy*	Q
Spread between money market interest rate and deposit interest rate	0.38	(0.76)	*std*	R
BRA $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		*stdyoy*	P
BRA $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.05)		
Outstanding domestic private debt securities to GDP (%)	-0.17	(0.18)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.34**	(0.16)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	-0.58***	(0.06)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.30***	(0.06)	$std\Delta yoy$	Q
Treasury Bill Rate, % pa	0.14	(0.09)	$std\Delta yoy$	P
BRA $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.04)		
Stock market capitalization to GDP (%)	0.33***	(0.06)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.49***	(0.05)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	-0.02	(0.05)	$std\Delta yoy$	Q
BRA Share prices: BOVESPA index	0.07	(0.07)	*stdyoy*	P
BRA $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Private credit by deposit money banks to GDP (%)	-0.00	(0.05)	$std\Delta yoy$	Q
Stock market capitalization to GDP (%)	0.29***	(0.06)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.42***	(0.05)	$std\Delta yoy$	Q
Outstanding domestic private debt securities to GDP (%)	-0.02	(0.07)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.06	(0.08)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	-0.37***	(0.08)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.21***	(0.04)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.02	(0.02)	$std\Delta yoy$	Q
Deposit interest rate, %	0.00	(0.00)	$std\Delta yoy$	P
Money market interest rate, % pa	0.00	(0.00)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.02	(0.04)	$std\Delta yoy$	P
Private credit by banks, LCU	0.00	(0.01)	*stdyoy*	Q
BRA Share prices: BOVESPA index	0.00	(0.01)	*stdyoy*	P
Spread between money market interest rate and deposit interest rate	-0.00	(0.00)	*std*	R
BRA $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.03)		
$FC^{(1)}_{CR}$	0.01	(0.01)	*std*	C
$FC^{(1)}_{B}$	0.29***	(0.05)	*std*	C
$FC^{(1)}_{EQ}$	0.33***	(0.04)	*std*	C

Table 6: Factor loadings and autoregressive coefficients: CAN

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, *std*%Δyoy—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote stat. significance at the 10, 5 and 1% levels.

CAN $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.80***	(0.07)		
Total credit to private non-financial sector, % of GDP	0.27***	(0.08)	*std*Δyoy	Q
Total credit to private non-financial sector, LCU	0.38***	(0.08)	*stdyoy*	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.47**	(0.22)	*std*Δyoy	P
Lending interest rate, % pa	0.47**	(0.22)	*std*Δyoy	P
Spread between lending and deposit interest rate	-0.16	(0.14)	*std*	R
Spread between lending interest rate and treasury bill rate	-0.08	(0.09)	*std*	R
CAN $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.04)		
5-Year Average Residential Mortgage Lending Rate (%)	0.14***	(0.03)	*std*Δyoy	P
Price to rent ratio	0.46***	(0.04)	*std*Δyoy	P
Price to income ratio	0.43***	(0.04)	*std*Δyoy	P
Real house price index, sa	0.46***	(0.04)	*stdyoy*	P
CAN $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.83***	(0.05)		
10Y-3M government bond spread	-0.40***	(0.05)	*std*	R
Treasury Bill Rate, % pa	0.49***	(0.05)	*std*Δyoy	P
CAN Rate 3-month prime corporate paper	0.49***	(0.05)	*std*Δyoy	P
3-month prime corporate - treasury bill spread	0.10	(0.08)	*std*	R
CAN $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.05)		
Stock market capitalization to GDP (%)	-0.27	(0.30)	*std*Δyoy	Q
Stock market total value traded to GDP (%)	0.35*	(0.18)	*std*Δyoy	Q
Stock market turnover ratio (%)	0.42***	(0.06)	*std*Δyoy	Q
Average daily stock market index value	-0.07	(0.27)	*stdyoy*	P
Average daily stock market return	-0.10	(0.14)	*std*	P
Standard deviation of daily stock market returns	0.21	(0.16)	*std*	R
CAN $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.84***	(0.07)		
Stock market capitalization to GDP (%)	0.01	(0.12)	*std*Δyoy	Q
Stock market total value traded to GDP (%)	0.12**	(0.06)	*std*Δyoy	Q
Stock market turnover ratio (%)	0.02	(0.05)	*std*Δyoy	Q
5-Year Average Residential Mortgage Lending Rate (%)	0.47***	(0.12)	*std*Δyoy	P
10Y-3M government bond spread	-0.38***	(0.09)	*std*	R
Total credit to private non-financial sector, % of GDP	0.16**	(0.07)	*std*Δyoy	Q
Total credit to private non-financial sector, LCU	0.33***	(0.04)	*stdyoy*	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.36**	(0.14)	*std*Δyoy	P
Lending interest rate, % pa	0.34**	(0.14)	*std*Δyoy	P
Treasury Bill Rate, % pa	0.48***	(0.09)	*std*Δyoy	P
Price to rent ratio	0.21	(0.17)	*std*Δyoy	P
Price to income ratio	0.10	(0.17)	*std*Δyoy	P
CAN Rate 3-month prime corporate paper	0.46***	(0.09)	*std*Δyoy	P
Real house price index, sa	0.18	(0.16)	*stdyoy*	P
Average daily stock market index value	-0.06	(0.14)	*stdyoy*	P
Average daily stock market return	-0.13*	(0.08)	*std*	P
Standard deviation of daily stock market returns	0.00	(0.09)	*std*	R
3-month prime corporate - treasury bill spread	0.04	(0.06)	*std*	R
Spread between lending and deposit interest rate, pp	0.04	(0.06)	*std*	R
Spread between lending interest rate and treasury bill rate, pp	-0.05	(0.04)	*std*	R
Spread between 3-month and overnight interbank rates, pp	-0.02	(0.09)	*std*	R
CAN $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.04)		
$FC^{(1)}_{CR}$	0.32***	(0.04)	*std*	C
$FC^{(1)}_{B}$	0.40***	(0.05)	*std*	C
$FC^{(1)}_{EQ}$	0.05	(0.06)	*std*	C
$FC^{(1)}_{H}$	0.26***	(0.08)	*std*	C

Table 7: Factor loadings and autoregressive coefficients: CHE

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

CHE $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.05)		
Total credit to private non-financial sector, % of GDP	0.25**	(0.11)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.36***	(0.07)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.15*	(0.09)	$std\Delta yoy$	P
Money market interest rate, % pa	0.14	(0.12)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	-0.26***	(0.05)	std	R
Spread between 3-month and overnight interbank rates	0.08**	(0.03)	std	R
CHE $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Price to rent ratio	0.38***	(0.02)	$std\Delta yoy$	P
Price to income ratio	0.37***	(0.02)	$std\Delta yoy$	P
Real house price index, sa	0.38***	(0.02)	$stdyoy$	P
CHE $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.04)		
10Y-3M government bond spread	-0.35***	(0.03)	std	R
Long-Term Government Bond Yields: 10-year	0.28***	(0.07)	$std\Delta yoy$	P
CHE $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.04)		
Stock market capitalization to GDP (%)	0.39***	(0.12)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	-0.14	(0.38)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	-0.16	(0.32)	$std\Delta yoy$	Q
CHE Share prices: UBS 100 index	0.38***	(0.07)	$stdyoy$	P
CHE $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Stock market capitalization to GDP (%)	-0.13**	(0.05)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.07	(0.06)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.06	(0.09)	$std\Delta yoy$	Q
10Y-3M government bond spread	0.01	(0.14)	std	R
Total credit to private non-financial sector, % of GDP	0.26***	(0.05)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.24***	(0.09)	$stdyoy$	Q
Long-Term Government Bond Yields: 10-year	0.11	(0.10)	$std\Delta yoy$	P
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.09	(0.09)	$std\Delta yoy$	P
Money market interest rate, % pa	0.14	(0.09)	$std\Delta yoy$	P
Price to rent ratio	0.27***	(0.05)	$std\Delta yoy$	P
Price to income ratio	0.27***	(0.06)	$std\Delta yoy$	P
Real house price index, sa	0.28***	(0.04)	$stdyoy$	P
CHE Share prices: UBS 100 index	-0.10	(0.07)	$stdyoy$	P
Spread between lending and deposit interest rate	-0.06	(0.12)	std	R
Spread between 3-month and overnight interbank rates	0.05**	(0.02)	std	R
CHE $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
$FC^{(1)}_{CR}$	0.26***	(0.03)	std	C
$FC^{(1)}_{B}$	0.18***	(0.06)	std	C
$FC^{(1)}_{EQ}$	-0.10	(0.08)	std	C
$FC^{(1)}_{H}$	0.11	(0.09)	std	C

Table 8: Factor loadings and autoregressive coefficients: CHL

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

CHL $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.04)		
Total credit to private non-financial sector, % of GDP	0.39***	(0.06)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.41***	(0.06)	$stdyoy$	Q
Lending interest rate, % pa	0.09**	(0.04)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	0.03**	(0.01)	std	R
CHL $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.89***	(0.03)		
Stock market capitalization to GDP (%)	0.31***	(0.05)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.49***	(0.04)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.34***	(0.08)	$std\Delta yoy$	Q
Average daily stock market index value	0.34***	(0.07)	$stdyoy$	P
Average daily stock market return	0.10*	(0.06)	std	P
Standard deviation of daily stock market returns	-0.02	(0.07)	std	R
CHL $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.03)		
Stock market capitalization to GDP (%)	-0.30***	(0.05)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	-0.44***	(0.04)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	-0.33***	(0.06)	$std\Delta yoy$	Q
Total credit to private non-financial sector, % of GDP	0.34***	(0.05)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.15***	(0.05)	$stdyoy$	Q
Lending interest rate, % pa	0.01	(0.02)	$std\Delta yoy$	P
Average daily stock market index value	-0.34***	(0.06)	$stdyoy$	P
Average daily stock market return	-0.11*	(0.06)	std	P
Standard deviation of daily stock market returns	0.07	(0.08)	std	R
Spread between lending and deposit interest rate	0.02	(0.02)	std	R
CHL $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.02)		
$FC^{(1)}_{CR}$	0.29***	(0.04)	std	C
$FC^{(1)}_{EQ}$	-0.34***	(0.03)	std	C

Table 9: Factor loadings and autoregressive coefficients: CHN

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

CHN $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.98***	(0.01)		
Prime Lending Rate (AVG, % per annum)	-0.01	(0.03)	$std\Delta yoy$	P
Total credit to private non-financial sector, % of GDP	-0.03	(0.04)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.12**	(0.05)	$stdyoy$	Q
Spread between lending and deposit interest rate	-0.19***	(0.03)	std	R
CHN $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Price of buildings sold, LCU	n/a		$stdyoy$	P
CHN $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.98***	(0.02)		
Outstanding domestic private debt securities to GDP (%)	-0.21**	(0.10)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.07	(0.05)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	0.21***	(0.04)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	0.09**	(0.04)	$std\Delta yoy$	Q
CHN 3-month treasury bond trading rate	0.07	(0.06)	$std\Delta yoy$	P
CHN $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.70***	(0.10)		
Average daily stock market index value	0.59***	(0.08)	$stdyoy$	P
Average daily stock market return	0.29***	(0.07)	std	P
Standard deviation of daily stock market returns	0.52***	(0.09)	std	R
CHN $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.97***	(0.02)		
Outstanding domestic private debt securities to GDP (%)	-0.21**	(0.09)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.06	(0.06)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	0.17***	(0.05)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	0.10**	(0.04)	$std\Delta yoy$	Q
Prime Lending Rate (AVG, % per annum)	0.01	(0.01)	$std\Delta yoy$	P
Total credit to private non-financial sector, % of GDP	0.14**	(0.07)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.12	(0.08)	$stdyoy$	Q
CHN 3-month treasury bond trading rate	0.05	(0.04)	$std\Delta yoy$	P
Average daily stock market index value	-0.01	(0.03)	$stdyoy$	P
Average daily stock market return	0.00	(0.02)	std	P
Standard deviation of daily stock market returns	0.01	(0.03)	std	R
Spread between lending and deposit interest rate	-0.09	(0.07)	std	R
CHN $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.99***	(0.02)		
$FC^{(1)}_{CR}$	0.17***	(0.02)	std	C
$FC^{(1)}_{EQ}$	0.14***	(0.05)	std	C

Table 10: Factor loadings and autoregressive coefficients: CZE

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

CZE $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.77***	(0.11)		
Total credit to private non-financial sector, % of GDP	0.44***	(0.07)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.45***	(0.07)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.35	(0.39)	$std\Delta yoy$	P
Money market interest rate, % pa	0.40	(0.33)	$std\Delta yoy$	P
Spread between lending interest rate and deposit interest rate	0.19***	(0.06)	std	R
Spread between lending interest rate and treasury bill rate	0.26	(0.20)	std	R
CZE $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		$stdyoy$	P
CZE $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.89***	(0.05)		
10Y-3M government bond spread	-0.44***	(0.11)	std	R
International debt securities by all issuers, amt outstanding, mln USD	-0.12	(0.07)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	-0.13	(0.16)	$stdyoy$	Q
Treasury Bill Rate, % pa	0.09	(0.06)	$std\Delta yoy$	P
CZE $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.07)		
Average daily stock market index value	0.49***	(0.07)	$stdyoy$	P
Average daily stock market return	0.21***	(0.05)	std	P
Standard deviation of daily stock market returns	-0.17***	(0.05)	std	R
CZE $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.07)		
Total credit to private non-financial sector, % of GDP	0.34***	(0.08)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.39***	(0.08)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.20**	(0.08)	$std\Delta yoy$	P
Money market interest rate, % pa	0.25***	(0.08)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.19***	(0.06)	$std\Delta yoy$	P
Average daily stock market index value	-0.04	(0.06)	$stdyoy$	P
Average daily stock market return	-0.03	(0.05)	std	P
Standard deviation of daily stock market returns	-0.04	(0.05)	std	R
Spread between lending interest rate and deposit interest rate	0.20***	(0.06)	std	R
Spread between lending interest rate and treasury bill rate	0.17**	(0.07)	std	R
CZE $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.03)		
Treasury Bill Rate, % pa	0.26***	(0.10)	$std\Delta yoy$	P
$FC^{(1)}_{CR}$	0.26***	(0.07)	std	C
$FC^{(1)}_{EQ}$	-0.13	(0.20)	std	C

Table 11: Factor loadings and autoregressive coefficients: DEU

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

DEU $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.76***	(0.05)		
Spread between money market rate and treasury bond rate	0.24**	(0.12)	*std*	R
Spread between 3-month and overnight interbank rates	0.09	(0.13)	*std*	R
Total credit to private non-financial sector, % of GDP	0.16	(0.14)	$std\Delta yoy$	Q
3-month interbank interest rate	0.53***	(0.09)	$std\Delta yoy$	P
Money market interest rate, pp	0.52***	(0.09)	$std\Delta yoy$	P
Private credit by banks, LCU	0.19	(0.14)	*stdyoy*	Q
DEU $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Price to rent ratio	0.30***	(0.02)	$std\Delta yoy$	P
Real house price index, sa	0.31***	(0.02)	*stdyoy*	P
DEU $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.84***	(0.03)		
Yields on debt securities outstanding issued by residents / Corporate bonds	0.47***	(0.04)	$std\Delta yoy$	P
Government Bonds Interest Rate, % pa	0.48***	(0.03)	$std\Delta yoy$	P
Spread between corporate bond rate and government bond rate	-0.04	(0.07)	*std*	R
DEU $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
DEU Share prices: CDAX index / Growth rate same period previous year	n/a		*std*	P
DEU $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.85***	(0.04)		
Yields on debt securities outstanding issued by residents / Corporate bonds	0.46***	(0.04)	$std\Delta yoy$	P
Government Bonds Interest Rate, % pa	0.42***	(0.04)	$std\Delta yoy$	P
Price to rent ratio	0.33***	(0.04)	$std\Delta yoy$	P
Real house price index, sa	0.22***	(0.05)	*stdyoy*	P
DEU Share prices: CDAX index / Growth rate same period previous year	-0.13**	(0.06)	*std*	P
Spread between corporate bond rate and government bond rate	0.09*	(0.05)	*std*	R
Spread between money market rate and treasury bond rate	0.23***	(0.06)	*std*	R
Spread between 3-month and overnight interbank rates	0.12	(0.07)	*std*	R
Total credit to private non-financial sector, % of GDP	-0.00	(0.06)	$std\Delta yoy$	Q
3-month interbank interest rate	0.37***	(0.09)	$std\Delta yoy$	P
Money market interest rate, pp	0.34***	(0.09)	$std\Delta yoy$	P
Private credit by banks, LCU	0.14***	(0.04)	*stdyoy*	Q
DEU $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.03)		
$FC^{(1)}_{CR}$	0.32***	(0.07)	*std*	C
$FC^{(1)}_{B}$	0.39***	(0.04)	*std*	C
$FC^{(1)}_{EQ}$	-0.14**	(0.06)	*std*	C
$FC^{(1)}_{H}$	0.28***	(0.04)	*std*	C

Table 12: Factor loadings and autoregressive coefficients: ESP

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

ESP $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.98***	(0.01)		
Total credit to private non-financial sector, % of GDP	0.23***	(0.02)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.20***	(0.02)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.02**	(0.01)	$std\Delta yoy$	P
Money market interest rate, % pa	0.02*	(0.01)	$std\Delta yoy$	P
Spread between money market rate and overnight rate	-0.01	(0.01)	std	R
Spread between money market interest rate and treasury bill rate	0.03	(0.02)	std	R
ESP $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Price to rent ratio	0.30***	(0.02)	$std\Delta yoy$	P
Price to income ratio	0.30***	(0.02)	$std\Delta yoy$	P
Real house price index, sa	0.30***	(0.02)	$stdyoy$	P
ESP $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.05)		
Outstanding international private debt securities to GDP (%)	-0.18	(0.15)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.38***	(0.12)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.21	(0.21)	std	R
Treasury Bill Rate, % pa	0.38**	(0.16)	$std\Delta yoy$	P
ESP $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.07)		
Average daily stock market index value	0.44***	(0.07)	$stdyoy$	P
Average daily stock market return	0.27***	(0.07)	std	P
Standard deviation of daily stock market returns	-0.37***	(0.08)	std	R
ESP $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.97***	(0.01)		
Outstanding international private debt securities to GDP (%)	0.07	(0.06)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.05	(0.04)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.09***	(0.02)	std	R
Total credit to private non-financial sector, % of GDP	0.22***	(0.04)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.23***	(0.03)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.01	(0.01)	$std\Delta yoy$	P
Money market interest rate, % pa	0.01	(0.01)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.03*	(0.02)	$std\Delta yoy$	P
Price to rent ratio	0.25***	(0.04)	$std\Delta yoy$	P
Price to income ratio	0.25***	(0.04)	$std\Delta yoy$	P
Real house price index, sa	0.18***	(0.03)	$stdyoy$	P
Average daily stock market index value	0.06**	(0.03)	$stdyoy$	P
Average daily stock market return	0.02	(0.03)	std	P
Standard deviation of daily stock market returns	-0.07**	(0.04)	std	R
Spread between money market rate and overnight rate	-0.00	(0.00)	std	R
Spread between money market interest rate and treasury bill rate	0.06**	(0.02)	std	R
ESP $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.01)		
Total Share Prices for All Shares	0.07*	(0.04)	$stdyoy$	P
$FC^{(1)}_{CR}$	0.21***	(0.02)	std	C
$FC^{(1)}_{B}$	0.11***	(0.04)	std	C
$FC^{(1)}_{H}$	0.26***	(0.04)	std	C

Table 13: Factor loadings and autoregressive coefficients: EST

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

EST $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.08)		
Private credit by deposit money banks to GDP (%)	0.30***	(0.09)	$std\Delta yoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.40***	(0.10)	$std\Delta yoy$	P
Lending interest rate, % pa	0.39***	(0.09)	$std\Delta yoy$	P
Private credit by banks, LCU	0.24***	(0.09)	$stdyoy$	Q
Spread between lending and deposit interest rate	0.03	(0.07)	std	R
EST $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.07)		
Price to rent ratio	0.32***	(0.06)	$std\Delta yoy$	P
Price to income ratio	0.42***	(0.07)	$std\Delta yoy$	P
Real house price index, sa	0.41***	(0.07)	$stdyoy$	P
EST $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.03)		
Outstanding international private debt securities to GDP (%)	-0.17*	(0.10)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.42**	(0.19)	$std\Delta yoy$	Q
International debt securities by all issuers, amt outstanding, mln USD	-0.16***	(0.05)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	-0.24***	(0.09)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	0.29***	(0.06)	$std\Delta yoy$	P
EST $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.11)		
Stock market capitalization to GDP (%)	-0.10	(0.19)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.37***	(0.06)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.34***	(0.12)	$std\Delta yoy$	Q
Average daily stock market index value	0.08	(0.08)	$stdyoy$	P
Average daily stock market return	-0.00	(0.10)	std	P
Standard deviation of daily stock market returns	-0.14***	(0.04)	std	R
EST $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.09)		
Private credit by deposit money banks to GDP (%)	0.41**	(0.17)	$std\Delta yoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.24**	(0.11)	$std\Delta yoy$	P
Lending interest rate, % pa	0.31**	(0.12)	$std\Delta yoy$	P
Private credit by banks, LCU	-0.08	(0.16)	$stdyoy$	Q
Price to rent ratio	-0.23	(0.15)	$std\Delta yoy$	P
Price to income ratio	-0.42***	(0.10)	$std\Delta yoy$	P
Real house price index, sa	-0.41***	(0.12)	$stdyoy$	P
Average daily stock market index value	-0.17***	(0.07)	$stdyoy$	P
Average daily stock market return	-0.05	(0.11)	std	P
Standard deviation of daily stock market returns	0.18***	(0.06)	std	R
Spread between lending and deposit interest rate	-0.04	(0.11)	std	R
EST $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.18)		
Average daily stock market index value	0.24	(0.40)	$stdyoy$	P
$FC^{(1)}_{CR}$	0.34**	(0.15)	std	C

Table 14: Factor loadings and autoregressive coefficients: FIN

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

FIN $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Total credit to private non-financial sector, % of GDP	0.38***	(0.07)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.28***	(0.07)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.21**	(0.11)	$std\Delta yoy$	P
Money market interest rate, % pa	0.17**	(0.08)	$std\Delta yoy$	P
Spread between money market interest rate and treasury bond rate	0.29***	(0.05)	std	R
Spread between money market and 3-month interbank interbank interest rate	0.08*	(0.04)	std	R
FIN $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.04)		
Price to rent ratio	0.38***	(0.04)	$std\Delta yoy$	P
Price to income ratio	0.37***	(0.04)	$std\Delta yoy$	P
Real house price index, sa	0.38***	(0.04)	$stdyoy$	P
FIN $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.76***	(0.09)		
International debt securities by all issuers, amt outstanding, mln USD	0.04***	(0.01)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.51***	(0.08)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	0.34	(0.25)	$std\Delta yoy$	P
FIN $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.04)		
Stock market capitalization to GDP (%)	0.34***	(0.04)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.26***	(0.05)	$std\Delta yoy$	Q
FIN Share prices: OMXH All Share index	0.37***	(0.07)	$stdyoy$	P
FIN $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.05)		
Stock market capitalization to GDP (%)	-0.13	(0.08)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.01	(0.07)	$std\Delta yoy$	Q
International debt securities by all issuers, amt outstanding, mln USD	0.02	(0.01)	$stdyoy$	Q
Total credit to private non-financial sector, % of GDP	0.40***	(0.09)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.21**	(0.10)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.16**	(0.06)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.20**	(0.10)	$std\Delta yoy$	P
Government Bonds Interest Rate, % pa	0.08	(0.10)	$std\Delta yoy$	P
Money market interest rate, % pa	0.16**	(0.08)	$std\Delta yoy$	P
Price to rent ratio	-0.30***	(0.05)	$std\Delta yoy$	P
Price to income ratio	-0.27***	(0.04)	$std\Delta yoy$	P
Real house price index, sa	-0.27***	(0.05)	$stdyoy$	P
FIN Share prices: OMXH All Share index	-0.33***	(0.10)	$stdyoy$	P
Spread between money market interest rate and treasury bond rate	0.31***	(0.05)	std	R
Spread between money market and 3-month interbank interbank interest rate	0.05	(0.05)	std	R
FIN $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.04)		
$FC^{(1)}_{CR}$	0.27***	(0.07)	std	C
$FC^{(1)}_{B}$	0.20***	(0.06)	std	C
$FC^{(1)}_{EQ}$	-0.25***	(0.09)	std	C
$FC^{(1)}_{H}$	-0.22***	(0.06)	std	C

Table 15: Factor loadings and autoregressive coefficients: FRA

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

FRA $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.04)		
Total credit to private non-financial sector, % of GDP	-0.07	(0.06)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.26***	(0.05)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.15	(0.11)	$std\Delta yoy$	P
Deposit interest rate, %	0.01	(0.04)	$std\Delta yoy$	P
Spread between deposit interest rate and overnight interbank interest rate	-0.36***	(0.13)	std	R
Spread between 3-month interbank and overnight interbank interest rate	-0.15	(0.13)	std	R
Spread between overnight interbank interest rate and treasury bond rate	0.28**	(0.13)	std	R
FRA $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.02)		
Price to rent ratio	0.29***	(0.02)	$std\Delta yoy$	P
Price to income ratio	0.27***	(0.02)	$std\Delta yoy$	P
Real house price index, sa	0.28***	(0.02)	$stdyoy$	P
FRA $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.03)		
10Y-3M government bond spread	-0.32***	(0.05)	std	R
International debt securities by all issuers, amt outstanding, mln USD	0.09***	(0.03)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.21***	(0.08)	$stdyoy$	Q
Treasury Bill Rate, % pa	0.06*	(0.03)	$std\Delta yoy$	P
FRA $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.05)		
Average daily stock market index value	0.43***	(0.04)	$stdyoy$	P
Average daily stock market return	0.18*	(0.10)	std	P
Standard deviation of daily stock market returns	-0.37***	(0.11)	std	R
FRA $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
10Y-3M government bond spread	0.08	(0.13)	std	R
International debt securities by all issuers, amt outstanding, mln USD	0.02	(0.04)	$stdyoy$	Q
Total credit to private non-financial sector, % of GDP	0.00	(0.05)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.04	(0.08)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.05	(0.06)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.02	(0.04)	$std\Delta yoy$	P
Deposit interest rate, %	-0.04*	(0.02)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.05	(0.05)	$std\Delta yoy$	P
Price to rent ratio	0.35***	(0.06)	$std\Delta yoy$	P
Price to income ratio	0.31***	(0.04)	$std\Delta yoy$	P
Real house price index, sa	0.32***	(0.04)	$stdyoy$	P
Average daily stock market index value	0.05	(0.05)	$stdyoy$	P
Average daily stock market return	0.00	(0.03)	std	P
Standard deviation of daily stock market returns	-0.02	(0.05)	std	R
Spread between deposit interest rate and overnight interbank interest rate	0.07	(0.12)	std	R
Spread between 3-month interbank and overnight interbank interest rate	-0.03	(0.06)	std	R
Spread between overnight interbank interest rate and treasury bond rate	-0.07	(0.12)	std	R
FRA $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.98***	(0.01)		
Total Share Prices Index	0.04	(0.03)	$stdyoy$	P
Treasury Bill Rate, % pa	0.04	(0.05)	$std\Delta yoy$	P
$FC^{(1)}_{CR}$	0.19***	(0.05)	std	C
$FC^{(1)}_{H}$	-0.05	(0.07)	std	C

Table 16: Factor loadings and autoregressive coefficients: GBR

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

GBR $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Total credit to private non-financial sector, % of GDP	0.28***	(0.03)	$std\Delta yoy$	Q
Lending interest rate, % pa	-0.00	(0.02)	$std\Delta yoy$	P
Money market interest rate, % pa	-0.01	(0.03)	$std\Delta yoy$	P
Private credit by banks, LCU	0.23***	(0.08)	$stdyoy$	Q
Spread between lending interest rate and treasury bill rate	0.03***	(0.01)	std	R
Spread between 3-month and overnight interbank rates	0.03	(0.03)	std	R
GBR $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.03)		
Household Variable Mortgage Rate in the United Kingdom	0.19***	(0.06)	$std\Delta yoy$	P
Price to rent ratio	0.38***	(0.03)	$std\Delta yoy$	P
Real house price index, sa	0.39***	(0.03)	$stdyoy$	P
GBR $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.02)		
Outstanding international private debt securities to GDP (%)	0.02	(0.15)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.20**	(0.08)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.32***	(0.05)	std	R
Treasury Bill Rate, % pa	0.14*	(0.08)	$std\Delta yoy$	P
GBR $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
GBR FTSE 100 share price index	n/a		$stdyoy$	P
GBR $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.02)		
Outstanding international private debt securities to GDP (%)	0.05	(0.07)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.20***	(0.04)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.24***	(0.05)	std	R
Total credit to private non-financial sector, % of GDP	0.27***	(0.04)	$std\Delta yoy$	Q
Household Variable Mortgage Rate in the United Kingdom	0.17*	(0.09)	$std\Delta yoy$	P
Lending interest rate, % pa	0.03	(0.04)	$std\Delta yoy$	P
Money market interest rate, % pa	0.04	(0.04)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.14*	(0.08)	$std\Delta yoy$	P
Private credit by banks, LCU	0.17***	(0.05)	$stdyoy$	Q
Price to rent ratio	0.19***	(0.07)	$std\Delta yoy$	P
Real house price index, sa	0.20***	(0.05)	$stdyoy$	P
GBR FTSE 100 share price index / Growth rate same period previous year	0.00	(0.04)	std	P
Spread between lending interest rate and treasury bill rate	0.00	(0.02)	std	R
Spread between 3-month and overnight interbank rates	-0.01	(0.03)	std	R
GBR $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.01)		
$FC^{(1)}_{CR}$	0.22***	(0.02)	std	C
$FC^{(1)}_{B}$	0.22***	(0.02)	std	C
$FC^{(1)}_{EQ}$	0.00	(0.02)	std	C
$FC^{(1)}_{H}$	0.16***	(0.03)	std	C

Table 17: Factor loadings and autoregressive coefficients: HUN

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

HUN $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.85***	(0.13)		
Total credit to private non-financial sector, % of GDP	0.38***	(0.10)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.40***	(0.12)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.33	(0.24)	$std\Delta yoy$	P
Deposit interest rate	0.36*	(0.21)	$std\Delta yoy$	P
Spread between lending interest rate and deposit interest rate	-0.15	(0.15)	std	R
Spread between lending interest rate and treasury bill rate	-0.26	(0.16)	std	R
HUN $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		$stdyoy$	P
HUN $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.05)		
5Y-3M government bond spread	-0.29***	(0.05)	std	R
International debt securities by all issuers, amt outstanding, mln USD	0.15***	(0.05)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.34***	(0.10)	$stdyoy$	Q
Treasury Bill Rate, % pa	0.02	(0.03)	$std\Delta yoy$	P
HUN $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.78***	(0.08)		
Average daily stock market return	0.28***	(0.08)	std	P
Standard deviation of daily stock market returns	-0.18*	(0.09)	std	R
Average daily stock market index value	0.46***	(0.08)	$stdyoy$	P
HUN $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.84***	(0.14)		
Average daily stock market return	-0.08	(0.14)	std	P
Standard deviation of daily stock market returns	0.18	(0.13)	std	R
Aggregated real house price index	0.23***	(0.08)	$stdyoy$	P
Average daily stock market index value	0.05	(0.16)	$stdyoy$	P
Total credit to private non-financial sector, % of GDP	0.35***	(0.12)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.37***	(0.12)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.35	(0.22)	$std\Delta yoy$	P
Deposit interset rate	0.37**	(0.18)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.23	(0.17)	$std\Delta yoy$	P
Spread between lending interest rate and deposit interest rate	-0.17	(0.14)	std	R
Spread between lending interest rate and treasury bill rate	-0.27*	(0.15)	std	R
HUN $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.07)		
Treasury Bill Rate, % pa	0.15	(0.17)	$std\Delta yoy$	P
$FC^{(1)}_{CR}$	0.35	(0.22)	std	C
$FC^{(1)}_{EQ}$	-0.18	(0.23)	std	C
$FC^{(1)}_{H}$	0.30***	(0.09)	std	C

Table 18: Factor loadings and autoregressive coefficients: IDN

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

IDN $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.77***	(0.11)		
Total credit to private non-financial sector, % of GDP	0.50	(0.36)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.60**	(0.27)	$stdyoy$	Q
Deposit interest rate, %	-0.54***	(0.12)	$std\Delta yoy$	P
Money market interest rate, % pa	-0.25	(0.31)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	-0.38	(0.24)	std	R
Spread between lending interest rate and overnight interbank rates	-0.47***	(0.18)	std	R
IDN $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		$stdyoy$	P
IDN $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.83***	(0.04)		
Stock market capitalization to GDP (%)	0.48***	(0.05)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.28**	(0.14)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	-0.15	(0.14)	$std\Delta yoy$	Q
Average daily stock market index value	0.39***	(0.06)	$stdyoy$	P
Average daily stock market return	0.11	(0.10)	std	P
Standard deviation of daily stock market returns	-0.23*	(0.13)	std	R
IDN $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.80***	(0.11)		
Stock market capitalization to GDP (%)	-0.41***	(0.07)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	-0.14**	(0.06)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.32***	(0.07)	$std\Delta yoy$	Q
Total credit to private non-financial sector, % of GDP	0.42	(0.30)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.53**	(0.24)	$stdyoy$	Q
Deposit interest rate, %	-0.52***	(0.12)	$std\Delta yoy$	P
Money market interest rate, % pa	-0.27	(0.24)	$std\Delta yoy$	P
Average daily stock market index value	-0.32***	(0.06)	$stdyoy$	P
Average daily stock market return	-0.12	(0.15)	std	P
Standard deviation of daily stock market returns	0.24**	(0.10)	std	R
Spread between lending and deposit interest rate	-0.43**	(0.17)	std	R
Spread between lending interest rate and overnight interbank rates	-0.48***	(0.17)	std	R
IDN $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.08)		
$FC^{(1)}_{CR}$	0.47***	(0.13)	std	C
$FC^{(1)}_{EQ}$	-0.47***	(0.06)	std	C

Table 19: Factor loadings and autoregressive coefficients: ITA

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

ITA $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.03)		
Total credit to private non-financial sector, % of GDP	0.11*	(0.06)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.32***	(0.05)	$stdyoy$	Q
Money market interest rate, % pa	0.09	(0.06)	$std\Delta yoy$	P
ITA 3-month interbank rate on deposits	0.12*	(0.07)	$std\Delta yoy$	P
Spread between lending interest rate and money market interest rate	-0.12	(0.08)	std	R
Spread between money market interest rate and treasury bond rate	0.19***	(0.04)	std	R
ITA $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.84***	(0.07)		
Price to rent ratio	0.51***	(0.05)	$std\Delta yoy$	P
Price to income ratio	0.51***	(0.06)	$std\Delta yoy$	P
Real house price index, sa	0.52***	(0.06)	$stdyoy$	P
ITA $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.87***	(0.03)		
Outstanding domestic private debt securities to GDP (%)	-0.39***	(0.06)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.38***	(0.05)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	-0.19	(0.16)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.28***	(0.09)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.20***	(0.06)	std	R
International debt securities by all issuers, amt outstanding, mln USD	-0.03	(0.04)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	-0.18**	(0.08)	$stdyoy$	Q
Treasury Bill Rate, % pa	0.08	(0.08)	$std\Delta yoy$	P
ITA $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.02)		
Stock market capitalization to GDP (%)	0.30***	(0.04)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.39***	(0.04)	$std\Delta yoy$	Q
Equities, Index	0.15***	(0.04)	$stdyoy$	P
ITA $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Stock market capitalization to GDP (%)	0.23***	(0.08)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.39***	(0.06)	$std\Delta yoy$	Q
Outstanding domestic private debt securities to GDP (%)	-0.29***	(0.05)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.25***	(0.04)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	-0.04	(0.13)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.15	(0.10)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.18***	(0.05)	std	R
International debt securities by all issuers, amt outstanding, mln USD	0.05	(0.03)	$stdyoy$	Q
Total credit to private non-financial sector, % of GDP	0.11	(0.12)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.21***	(0.05)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	-0.07	(0.07)	$stdyoy$	Q
Money market interest rate, % pa	0.10*	(0.06)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.13*	(0.07)	$std\Delta yoy$	P
Equities, Index	0.07	(0.07)	$stdyoy$	P
Price to rent ratio	0.10**	(0.04)	$std\Delta yoy$	P
Price to income ratio	0.05	(0.04)	$std\Delta yoy$	P
ITA 3-month interbank rate on deposits	0.13*	(0.07)	$std\Delta yoy$	P
Real house price index, sa	0.08**	(0.03)	$stdyoy$	P
Spread between lending interest rate and money market interest rate	-0.11	(0.07)	std	R
Spread between money market interest rate and treasury bond rate	0.16***	(0.04)	std	R
ITA $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.03)		
Treasury Bill Rate, % pa	0.15	(0.11)	$std\Delta yoy$	P
Equities, Index	-0.07	(0.11)	$stdyoy$	P
$FC^{(1)}_{CR}$	0.29***	(0.04)	std	C
$FC^{(1)}_{H}$	0.17***	(0.06)	std	C

Table 20: Factor loadings and autoregressive coefficients: JPN

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

JPN $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.99***	(0.01)		
Lending interest rate, % pa	0.01	(0.02)	$std\Delta yoy$	P
Money market interest rate, % pa	0.01	(0.01)	$std\Delta yoy$	P
Private credit by banks, LCU	0.11*	(0.07)	$stdyoy$	Q
Private credit by banks, %GDP	0.06	(0.06)	$std\Delta yoy$	Q
Spread between lending interest rate and deposit interest rate	0.15***	(0.05)	std	R
Spread between lending interest rate and treasury bill rate	0.10***	(0.03)	std	R
JPN $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.03)		
Price to rent ratio	0.32***	(0.03)	$std\Delta yoy$	P
Price to income ratio	0.30***	(0.04)	$std\Delta yoy$	P
Real house price index, sa	0.27***	(0.03)	$stdyoy$	P
JPN $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.02)		
Outstanding international private debt securities to GDP (%)	0.33***	(0.03)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	0.31***	(0.03)	$std\Delta yoy$	Q
Government bond - Treasury bill spread	0.02	(0.04)	std	R
Treasury Bill Rate, % pa	0.19***	(0.05)	$std\Delta yoy$	P
JPN $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.04)		
Average daily stock market index value	0.27***	(0.08)	$stdyoy$	P
Average daily stock market return	0.12**	(0.05)	std	P
Standard deviation of daily stock market returns	-0.25***	(0.04)	std	R
JPN $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.97***	(0.02)		
Outstanding international private debt securities to GDP (%)	0.11*	(0.07)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	0.11*	(0.06)	$std\Delta yoy$	Q
Government bond - Treasury bill spread	0.11***	(0.01)	std	R
Average daily stock market index value	0.09***	(0.03)	$stdyoy$	P
Average daily stock market return	0.04	(0.03)	std	P
Standard deviation of daily stock market returns	0.02	(0.05)	std	R
Lending interest rate, % pa	0.01	(0.01)	$std\Delta yoy$	P
Money market interest rate, % pa	0.01	(0.01)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.03	(0.05)	$std\Delta yoy$	P
Private credit by banks, LCU	0.14***	(0.05)	$stdyoy$	Q
Private credit by banks, %GDP	0.13*	(0.08)	$std\Delta yoy$	Q
Price to rent ratio	0.11**	(0.05)	$std\Delta yoy$	P
Price to income ratio	0.07**	(0.04)	$std\Delta yoy$	P
Real house price index, sa	0.11***	(0.04)	$stdyoy$	P
Spread between lending interest rate and deposit interest rate	0.17***	(0.02)	std	R
Spread between lending interest rate and treasury bill rate	0.09***	(0.03)	std	R
JPN $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.98***	(0.01)		
$FC^{(1)}_{CR}$	0.15***	(0.01)	std	C
$FC^{(1)}_{B}$	0.08**	(0.03)	std	C
$FC^{(1)}_{EQ}$	0.10***	(0.03)	std	C
$FC^{(1)}_{H}$	0.07***	(0.02)	std	C

Table 21: Factor loadings and autoregressive coefficients: KOR

Note: The table shows factor loadings from the dynamic factor model associated with the segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. **Trans** reports the transformations to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, *std*%Δyoy—year-on-year percent change. **SE** indicates standard errors. *, **, *** denote stat. significance at the 10, 5 and 1% levels.

KOR $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.99***	(0.01)		
Total credit to private non-financial sector, % of GDP	0.06	(0.04)	*std*Δyoy	Q
Total credit to private non-financial sector, LCU	0.12***	(0.03)	*stdyoy*	Q
Deposit interest rate, %	-0.03	(0.02)	*std*	P
Money market interest rate, % pa	0.06***	(0.01)	*std*	P
Spread between lending and deposit interest rate	-0.10***	(0.02)	*std*	R
Spread between lending interest rate and treasury bond rate	-0.14***	(0.02)	*std*	R

KOR $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.04)		
Price to rent ratio	0.36***	(0.03)	*std*Δyoy	P
Price to income ratio	0.33***	(0.03)	*std*Δyoy	P
Real house price index, sa	0.36***	(0.03)	*stdyoy*	P

KOR $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.07)		
Outstanding domestic private debt securities to GDP (%)	-0.37***	(0.08)	*std*Δyoy	Q
Outstanding domestic public debt securities to GDP (%)	-0.28***	(0.09)	*std*Δyoy	Q
Outstanding international private debt securities to GDP (%)	-0.44***	(0.12)	*std*Δyoy	Q
Outstanding international public debt securities to GDP (%)	-0.56***	(0.10)	*std*Δyoy	Q
International debt securities by all issuers, amt outstanding, mln USD	0.01	(0.03)	*stdyoy*	Q
Government Bonds Interest Rate, % pa	0.12	(0.09)	*std*Δyoy	P

KOR $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.87***	(0.04)		
Stock market capitalization to GDP (%)	0.41***	(0.04)	*std*Δyoy	Q
Stock market total value traded to GDP (%)	0.41***	(0.05)	*std*Δyoy	Q
Stock market turnover ratio (%)	0.18**	(0.09)	*std*Δyoy	Q
Average daily stock market index value	0.36***	(0.07)	*stdyoy*	P
Average daily stock market return	0.14**	(0.06)	*std*	P
Standard deviation of daily stock market returns	0.02	(0.09)	*std*	R

KOR $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.07)		
Stock market capitalization to GDP (%)	-0.29	(0.26)	*std*Δyoy	Q
Stock market total value traded to GDP (%)	-0.19	(0.32)	*std*Δyoy	Q
Outstanding domestic private debt securities to GDP (%)	0.02	(0.19)	*std*Δyoy	Q
Outstanding domestic public debt securities to GDP (%)	-0.07	(0.20)	*std*Δyoy	Q
Outstanding international private debt securities to GDP (%)	0.30	(0.22)	*std*Δyoy	Q
Outstanding international public debt securities to GDP (%)	0.19	(0.20)	*std*Δyoy	Q
Stock market turnover ratio (%)	0.10	(0.18)	*std*Δyoy	Q
International debt securities by all issuers, amt outstanding, mln USD	0.06*	(0.04)	*stdyoy*	Q
Total credit to private non-financial sector, % of GDP	0.24	(0.25)	*std*Δyoy	Q
Total credit to private non-financial sector, LCU	0.12	(0.11)	*stdyoy*	Q
Deposit interest rate, %	0.01	(0.11)	*std*	P
Government Bonds Interest Rate, % pa	-0.00	(0.08)	*std*Δyoy	P
Money market interest rate, % pa	0.16**	(0.07)	*std*	P
Price to rent ratio	-0.28***	(0.06)	*std*Δyoy	P
Price to income ratio	-0.24***	(0.07)	*std*Δyoy	P
Real house price index, sa	-0.26**	(0.11)	*stdyoy*	P
Average daily stock market index value	-0.17	(0.23)	*stdyoy*	P
Average daily stock market return	-0.03	(0.12)	*std*	P
Standard deviation of daily stock market returns	0.02	(0.12)	*std*	R
Spread between lending and deposit interest rate	-0.10	(0.10)	*std*	R
Spread between lending interest rate and treasury bond rate	-0.14	(0.10)	*std*	R

KOR $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.99***	(0.01)		
$FC^{(1)}_{CR}$	0.15***	(0.02)	*std*	C
$FC^{(1)}_{B}$	-0.03	(0.02)	*std*	C
$FC^{(1)}_{EQ}$	-0.03	(0.03)	*std*	C
$FC^{(1)}_{H}$	-0.16***	(0.02)	*std*	C

Table 22: Factor loadings and autoregressive coefficients: LTU

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, *std*%Δyoy—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

LTU $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.02)		
Private credit by deposit money banks to GDP (%)	0.25***	(0.02)	*std*Δyoy	Q
Money market interest rate, % pa	-0.03	(0.05)	*std*Δyoy	P
Private credit by banks, LCU	0.25***	(0.04)	*stdyoy*	Q
LTU Overnight VILIBOR rate and proxy EONIA EMU	-0.02	(0.05)	*std*Δyoy	P
Spread between money market interest rate and treasury bill rate	0.07**	(0.03)	*std*	R
Spread between 3-month and overnight interbank rates	-0.04	(0.03)	*std*	R
LTU $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		*stdyoy*	P
LTU $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.84***	(0.11)		
10Y-3M government bond spread	-0.48***	(0.16)	*std*	R
Treasury Bill Rate, % pa	0.04	(0.06)	*std*Δyoy	P
LTU $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.06)		
Average daily stock market index value	0.43***	(0.06)	*stdyoy*	P
Average daily stock market return	0.28*	(0.16)	*std*	P
Standard deviation of daily stock market returns	-0.19	(0.20)	*std*	R
LTU $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.06)		
Private credit by deposit money banks to GDP (%)	0.25***	(0.10)	*std*Δyoy	Q
10Y-3M government bond spread	-0.28*	(0.17)	*std*	R
Property prices, real, index, 2010 = 100	0.33*	(0.17)	*std*Δyoy	P
Money market interest rate, % pa	-0.19	(0.24)	*std*Δyoy	P
Treasury Bill Rate, % pa	0.02	(0.07)	*std*Δyoy	P
Private credit by banks, LCU	0.35***	(0.06)	*stdyoy*	Q
LTU Overnight VILIBOR rate and proxy EONIA EMU	-0.19	(0.25)	*std*Δyoy	P
Average daily stock market index value	0.20	(0.17)	*stdyoy*	P
Average daily stock market return	0.03	(0.08)	*std*	P
Standard deviation of daily stock market returns	-0.08	(0.20)	*std*	R
Spread between money market interest rate and treasury bill rate	0.17	(0.16)	*std*	R
Spread between 3-month and overnight interbank rates	-0.15	(0.15)	*std*	R
LTU $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.02)		
$FC^{(1)}_{CR}$	0.27***	(0.03)	*std*	C
$FC^{(1)}_{B}$	0.24***	(0.05)	*std*	C
$FC^{(1)}_{EQ}$	0.14*	(0.08)	*std*	C
$FC^{(1)}_{H}$	0.28***	(0.06)	*std*	C

Table 23: Factor loadings and autoregressive coefficients: LVA

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

LVA $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.08)		
Lending interest rate, % pa	0.25**	(0.12)	$std\Delta yoy$	P
Private credit by banks, LCU	0.13	(0.15)	$stdyoy$	Q
Private credit by banks, % GDP	0.49***	(0.08)	$std\Delta yoy$	Q
LVA overnight RIGBOR rate and proxy EONIA EMU	0.37**	(0.19)	$std\Delta yoy$	P
Spread between lending interest rate and deposit interest rate	-0.01	(0.04)	std	R
Spread between overnight and 3-month interbank rates	0.27	(0.18)	std	R
LVA $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.12)		
Price to rent ratio	0.46***	(0.06)	$std\Delta yoy$	P
Price to income ratio	0.47***	(0.05)	$std\Delta yoy$	P
Real house price index, sa	0.46***	(0.05)	$stdyoy$	P
LVA $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.84***	(0.09)		
10Y-3M government bond spread	-0.49***	(0.14)	std	R
International debt securities by all issuers, amt outstanding, mln USD	0.01	(0.03)	$stdyoy$	Q
Treasury Bill Rate, % pa	0.21***	(0.05)	$std\Delta yoy$	P
LVA $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.09)		
Average daily stock market index value	0.45***	(0.06)	$stdyoy$	P
Average daily stock market return	0.29***	(0.11)	std	P
Standard deviation of daily stock market returns	0.02	(0.18)	std	R
LVA $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.84***	(0.10)		
Lending interest rate, % pa	0.31***	(0.08)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.19***	(0.05)	$std\Delta yoy$	P
Private credit by banks, LCU	0.06	(0.13)	$stdyoy$	Q
Equities, Index	-0.22**	(0.09)	$stdyoy$	P
Private credit by banks, % GDP	0.46***	(0.09)	$std\Delta yoy$	Q
LVA overnight RIGBOR rate and proxy EONIA EMU	0.47***	(0.13)	$std\Delta yoy$	P
Spread between lending interest rate and deposit interest rate	-0.00	(0.03)	std	R
Spread between overnight and 3-month interbank rates	0.32*	(0.17)	std	R
LVA $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.87***	(0.08)		
Treasury Bill Rate, % pa	0.17***	(0.05)	$std\Delta yoy$	P
Equities, Index	-0.22***	(0.07)	$stdyoy$	P
$FC^{(1)}_{CR}$	0.45***	(0.07)	std	C

Table 24: Factor loadings and autoregressive coefficients: MEX

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

MEX $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.75***	(0.07)		
Total credit to private non-financial sector, % of GDP	0.24*	(0.12)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	-0.08	(0.17)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.59***	(0.14)	$std\Delta yoy$	P
Money market interest rate, % pa	0.56***	(0.12)	$std\Delta yoy$	P
Spread between money market interest rate and short-term treasury bond rate	0.31	(0.21)	std	R
MEX $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		$stdyoy$	P
MEX $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.81***	(0.06)		
Outstanding domestic private debt securities to GDP (%)	0.33**	(0.16)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	0.39***	(0.09)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	0.50***	(0.08)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	0.04	(0.03)	$std\Delta yoy$	Q
10Y-3M government bond spread	0.09	(0.09)	std	R
Treasury Bill Rate, % pa	0.02	(0.05)	$std\Delta yoy$	P
MEX $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.03)		
Stock market capitalization to GDP (%)	0.44***	(0.04)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.41***	(0.03)	$std\Delta yoy$	Q
MEX Share prices: MSE IPC share price index	0.14	(0.08)	$stdyoy$	P
MEX $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.03)		
Stock market capitalization to GDP (%)	0.32**	(0.16)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.39***	(0.07)	$std\Delta yoy$	Q
Outstanding domestic private debt securities to GDP (%)	-0.09	(0.16)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	0.05	(0.16)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	0.12	(0.14)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.02	(0.06)	$std\Delta yoy$	Q
10Y-3M government bond spread	0.12	(0.13)	std	R
Total credit to private non-financial sector, % of GDP	0.16**	(0.07)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.08	(0.07)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.02	(0.03)	$std\Delta yoy$	P
Money market interest rate, % pa	0.02	(0.04)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.01	(0.08)	$std\Delta yoy$	P
MEX Share prices: MSE IPC share price index	0.04	(0.03)	$stdyoy$	P
Spread between money market interest rate and short-term treasury bond rate	-0.10	(0.11)	std	R
MEX $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.02)		
Treasury Bill Rate, % pa	-0.14	(0.12)	$std\Delta yoy$	P
$FC^{(1)}_{CR}$	0.03	(0.09)	std	C
$FC^{(1)}_{EQ}$	0.34***	(0.03)	std	C

Table 25: Factor loadings and autoregressive coefficients: MYS

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

MYS $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.02)		
Total credit to private non-financial sector, % of GDP	0.31***	(0.05)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.27***	(0.03)	$stdyoy$	Q
Deposit interest rate, %	0.07***	(0.02)	$std\Delta yoy$	P
Money market interest rate, % pa	0.07***	(0.03)	$std\Delta yoy$	P
Spread between money market interest rate and deposit interest rate	-0.12**	(0.05)	std	R
Spread between money market interest rate and treasury bill rate	0.17***	(0.05)	std	R
MYS $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		$stdyoy$	P
MYS $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.82***	(0.05)		
Outstanding domestic private debt securities to GDP (%)	-0.03	(0.22)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.35***	(0.09)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	-0.30	(0.33)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.06	(0.08)	$std\Delta yoy$	Q
10Y-3M government bond spread	-0.39***	(0.08)	std	R
Treasury Bill Rate, % pa	0.39***	(0.14)	$std\Delta yoy$	P
MYS $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.03)		
Stock market capitalization to GDP (%)	0.33*	(0.18)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	-0.05	(0.25)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	-0.14	(0.18)	$std\Delta yoy$	Q
Stock market return (%, year-on-year)	0.20	(0.20)	std	P
Stock price volatility	-0.32***	(0.11)	std	R
MYS $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.03)		
Stock market capitalization to GDP (%)	-0.15	(0.15)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	-0.07	(0.12)	$std\Delta yoy$	Q
Outstanding domestic private debt securities to GDP (%)	0.10**	(0.05)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	-0.15*	(0.08)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	0.20	(0.18)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.02	(0.04)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	-0.00	(0.10)	$std\Delta yoy$	Q
Stock market return (%, year-on-year)	-0.11	(0.10)	std	P
Stock price volatility	-0.12	(0.21)	std	R
10Y-3M government bond spread	-0.19	(0.12)	std	R
Total credit to private non-financial sector, % of GDP	0.46***	(0.05)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.28***	(0.05)	$stdyoy$	Q
Deposit interest rate, %	0.07***	(0.02)	$std\Delta yoy$	P
Money market interest rate, % pa	0.07***	(0.02)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.19	(0.13)	$std\Delta yoy$	P
Spread between money market interest rate and deposit interest rate	-0.00	(0.04)	std	R
Spread between money market interest rate and treasury bill rate	0.11***	(0.03)	std	R
MYS $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.05)		
Stock market return (%, year-on-year)	-0.21	(0.23)	std	P
Treasury Bill Rate, % pa	0.28	(0.17)	$std\Delta yoy$	P
$FC^{(1)}_{CR}$	0.36***	(0.08)	std	C

Table 26: Factor loadings and autoregressive coefficients: NLD

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

NLD $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.98***	(0.01)		
Total credit to private non-financial sector, % of GDP	0.02	(0.03)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.08***	(0.03)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.03	(0.04)	$std\Delta yoy$	P
Lending interest rate, % pa	0.03	(0.03)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	0.21***	(0.03)	std	R
Spread between lending and treasury bond rate	0.19***	(0.04)	std	R
NLD $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.97***	(0.02)		
Price to rent ratio	0.21***	(0.02)	$std\Delta yoy$	P
Price to income ratio	0.27***	(0.02)	$std\Delta yoy$	P
Real house price index, sa	0.22***	(0.02)	$stdyoy$	P
NLD $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.85***	(0.05)		
International debt securities by all issuers, amt outstanding, mln USD	0.14***	(0.02)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.45***	(0.04)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	0.28***	(0.07)	$std\Delta yoy$	P
NLD $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.03)		
Stock market capitalization to GDP (%)	0.40***	(0.07)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.34***	(0.06)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.25***	(0.08)	$std\Delta yoy$	Q
Average daily stock market index value	0.29***	(0.09)	$stdyoy$	P
Average daily stock market return	0.09	(0.08)	std	P
Standard deviation of daily stock market returns	-0.18*	(0.10)	std	R
NLD $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.02)		
Stock market capitalization to GDP (%)	0.32***	(0.09)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.36***	(0.06)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.28***	(0.07)	$std\Delta yoy$	Q
International debt securities by all issuers, amt outstanding, mln USD	0.04**	(0.02)	$stdyoy$	Q
Total credit to private non-financial sector, % of GDP	0.12	(0.08)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.17***	(0.03)	$stdyoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.05	(0.05)	$stdyoy$	Q
3-Month or 90-day Rates and Yields: Interbank Rates	0.12**	(0.05)	$std\Delta yoy$	P
Government Bonds Interest Rate, % pa	0.07**	(0.03)	$std\Delta yoy$	P
Lending interest rate, % pa	0.05	(0.05)	$std\Delta yoy$	P
Price to rent ratio	0.20***	(0.03)	$std\Delta yoy$	P
Price to income ratio	0.21***	(0.04)	$std\Delta yoy$	P
Real house price index, sa	0.19***	(0.03)	$stdyoy$	P
Average daily stock market index value	0.21***	(0.08)	$stdyoy$	P
Average daily stock market return	0.05	(0.06)	std	P
Standard deviation of daily stock market returns	-0.11	(0.08)	std	R
Spread between lending and deposit interest rate	0.13**	(0.06)	std	R
Spread between lending and treasury bond rate	0.12*	(0.06)	std	R
NLD $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.02)		
$FC^{(1)}_{CR}$	0.16***	(0.04)	std	C
$FC^{(1)}_{B}$	0.07*	(0.04)	std	C
$FC^{(1)}_{EQ}$	0.27***	(0.07)	std	C
$FC^{(1)}_{H}$	0.22***	(0.03)	std	C

Table 27: Factor loadings and autoregressive coefficients: NOR

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

NOR $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.02)		
Total credit to private non-financial sector, % of GDP	0.31***	(0.04)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.30***	(0.03)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.04	(0.06)	$std\Delta yoy$	P
Spread between 3-month and overnight interbank rates	0.06	(0.06)	std	R
NOR $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.03)		
Price to rent ratio	0.39***	(0.03)	$std\Delta yoy$	P
Price to income ratio	0.39***	(0.03)	$std\Delta yoy$	P
Real house price index, sa	0.42***	(0.03)	$stdyoy$	P
NOR $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
Government Bonds Interest Rate, %pa	n/a		$std\Delta yoy$	P
NOR $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.87***	(0.04)		
Stock market capitalization to GDP (%)	0.31***	(0.08)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.37***	(0.05)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.23***	(0.07)	$std\Delta yoy$	Q
Average daily stock market index value	0.33***	(0.10)	$stdyoy$	P
Average daily stock market return	0.12	(0.08)	std	P
Standard deviation of daily stock market returns	-0.19	(0.15)	std	R
NOR $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Stock market capitalization to GDP (%)	0.10	(0.08)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.21***	(0.07)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.12**	(0.05)	$std\Delta yoy$	Q
Total credit to private non-financial sector, % of GDP	0.09	(0.09)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.23***	(0.04)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.02	(0.06)	$std\Delta yoy$	P
Government Bonds Interest Rate, % pa	0.20***	(0.05)	$std\Delta yoy$	P
Price to rent ratio	0.35***	(0.06)	$std\Delta yoy$	P
Price to income ratio	0.35***	(0.06)	$std\Delta yoy$	P
Real house price index, sa	0.37***	(0.06)	$stdyoy$	P
Average daily stock market index value	0.12	(0.08)	$stdyoy$	P
Average daily stock market return	0.03	(0.04)	std	P
Standard deviation of daily stock market returns	-0.10	(0.08)	std	R
Spread between 3-month and overnight interbank rates	0.05	(0.06)	std	R
NOR $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.02)		
$FC^{(1)}_{CR}$	0.24***	(0.03)	std	C
$FC^{(1)}_{B}$	0.22***	(0.07)	std	C
$FC^{(1)}_{EQ}$	0.16**	(0.08)	std	C
$FC^{(1)}_{H}$	0.29***	(0.06)	std	C

Table 28: Factor loadings and autoregressive coefficients: PHL

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, *std*%Δyoy—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

PHL $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.02)		
Private credit by deposit money banks to GDP (%)	0.35***	(0.03)	*std*Δyoy	Q
Lending interest rate, % pa	-0.07	(0.10)	*std*Δyoy	P
Money market interest rate, % pa	-0.06	(0.09)	*std*Δyoy	P
Private credit by banks, LCU	0.31***	(0.04)	*stdyoy*	Q
Spread between lending and deposit interest rate	-0.06	(0.08)	*std*	R
Spread between money market interest rate and treasury bill rate	0.11	(0.07)	*std*	R
PHL $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		*stdyoy*	P
PHL $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.05)		
Outstanding domestic private debt securities to GDP (%)	-0.06	(0.22)	*std*Δyoy	Q
Outstanding domestic public debt securities to GDP (%)	-0.05	(0.26)	*std*Δyoy	Q
Outstanding international private debt securities to GDP (%)	0.39***	(0.07)	*std*Δyoy	Q
Outstanding international public debt securities to GDP (%)	0.18	(0.32)	*std*Δyoy	Q
Treasury Bill Rate, % pa	0.02	(0.06)	*std*Δyoy	P
PHL $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.89***	(0.05)		
Stock market capitalization to GDP (%)	0.37***	(0.05)	*std*Δyoy	Q
Stock market total value traded to GDP (%)	0.37***	(0.05)	*std*Δyoy	Q
Stock market turnover ratio (%)	0.28***	(0.05)	*std*Δyoy	Q
Average daily stock market index value	0.32***	(0.05)	*stdyoy*	P
Average daily stock market return	0.05	(0.04)	*std*	P
Standard deviation of daily stock market returns	-0.14***	(0.04)	*std*	R
PHL $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.05)		
Private credit by deposit money banks to GDP (%)	0.41***	(0.10)	*std*Δyoy	Q
Stock market capitalization to GDP (%)	0.02	(0.20)	*std*Δyoy	Q
Stock market total value traded to GDP (%)	0.26	(0.17)	*std*Δyoy	Q
Outstanding domestic private debt securities to GDP (%)	-0.15***	(0.04)	*std*Δyoy	Q
Outstanding domestic public debt securities to GDP (%)	-0.21***	(0.08)	*std*Δyoy	Q
Outstanding international private debt securities to GDP (%)	0.19	(0.20)	*std*Δyoy	Q
Outstanding international public debt securities to GDP (%)	-0.19	(0.13)	*std*Δyoy	Q
Stock market turnover ratio (%)	0.15*	(0.09)	*std*Δyoy	Q
Lending interest rate, % pa	0.04	(0.02)	*std*Δyoy	P
Money market interest rate, % pa	0.04	(0.03)	*std*Δyoy	P
Treasury Bill Rate, % pa	0.06	(0.04)	*std*Δyoy	P
Private credit by banks, LCU	0.24***	(0.05)	*stdyoy*	Q
Average daily stock market index value	0.01	(0.15)	*stdyoy*	P
Average daily stock market return	-0.03	(0.06)	*std*	P
Standard deviation of daily stock market returns	0.03	(0.08)	*std*	R
Spread between lending and deposit interest rate	0.11**	(0.05)	*std*	R
Spread between money market interest rate and treasury bill rate	0.02	(0.03)	*std*	R
PHL $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Treasury Bill Rate, % pa	0.00	(0.02)	*std*Δyoy	P
$FC^{(1)}_{CR}$	0.23***	(0.02)	*std*	C
$FC^{(1)}_{EQ}$	0.23***	(0.06)	*std*	C

Table 29: Factor loadings and autoregressive coefficients: POL

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

POL $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.05)		
Total credit to private non-financial sector, % of GDP	-0.09	(0.14)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.26***	(0.06)	$std yoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.33*	(0.20)	$std\Delta yoy$	P
Money market interest rate, % pa	0.29	(0.21)	$std\Delta yoy$	P
Spread between money market interest rate and overnight interbank rate	-0.12**	(0.05)	std	R
POL $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Average House Price: Residential Bldgs	n/a		$std yoy$	P
POL $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.72***	(0.13)		
10Y-3M government bond spread	0.05	(0.13)	std	R
International debt securities by all issuers, amt outstanding, mln USD	-0.05*	(0.03)	$std yoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	0.62***	(0.14)	$std yoy$	Q
Treasury Bill Rate, % pa	0.18**	(0.08)	$std\Delta yoy$	P
POL $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.78***	(0.05)		
Average daily stock market index value	0.49***	(0.05)	$std yoy$	P
Average daily stock market return	0.23**	(0.10)	std	P
Standard deviation of daily stock market returns	-0.07	(0.11)	std	R
POL $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.08)		
Average House Price: Residential Bldgs	0.28***	(0.09)	$std yoy$	P
Total credit to private non-financial sector, % of GDP	0.47***	(0.09)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.33***	(0.07)	$std yoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	-0.01	(0.08)	$std\Delta yoy$	P
Money market interest rate, % pa	0.01	(0.07)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.01	(0.06)	$std\Delta yoy$	P
Average daily stock market index value	-0.30***	(0.08)	$std yoy$	P
Average daily stock market return	-0.14*	(0.07)	std	P
Standard deviation of daily stock market returns	0.21***	(0.07)	std	R
Spread between money market interest rate and overnight interbank rate	-0.00	(0.04)	std	R
POL $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.04)		
Treasury Bill Rate, % pa	-0.03	(0.05)	$std\Delta yoy$	P
$FC^{(1)}_{CR}$	0.26***	(0.05)	std	
$FC^{(1)}_{EQ}$	0.16	(0.15)	std	

Table 30: Factor loadings and autoregressive coefficients: RUS

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

RUS $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.08)		
Total credit to private non-financial sector, % of GDP	0.19	(0.16)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.44***	(0.12)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	-0.19	(0.17)	$std\Delta yoy$	P
Money market interest rate, % pa	-0.14	(0.11)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	0.04*	(0.02)	std	R
Spread between 3-month and overnight interbank rates	-0.36***	(0.07)	std	R
RUS $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.86***	(0.06)		
Price to income ratio	0.39***	(0.06)	$std\Delta yoy$	P
Real house price index, sa	0.43***	(0.06)	$stdyoy$	P
RUS $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.83***	(0.11)		
Outstanding domestic public debt securities to GDP (%)	-0.15***	(0.03)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	-0.59**	(0.28)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	0.06	(0.13)	$std\Delta yoy$	Q
Domestic debt securities by all issuers, amt outstanding, mln USD	-0.27	(0.33)	$stdyoy$	Q
International debt securities by all issuers, amt outstanding, mln USD	0.01	(0.02)	$stdyoy$	Q
RUS Long-term Government Bond Yields/ 10 Years	-0.02	(0.04)	$std\Delta yoy$	Q
RUS $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.87***	(0.06)		
Stock market capitalization to GDP (%)	0.44***	(0.14)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.27**	(0.12)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.04*	(0.02)	$std\Delta yoy$	Q
Average daily stock market index value	0.28*	(0.17)	$stdyoy$	P
Average daily stock market return	0.12	(0.14)	std	P
Standard deviation of daily stock market returns	-0.20	(0.19)	std	R
RUS $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.03)		
Stock market capitalization to GDP (%)	0.33***	(0.11)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.33***	(0.05)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.01	(0.02)	$std\Delta yoy$	Q
Total credit to private non-financial sector, % of GDP	0.12**	(0.06)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.20***	(0.03)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	-0.00	(0.01)	$std\Delta yoy$	P
CBS, Monetary Base, LCU	0.11**	(0.04)	$stdyoy$	Q
Money market interest rate, % pa	-0.00	(0.01)	$std\Delta yoy$	P
RUS Long-term Government Bond Yields/ 10 Years	-0.03	(0.03)	$std\Delta yoy$	Q
Real house price index, sa	0.28***	(0.06)	$stdyoy$	P
Average daily stock market index value	0.10*	(0.06)	$stdyoy$	P
Average daily stock market return	0.04	(0.04)	std	P
Standard deviation of daily stock market returns	-0.06	(0.07)	std	R
Spread between lending and deposit interest rate	0.02	(0.03)	std	R
Spread between lending interest rate and government bond rate	-0.01	(0.02)	std	R
Spread between 3-month and overnight interbank rates	-0.09*	(0.05)	std	R
RUS $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.03)		
$FC^{(1)}_{CR}$	0.25***	(0.09)	std	Q
$FC^{(1)}_{EQ}$	0.22*	(0.12)	std	Q

Table 31: Factor loadings and autoregressive coefficients: SGP

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

SGP $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.97***	(0.01)		
Total credit to private non-financial sector, % of GDP	0.09***	(0.03)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.13***	(0.03)	$stdyoy$	Q
Lending interest rate, % pa	0.05	(0.03)	$std\Delta yoy$	P
Money market interest rate, % pa	0.03	(0.02)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	-0.17***	(0.02)	std	R
Spread between money market interest rate and treasury bill rate	0.18***	(0.02)	std	R
SGP $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Singapore: Property Price Index (NSA, Q1-09=100)	n/a		$stdyoy$	P
SGP $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.85***	(0.06)		
10Y-3M government bond spread	-0.44***	(0.04)	std	R
Treasury Bill Rate, % pa	0.24***	(0.08)	$std\Delta yoy$	P
SGP $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.85***	(0.08)		
Stock market capitalization to GDP (%)	0.42***	(0.08)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.28***	(0.10)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	0.13*	(0.07)	$std\Delta yoy$	Q
Average daily stock market index value	0.40***	(0.09)	$stdyoy$	P
Average daily stock market return	0.09	(0.08)	std	P
Standard deviation of daily stock market returns	-0.30***	(0.09)	std	R
SGP $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.16)		
Singapore: Property Price Index (NSA, Q1-09=100)	-0.06	(0.34)	$stdyoy$	P
Mortgage Rate: 15-years (EOP, % per annum)	0.18	(0.34)	$std\Delta yoy$	P
Total credit to private non-financial sector, % of GDP	0.17	(0.19)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.16*	(0.09)	$stdyoy$	Q
Lending interest rate, % pa	0.16	(0.33)	$std\Delta yoy$	P
Money market interest rate, % pa	0.09	(0.17)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	-0.01	(0.06)	$std\Delta yoy$	P
Equities, Index	-0.24	(0.47)	$stdyoy$	P
Spread between lending and deposit interest rate	-0.31***	(0.08)	std	R
Spread between money market interest rate and treasury bill rate	0.23***	(0.06)	std	R
SGP $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.97***	(0.02)		
$FC^{(1)}_{CR}$	0.22***	(0.03)	std	C
$FC^{(1)}_{H}$	0.18**	(0.08)	std	C

Table 32: Factor loadings and autoregressive coefficients: SVK

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

SVK $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.07)		
Private credit by deposit money banks to GDP (%)	0.24***	(0.05)	$std\Delta yoy$	Q
Immediate Rates: Less than 24 Hours: Call Money	0.11	(0.24)	$std\Delta yoy$	P
Private credit by banks, LCU	0.31	(0.20)	$stdyoy$	Q
Spread between 3-month and overnight interbank rates	-0.08	(0.20)	std	R
SVK $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.89***	(0.06)		
Residential property prices total	0.32***	(0.04)	$stdyoy$	P
Price to rent ratio	0.41***	(0.05)	$std\Delta yoy$	P
Price to income ratio	0.41***	(0.05)	$std\Delta yoy$	P
SVK $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.89***	(0.05)		
Outstanding international private debt securities to GDP (%)	-0.42***	(0.07)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.19	(0.18)	$std\Delta yoy$	Q
Debt securities by all issuers, amt outstanding, mln USD	-0.01	(0.03)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	0.19	(0.15)	$std\Delta yoy$	P
SVK $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.11)		
Stock market capitalization to GDP (%)	-0.14	(0.14)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.36***	(0.07)	$std\Delta yoy$	Q
Stock price volatility	-0.40***	(0.07)	$std\Delta yoy$	R
SVK Share prices: SAX index	0.20	(0.15)	$stdyoy$	P
SVK $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.04)		
Private credit by deposit money banks to GDP (%)	0.20***	(0.05)	$std\Delta yoy$	Q
Stock market capitalization to GDP (%)	-0.15**	(0.08)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.02	(0.02)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	0.12	(0.08)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	0.21**	(0.10)	$std\Delta yoy$	Q
Stock price volatility	0.06	(0.05)	$std\Delta yoy$	R
Debt securities by all issuers, amt outstanding, mln USD	-0.01	(0.02)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	0.00	(0.02)	$std\Delta yoy$	P
Government Bonds Interest Rate, % pa	0.12	(0.08)	$std\Delta yoy$	P
Private credit by banks, LCU	0.04	(0.07)	$stdyoy$	Q
SVK Share prices: SAX index	-0.28**	(0.13)	$stdyoy$	P
Spread between 3-month and overnight interbank rates	-0.00	(0.01)	std	R
SVK $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.07)		
$FC^{(1)}_{CR}$	0.32***	(0.04)	std	
$FC^{(1)}_{EQ}$	0.26***	(0.09)	std	

Table 33: Factor loadings and autoregressive coefficients: SWE

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

SWE $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.03)		
Total credit to private non-financial sector, % of GDP	0.34***	(0.04)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.39***	(0.06)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	-0.08	(0.10)	$std\Delta yoy$	P
Money market interest rate, % pa	-0.06	(0.14)	$std\Delta yoy$	P
Spread between money market and 3-month interbank interbank interest rate	-0.07	(0.14)	std	R
Spread between money market interest rate and treasury bill rate	-0.08	(0.16)	std	R
SWE $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.02)		
Price to rent ratio	0.30***	(0.02)	$std\Delta yoy$	P
Price to income ratio	0.30***	(0.02)	$std\Delta yoy$	P
Real house price index, sa	0.33***	(0.02)	$stdyoy$	P
SWE $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.76***	(0.05)		
5Y-3M government bond spread	-0.50***	(0.05)	std	R
Treasury Bill Rate, % pa	0.46***	(0.07)	$std\Delta yoy$	P
SWE $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.88***	(0.03)		
Stock market capitalization to GDP (%)	0.40***	(0.04)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.25***	(0.06)	$std\Delta yoy$	Q
SWE Share prices: OMXS30 index	0.40***	(0.08)	$stdyoy$	P
SWE $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.04)		
Stock market capitalization to GDP (%)	0.16	(0.16)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.12**	(0.05)	$std\Delta yoy$	Q
5Y-3M government bond spread	0.17	(0.15)	std	R
Total credit to private non-financial sector, % of GDP	0.15	(0.10)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.21***	(0.07)	$stdyoy$	Q
Immediate Rates: Less than 24 Hours: Call Money/Interbank Rate	-0.13	(0.17)	$std\Delta yoy$	P
Money market interest rate, % pa	-0.13	(0.27)	$std\Delta yoy$	P
Treasury Bill Rate, % pa	0.04	(0.08)	$std\Delta yoy$	P
Price to rent ratio	0.31***	(0.10)	$std\Delta yoy$	P
Price to income ratio	0.31**	(0.12)	$std\Delta yoy$	P
Real house price index, sa	0.35***	(0.11)	$stdyoy$	P
SWE Share prices: OMXS30 index	0.13	(0.19)	$stdyoy$	P
Spread between money market and 3-month interbank interbank interest rate	-0.15	(0.27)	std	R
Spread between money market interest rate and treasury bill rate	-0.16	(0.30)	std	R
SWE $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.01)		
Total Share Prices for All Shares	-0.00	(0.09)	$stdyoy$	P
Real house price index, sa	0.27***	(0.05)	$stdyoy$	P
$FC^{(1)}_{CR}$	0.23***	(0.04)	std	C
$FC^{(1)}_{B}$	-0.03	(0.05)	std	C

Table 34: Factor loadings and autoregressive coefficients: THA

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

THA $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Total credit to private non-financial sector, % of GDP	0.28***	(0.04)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.29***	(0.04)	$stdyoy$	Q
Lending interest rate, % pa	0.05*	(0.03)	$std\Delta yoy$	P
Money market interest rate, % pa	0.07*	(0.04)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	-0.21***	(0.03)	std	R
Spread between lending interest rate and treasury bond rate	0.12***	(0.03)	std	R
THA $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
Real housing price	n/a		$stdyoy$	P
THA $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.04)		
Outstanding domestic private debt securities to GDP (%)	0.32***	(0.07)	$std\Delta yoy$	Q
Outstanding domestic public debt securities to GDP (%)	0.13*	(0.08)	$std\Delta yoy$	Q
Outstanding international private debt securities to GDP (%)	-0.24***	(0.04)	$std\Delta yoy$	Q
Outstanding international public debt securities to GDP (%)	-0.04	(0.12)	$std\Delta yoy$	Q
10Y-3M government bond spread	0.13	(0.09)	std	R
Domestic debt securities by all issuers, amt outstanding, mln USD	0.01	(0.01)	$stdyoy$	Q
International debt securities by all issuers, amt outstanding, mln USD	-0.11***	(0.02)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	-0.02	(0.04)	$std\Delta yoy$	P
THA $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.91***	(0.02)		
Stock market capitalization to GDP (%)	0.36***	(0.02)	$std\Delta yoy$	Q
Stock market total value traded to GDP (%)	0.36***	(0.08)	$std\Delta yoy$	Q
Stock market turnover ratio (%)	-0.04	(0.10)	$std\Delta yoy$	Q
Stock market return (%, year-on-year)	0.31***	(0.04)	std	P
Stock price volatility	-0.08	(0.09)	std	R
THA $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.96***	(0.01)		
Stock market capitalization to GDP (%)	0.15***	(0.04)	std	Q
Stock market total value traded to GDP (%)	0.07**	(0.03)	std	Q
Stock market turnover ratio (%)	-0.06*	(0.03)	std	Q
Stock price volatility	-0.16***	(0.04)	std	R
Total credit to private non-financial sector, % of GDP	0.30***	(0.03)	$std\Delta yoy$	Q
Total credit to private non-financial sector, LCU	0.26***	(0.04)	$stdyoy$	Q
CBS, Monetary Base, LCU	0.12***	(0.04)	$stdyoy$	Q
Government Bonds Interest Rate, % pa	0.12***	(0.04)	$std\Delta yoy$	P
Lending interest rate, % pa	0.03	(0.02)	$std\Delta yoy$	P
Money market interest rate, % pa	0.07*	(0.03)	$std\Delta yoy$	P
Spread between lending and deposit interest rate	-0.15***	(0.03)	std	R
Spread between lending interest rate and treasury bond rate	0.05*	(0.03)	std	R
Stock market index return	0.21***	(0.03)	std	P
THA $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.97***	(0.01)		
Government Bonds Interest Rate, % pa	0.09**	(0.04)	$std\Delta yoy$	P
$FC^{(1)}_{CR}$	0.26***	(0.03)	std	C
$FC^{(1)}_{EQ}$	0.04	(0.06)	std	C

Table 35: Factor loadings and autoregressive coefficients: USA

Note: The table shows factor loadings from the dynamic factor model associated with the corresponding segment-specific or aggregate financial cycle. F_{t-1} denotes the autoregressive coefficient of the financial cycle index in the **Coef** column; *n/a* indicates the variable was used as a proxy for the financial cycle instead of dynamic factor model. **Attr** indicates the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*, or (C) for financial cycles. Column **Trans** reports the transformations applied to the input signal variables: *std*—standardization, Δyoy—year-on-year difference, $std\%\Delta yoy$—year-on-year percent change. Column **SE** indicates standard errors. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

USA $FC^{(1)}_{CR}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.02)		
Spread between lending interest rate and Federal funds rate	-0.25***	(0.03)	*std*	R
Spread between lending interest rate and government bond rate	-0.23***	(0.03)	*std*	R
Lending interest rate, % pa	0.13*	(0.07)	$std\Delta yoy$	P
Money market interest rate, % pa	0.16**	(0.07)	$std\Delta yoy$	P
Private credit by banks, LCU	0.32***	(0.04)	*stdyoy*	Q
Private credit by banks, % GDP	0.25***	(0.04)	$std\Delta yoy$	Q
USA $FC^{(1)}_{H}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Price to rent ratio	0.28***	(0.03)	$std\Delta yoy$	P
Price to income ratio	0.27***	(0.03)	$std\Delta yoy$	P
Real house price index, sa	0.30***	(0.02)	*stdyoy*	P
Multifamily Residential Mortgages, Assets, LCU	0.19***	(0.03)	*stdyoy*	Q
USA $FC^{(1)}_{B}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.04)		
10Y-3M government bond spread	-0.33***	(0.03)	*std*	R
Aaa-3M government bond spread	-0.31***	(0.03)	*std*	R
Moody's Seasoned Aaa Corporate Bond Yield	0.29***	(0.04)	$std\Delta yoy$	P
3-Month Treasury Bill: Secondary Market Rate	0.30***	(0.05)	$std\Delta yoy$	P
Nonfinancial corporate business; corporate bonds; liability, Level	-0.08	(0.06)	*stdyoy*	P
USA $FC^{(1)}_{EQ}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.81***	(0.05)		
Average daily stock market return	0.15***	(0.04)	*std*	P
Standard deviation of daily stock market returns	-0.39***	(0.05)	*std*	R
Average stock market index value	0.42***	(0.05)	*stdyoy*	P
USA $FC^{(1)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.92***	(0.02)		
10Y-3M government bond spread	-0.22***	(0.04)	*std*	R
Aaa-3M government bond spread	-0.19***	(0.05)	*std*	R
Price to rent ratio	0.23***	(0.05)	$std\Delta yoy$	P
Price to income ratio	0.21***	(0.05)	$std\Delta yoy$	P
Real house price index, sa	0.26***	(0.05)	*stdyoy*	P
Average daily stock market return	-0.00	(0.04)	*std*	P
Standard deviation of daily stock market returns	-0.14**	(0.06)	*std*	R
Spread between lending interest rate and Federal funds rate	-0.19***	(0.03)	*std*	R
Spread between lending interest rate and government bond rate	-0.12***	(0.03)	*std*	R
Moody's Seasoned Aaa Corporate Bond Yield	0.11*	(0.06)	$std\Delta yoy$	P
Multifamily Residential Mortgages, Assets, LCU	0.23***	(0.03)	*stdyoy*	Q
3-Month Treasury Bill: Secondary Market Rate	0.27***	(0.06)	$std\Delta yoy$	P
Nonfinancial corporate business; corporate bonds; liability, Level	-0.03	(0.04)	*stdyoy*	P
Lending interest rate, % pa	0.21***	(0.07)	$std\Delta yoy$	P
Money market interest rate, % pa	0.22***	(0.07)	$std\Delta yoy$	P
Private credit by banks, LCU	0.34***	(0.03)	*stdyoy*	Q
Private credit by banks, % GDP	0.26***	(0.04)	$std\Delta yoy$	Q
Average stock market index value	0.03	(0.05)	*stdyoy*	P
USA $FC^{(2)}_{AG}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.94***	(0.01)		
$FC^{(1)}_{CR}$	0.29***	(0.02)	*std*	C
$FC^{(1)}_{B}$	0.21***	(0.03)	*std*	C
$FC^{(1)}_{EQ}$	0.14*	(0.08)	*std*	C
$FC^{(1)}_{H}$	0.23***	(0.04)	*std*	C

Table 36: Factor loadings and autoregressive coefficients: global financial cycle (specification 1)

Note: The table shows factor loadings and autoregressive coefficient estimates from the dynamic factor models associated with the estimation of the global financial cycle g^{GL}. v1-v3 correspond to the version of a dynamic factor model as outlined in the methodology section. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

Variable	Country	v1	v2	v3
g^{GL}_{t-1}		0.97***	0.99***	0.97***
FC^{USA}_{AG}	USA	0.11***	0.07*	0.25***
FC^{AUT}_{AG}	AUT	0.12***	0.08***	0.10***
FC^{SWE}_{AG}	SWE	0.20***	0.16***	0.07
FC^{DEU}_{AG}	DEU	0.07***	0.03**	0.02
FC^{AUS}_{AG}	AUS	0.23***	0.14***	0.18***
FC^{FRA}_{AG}	FRA	0.06*	-0.02	0.09
FC^{CAN}_{AG}	CAN	0.18***	0.08***	0.11***
FC^{SGP}_{AG}	SGP	-0.03	-0.10***	0.03
FC^{JPN}_{AG}	JPN	0.13***	-0.05*	0.05
FC^{CHE}_{AG}	CHE	0.18***	0.03	-0.03
FC^{GBR}_{AG}	GBR	0.22***	0.16***	0.18***
FC^{ITA}_{AG}	ITA	0.17***	0.14***	0.15***
FC^{MYS}_{AG}	MYS		-0.07*	-0.02
FC^{NOR}_{AG}	NOR		0.12***	0.16***
FC^{ESP}_{AG}	ESP		0.16***	0.23***
FC^{BEL}_{AG}	BEL		0.13***	0.26***
FC^{PHL}_{AG}	PHL		-0.18***	-0.01
FC^{THA}_{AG}	THA		-0.16***	-0.01
FC^{IDN}_{AG}	IDN		0.01	-0.04
FC^{KOR}_{AG}	KOR		-0.13***	-0.00
FC^{HUN}_{AG}	HUN		0.15***	0.05
FC^{NLD}_{AG}	NLD		0.03	0.19***
FC^{FIN}_{AG}	FIN			-0.03
FC^{MEX}_{AG}	MEX			0.09***
FC^{CHN}_{AG}	CHN			0.01
FC^{CZE}_{AG}	CZE			-0.02
FC^{CHL}_{AG}	CHL			-0.08
FC^{BRA}_{AG}	BRA			0.16***
FC^{POL}_{AG}	POL			0.06
FC^{RUS}_{AG}	RUS			0.22***
FC^{EST}_{AG}	EST			0.07***
FC^{SVK}_{AG}	SVK			0.04***
FC^{LVA}_{AG}	LVA			0.03
FC^{LTU}_{AG}	LTU			0.22***

Table 37: Factor loadings and autoregressive coefficients: global and regional financial cycles (specification 2)

Note: The table shows factor loadings and autoregressive coefficient estimates from the dynamic factor models associated with the joint estimation of the global financial cycle g^{GLR} and regional financial cycles r^{AME}, r^{ASI} and r^{EUR}. Columns v1 and v2 list autoregressive coefficients for the global and regional factors and loadings on the global and regional factors for each country in the sample. v1-v2 correspond to the version of a dynamic factor model as outlined in the methodology section. *, **, *** denote statistical significance at the 10, 5 and 1% levels, respectively.

Variable	Country	Global/regional factors	v1	v2
g_{t-1}^{GLR}			0.98***	0.99***
r_{t-1}^{EUR}			0.98***	0.97***
r_{t-1}^{ASI}			1.00***	0.89***
r_{t-1}^{AME}			0.96***	0.95***
FC_{AG}^{USA}	USA	g_t^{GLR}	0.11***	0.01
		r_t^{AME}	0.25***	0.31***
FC_{AG}^{AUT}	AUT	g_t^{GLR}	0.09***	0.05**
		r_t^{EUR}	0.07***	0.13***
FC_{AG}^{SWE}	SWE	g_t^{GLR}	0.22***	0.13***
		r_t^{EUR}	0.02	0.05**
FC_{AG}^{DEU}	DEU	g_t^{GLR}	0.06***	0.02
		r_t^{EUR}	0.06***	0.04*
FC_{AG}^{AUS}	AUS	g_t^{GLR}	0.22***	0.08***
		r_t^{ASI}	0.08***	0.04
FC_{AG}^{FRA}	FRA	g_t^{GLR}	-0.05***	-0.04*
		r_t^{EUR}	0.16***	0.12***
FC_{AG}^{CAN}	CAN	g_t^{GLR}	0.17***	0.05***
		r_t^{AME}	0.05**	0.08***
FC_{AG}^{SGP}	SGP	g_t^{GLR}	-0.08***	-0.10***
		r_t^{ASI}	0.05***	0.00
FC_{AG}^{CHE}	CHE	g_t^{GLR}	0.10***	0.03
		r_t^{EUR}	0.18***	-0.02
FC_{AG}^{GBR}	GBR	g_t^{GLR}	0.17***	0.11***
		r_t^{EUR}	0.08***	0.15***
FC_{AG}^{JPN}	JPN	g_t^{GLR}	0.06***	-0.06
		r_t^{ASI}	0.13***	0.10
FC_{AG}^{ITA}	ITA	g_t^{GLR}	0.12***	0.10***
		r_t^{EUR}	0.14***	0.08***
FC_{AG}^{BEL}	BEL	g_t^{GLR}		0.07**
		r_t^{EUR}		0.24***
FC_{AG}^{ESP}	ESP	g_t^{GLR}		0.11***
		r_t^{EUR}		0.14***
FC_{AG}^{NOR}	NOR	g_t^{GLR}		0.08***
		r_t^{EUR}		0.13***
FC_{AG}^{HUN}	HUN	g_t^{GLR}		0.12***
		r_t^{EUR}		0.03*
FC_{AG}^{NLD}	NLD	g_t^{GLR}		-0.01
		r_t^{EUR}		0.22***
FC_{AG}^{PHL}	PHL	g_t^{GLR}		-0.15***
		r_t^{ASI}		-0.05
FC_{AG}^{THA}	THA	g_t^{GLR}		-0.14***
		r_t^{ASI}		0.02
FC_{AG}^{KOR}	KOR	g_t^{GLR}		-0.13***
		r_t^{ASI}		0.00
FC_{AG}^{IDN}	IDN	g_t^{GLR}		0.04
		r_t^{ASI}		0.40***
FC_{AG}^{MYS}	MYS	g_t^{GLR}		-0.03
		r_t^{ASI}		0.44***

Appendix B: Figures

Note: The following figures show the estimated benchmark (version 1) segment-specific financial cycles (smoothed and unsmoothed). The figures are sorted first by region—AME, ASI, EUR; then alphabetically by country code. For brevity version superscripts are dropped, except for aggregate cycles.

Figure 11: Financial cycles (North and South America): BRA

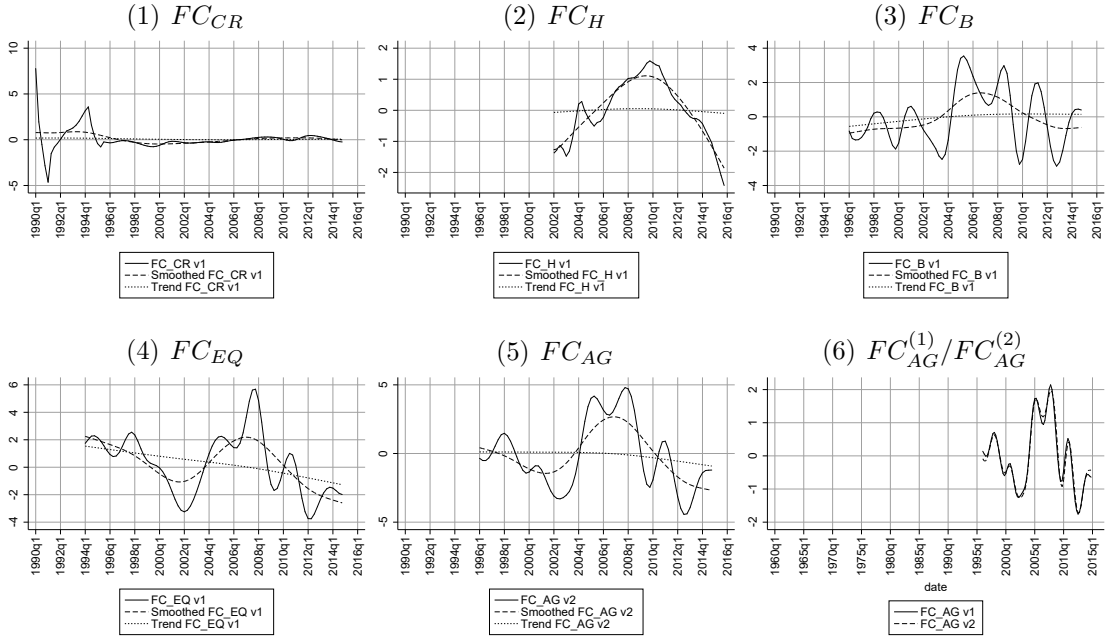


Figure 12: Financial cycles (North and South America): CAN

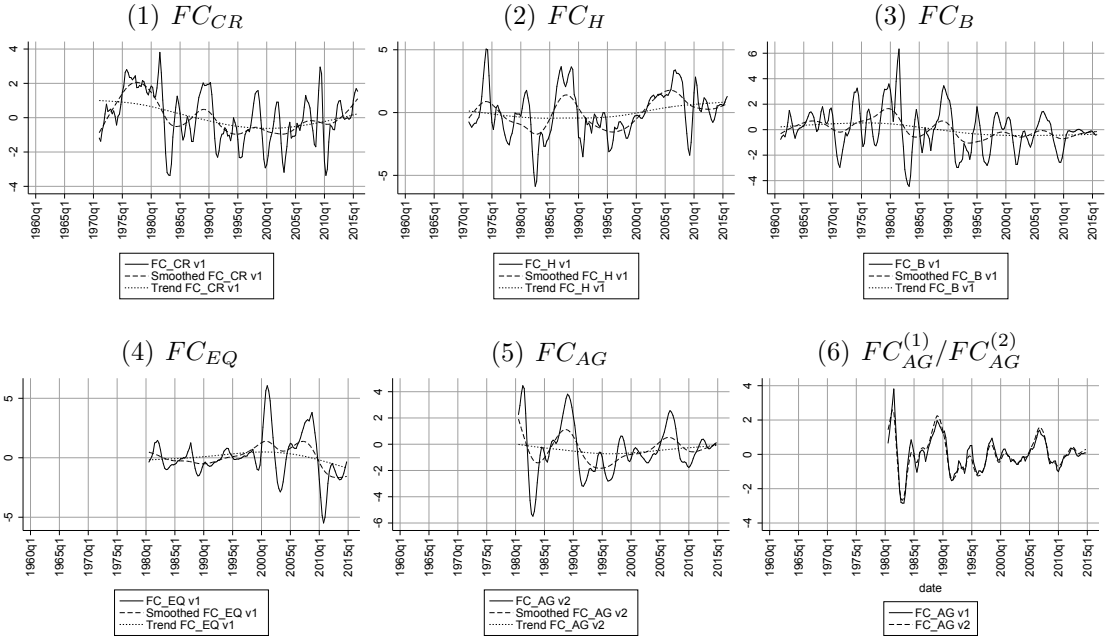


Figure 13: Financial cycles (North and South America): CHL

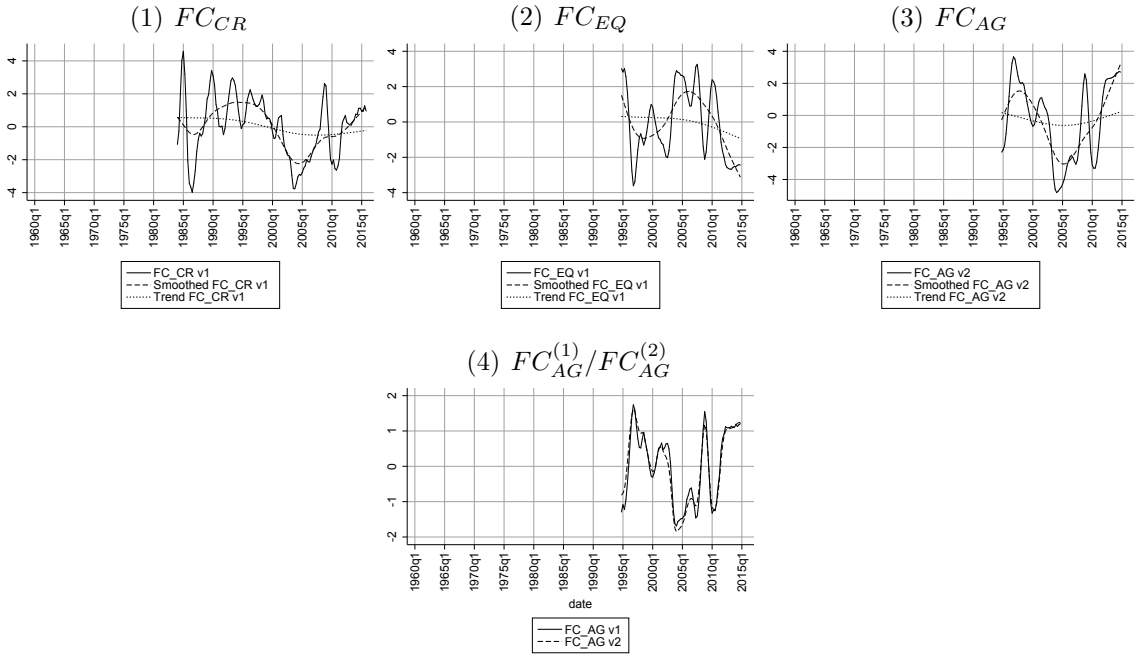


Figure 14: Financial cycles (North and South America): MEX

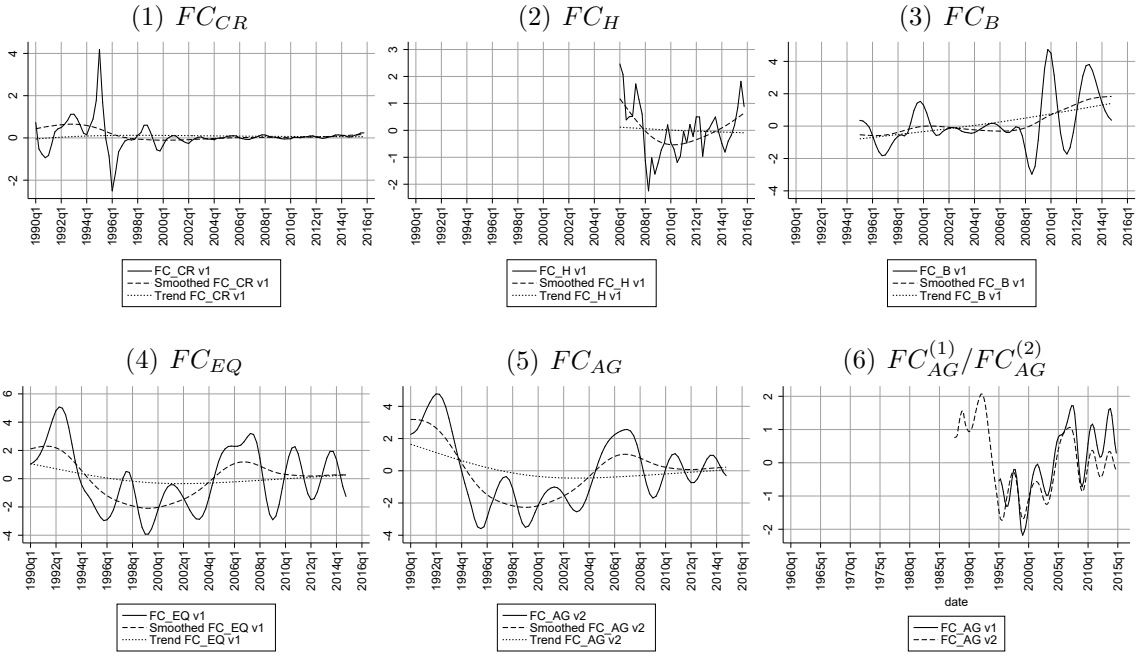


Figure 15: Financial cycles (North and South America): USA

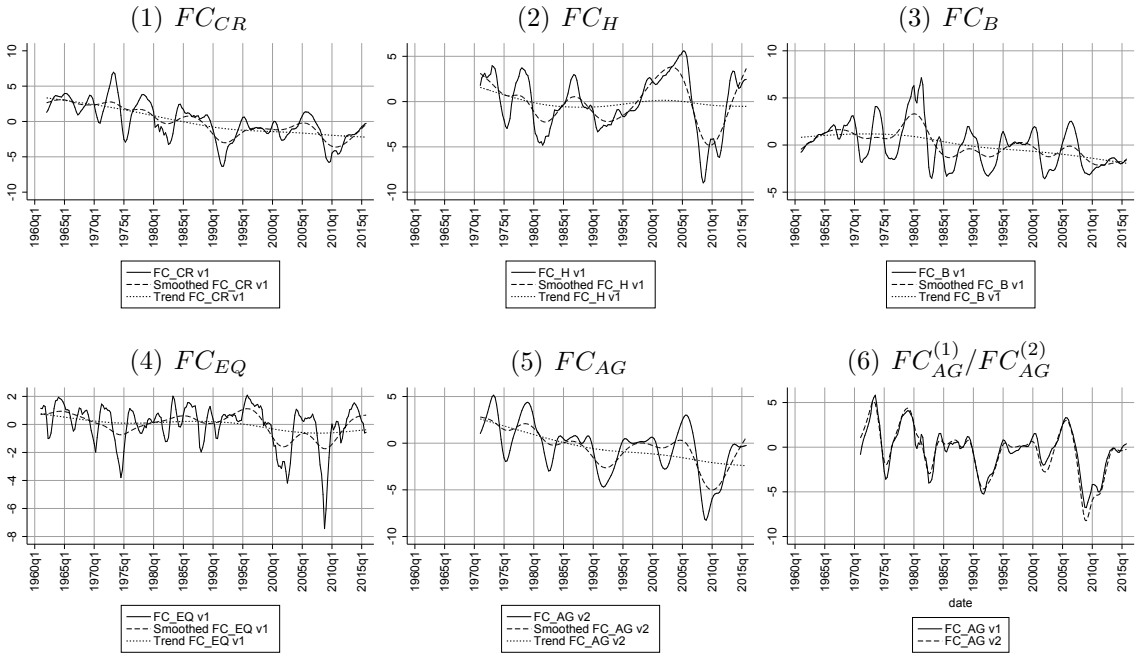


Figure 16: Financial cycles (Asia): AUS

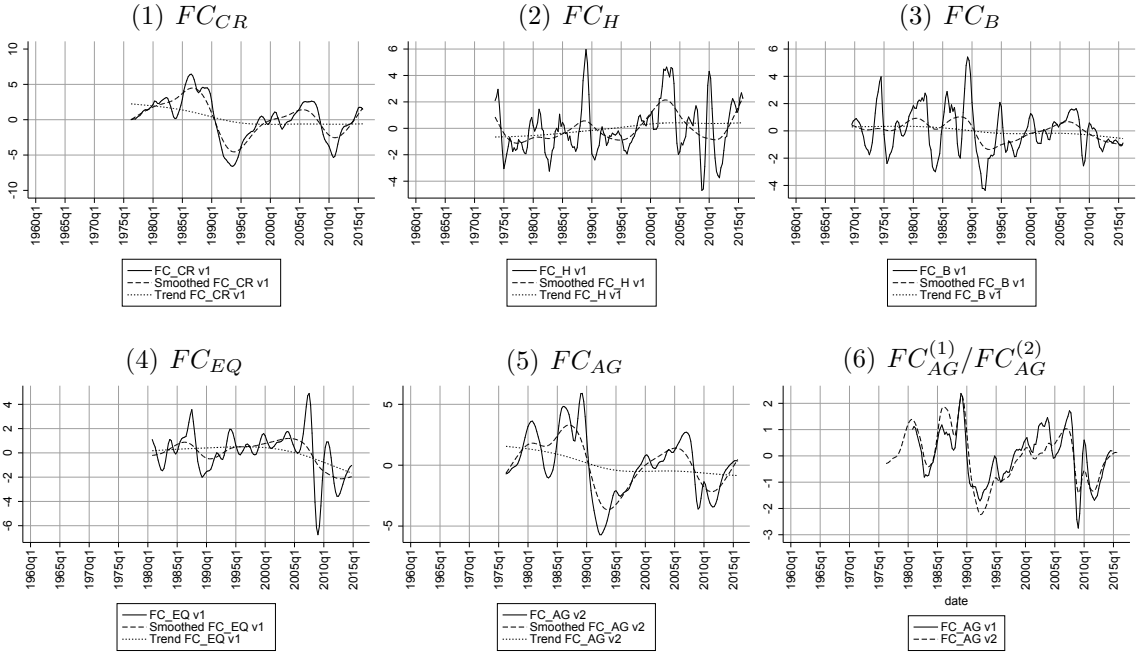


Figure 17: Financial cycles (Asia): CHN

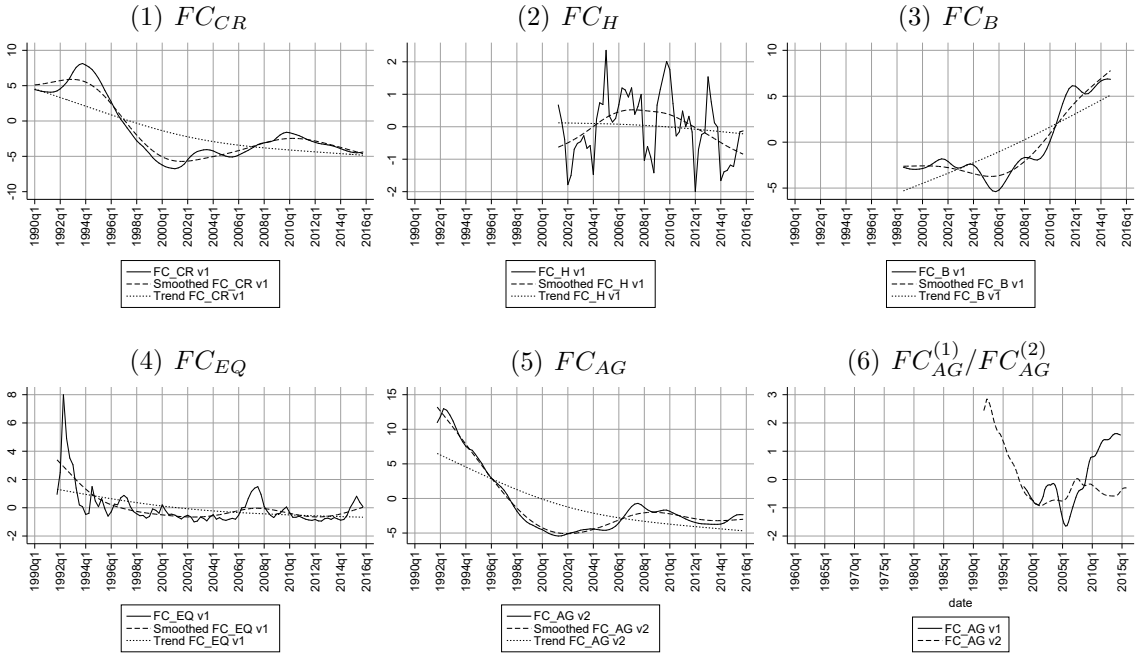


Figure 18: Financial cycles (Asia): IDN

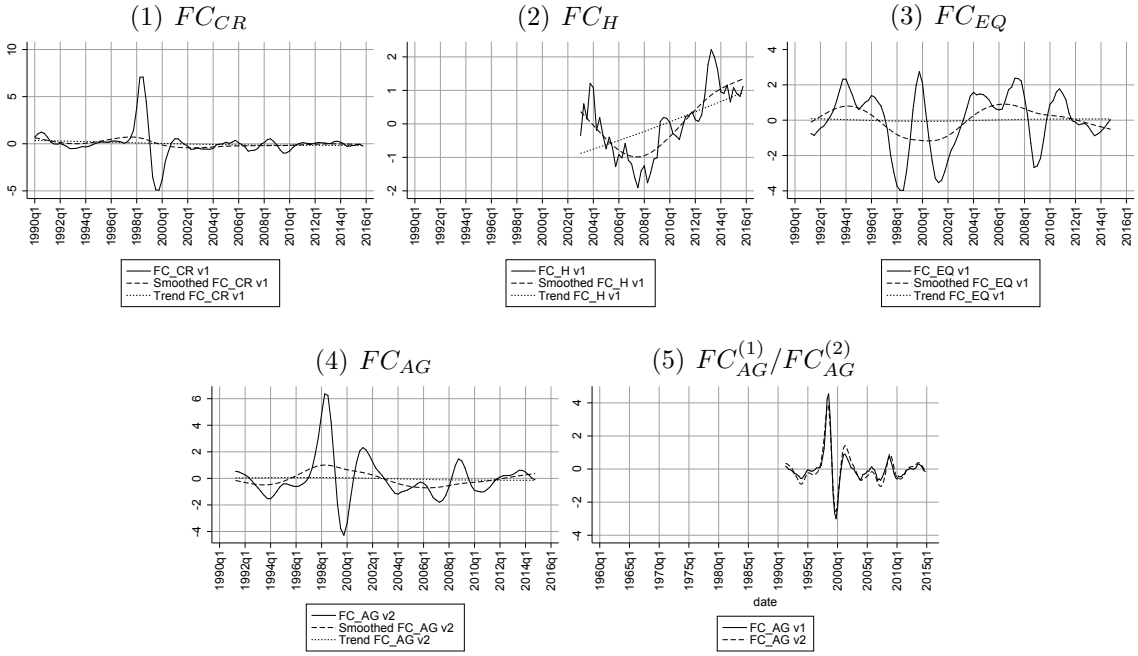


Figure 19: Financial cycles (Asia): JPN

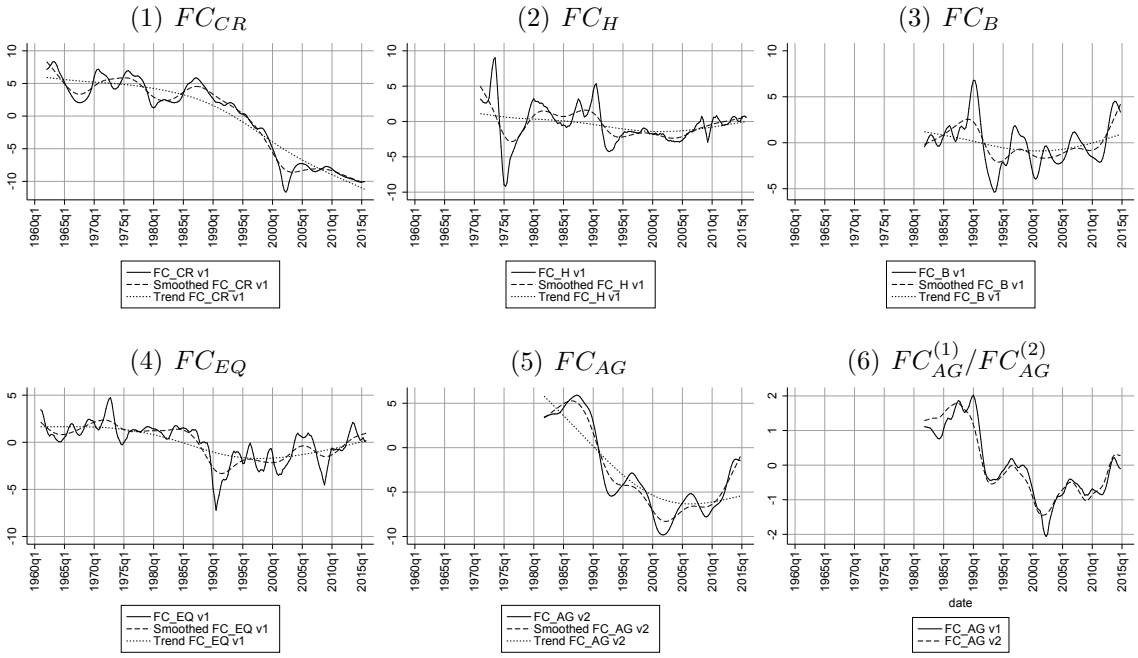


Figure 20: Financial cycles (Asia): KOR

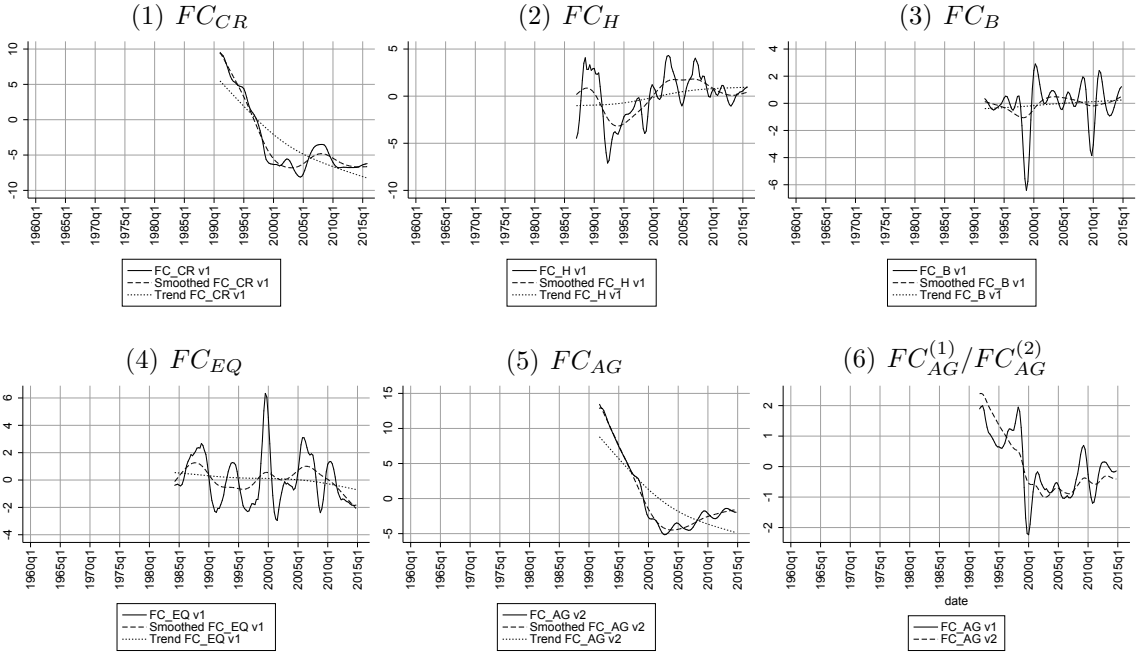


Figure 21: Financial cycles (Asia): MYS

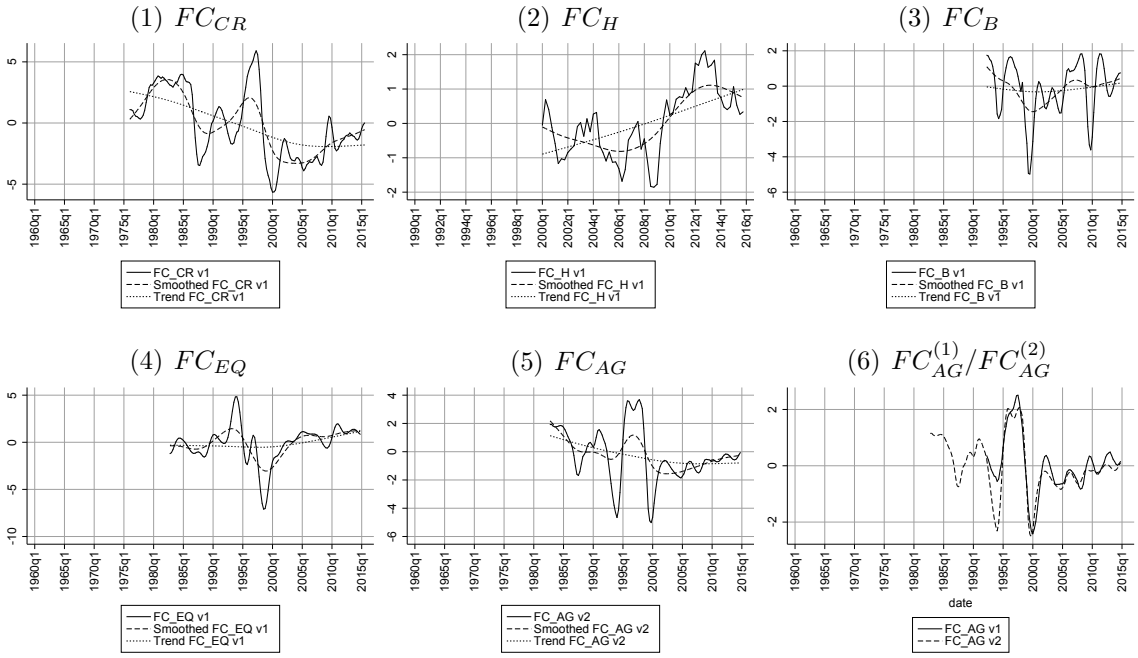


Figure 22: Financial cycles (Asia): PHL

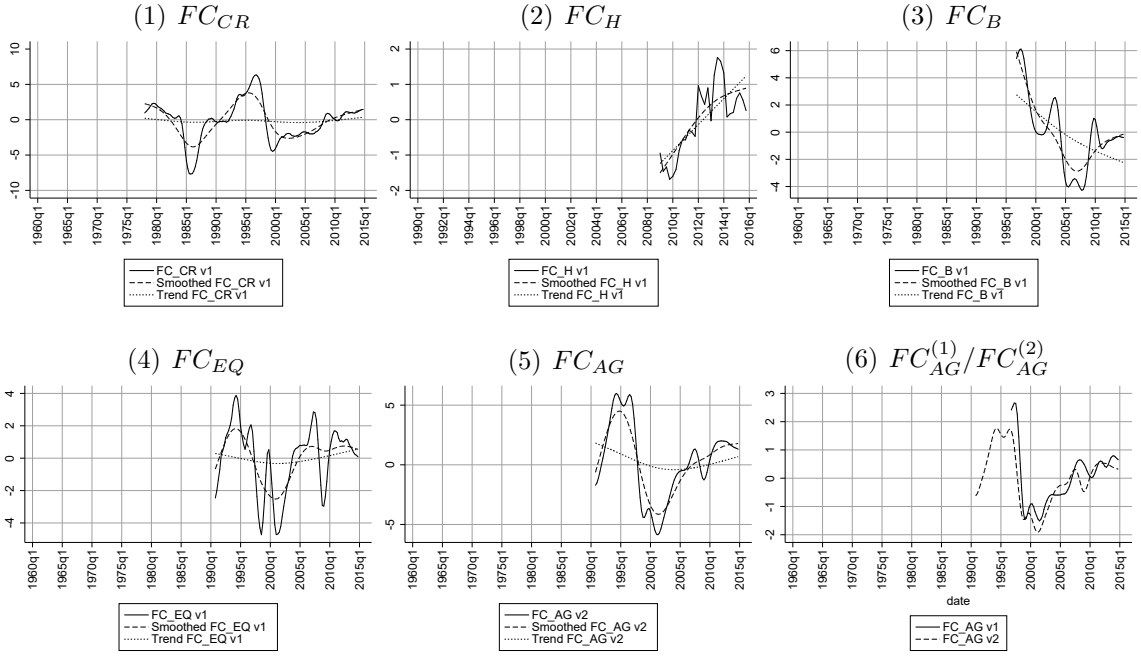


Figure 23: Financial cycles (Asia): SGP

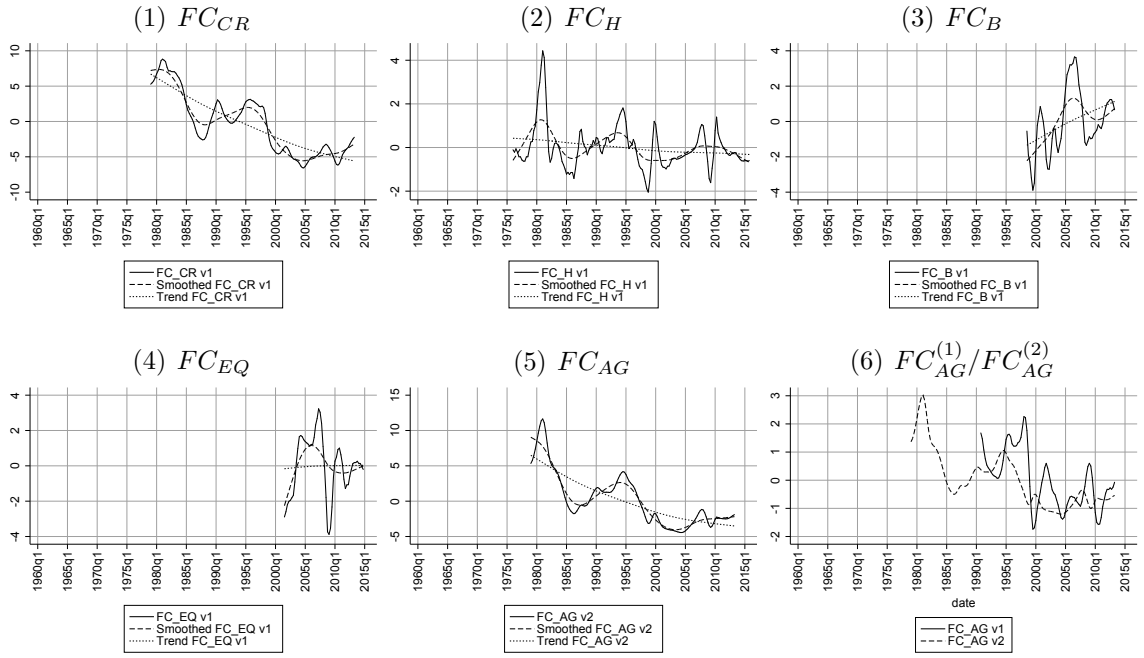


Figure 24: Financial cycles (Asia): THA

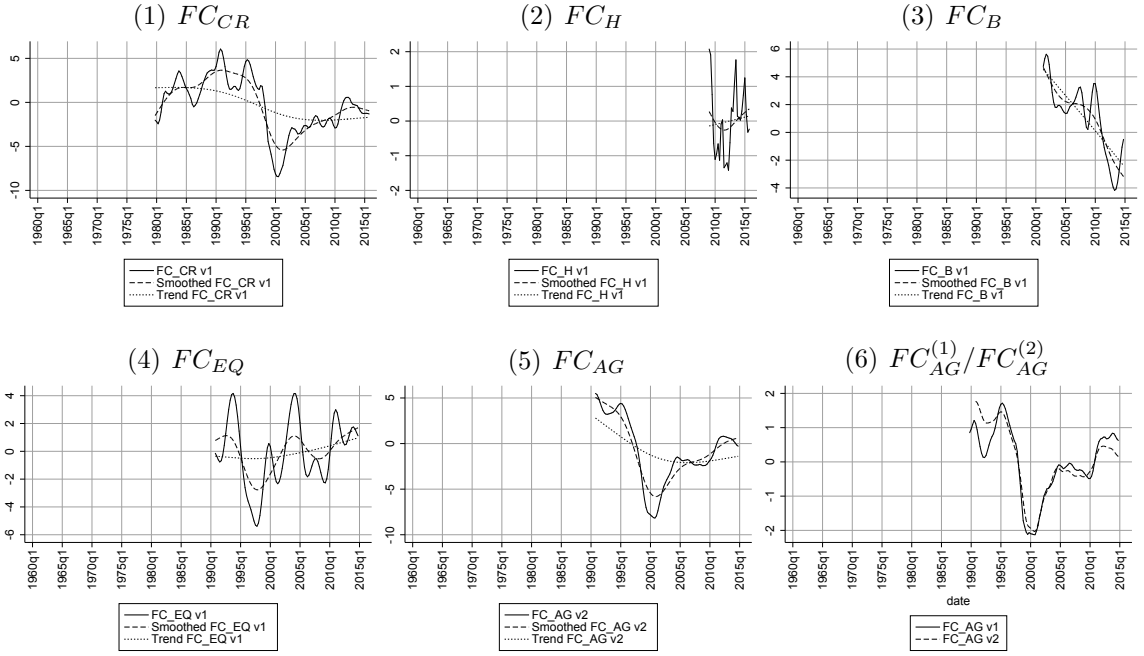


Figure 25: Financial cycles (Europe): AUT

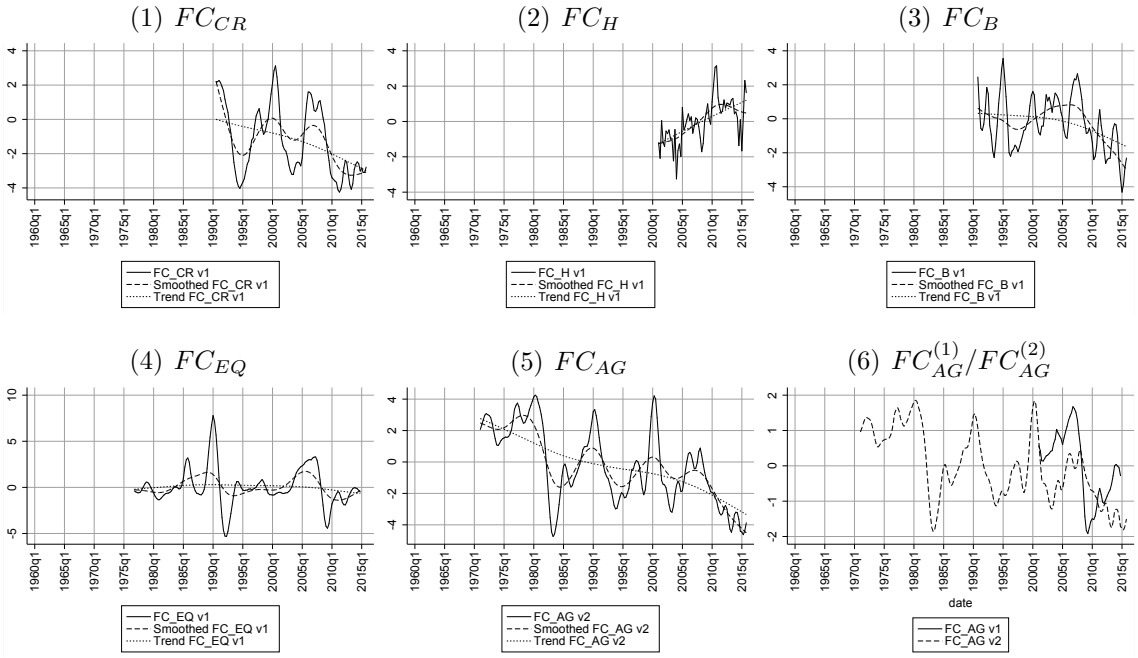


Figure 26: Financial cycles (Europe): BEL

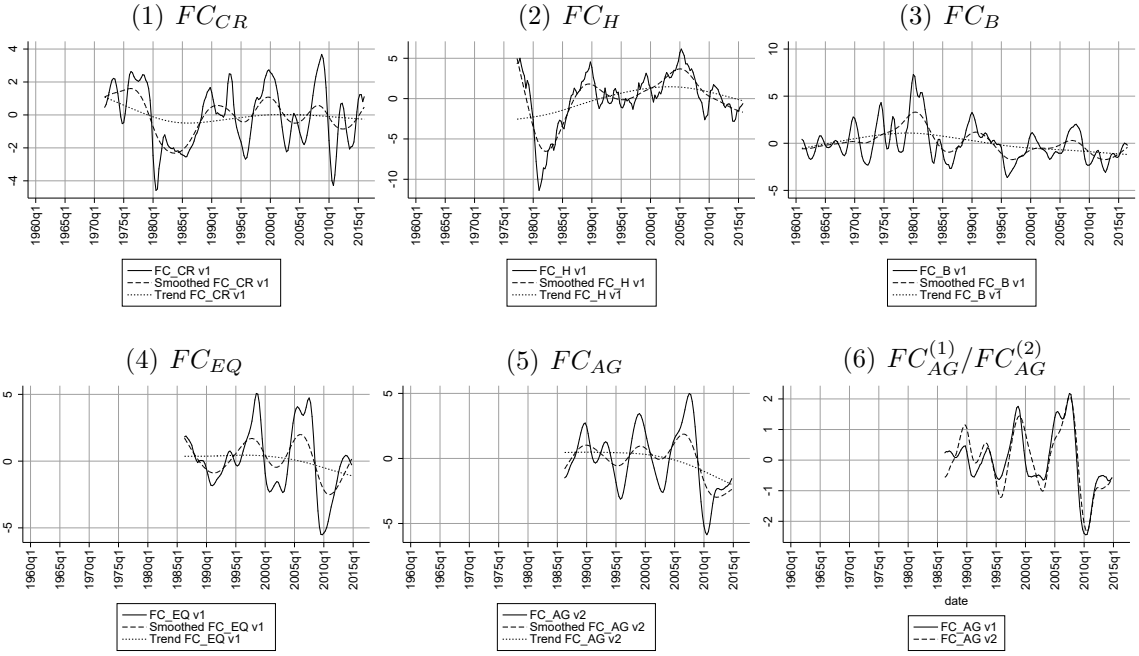


Figure 27: Financial cycles (Europe): CHE

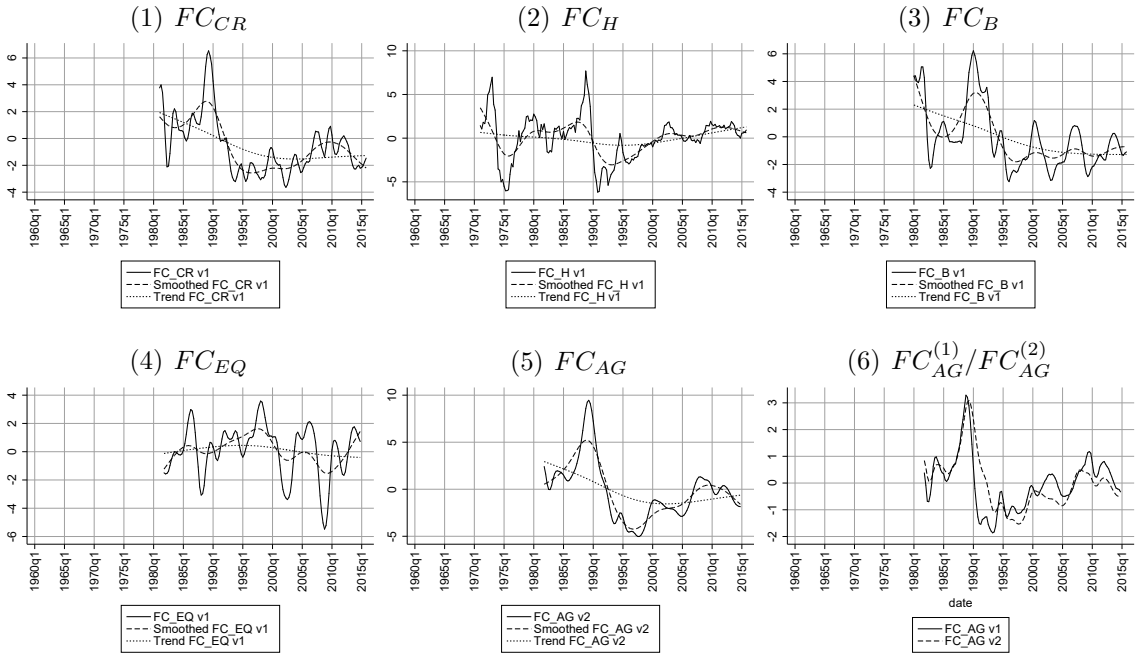


Figure 28: Financial cycles (Europe): CZE

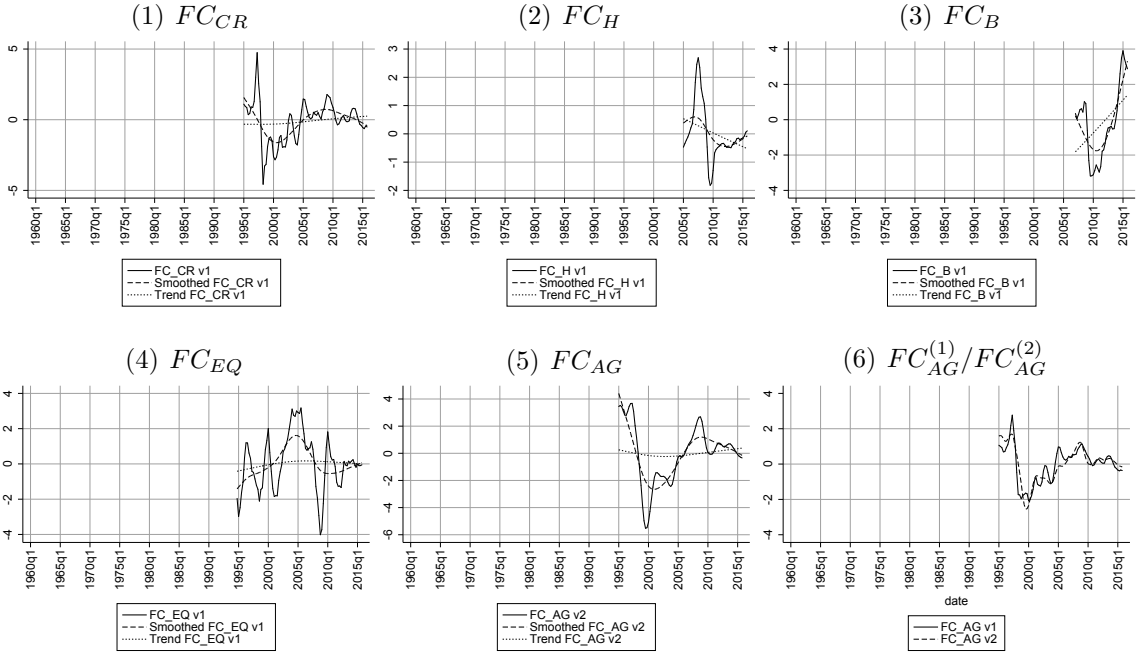


Figure 29: Financial cycles (Europe): DEU

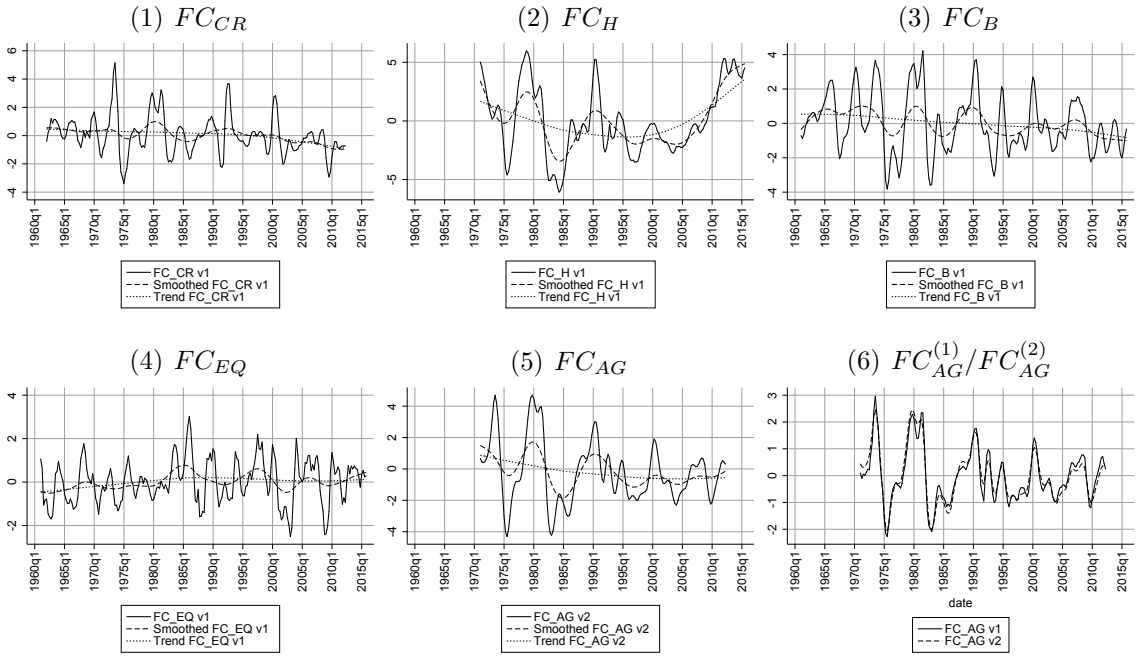


Figure 30: Financial cycles (Europe): ESP

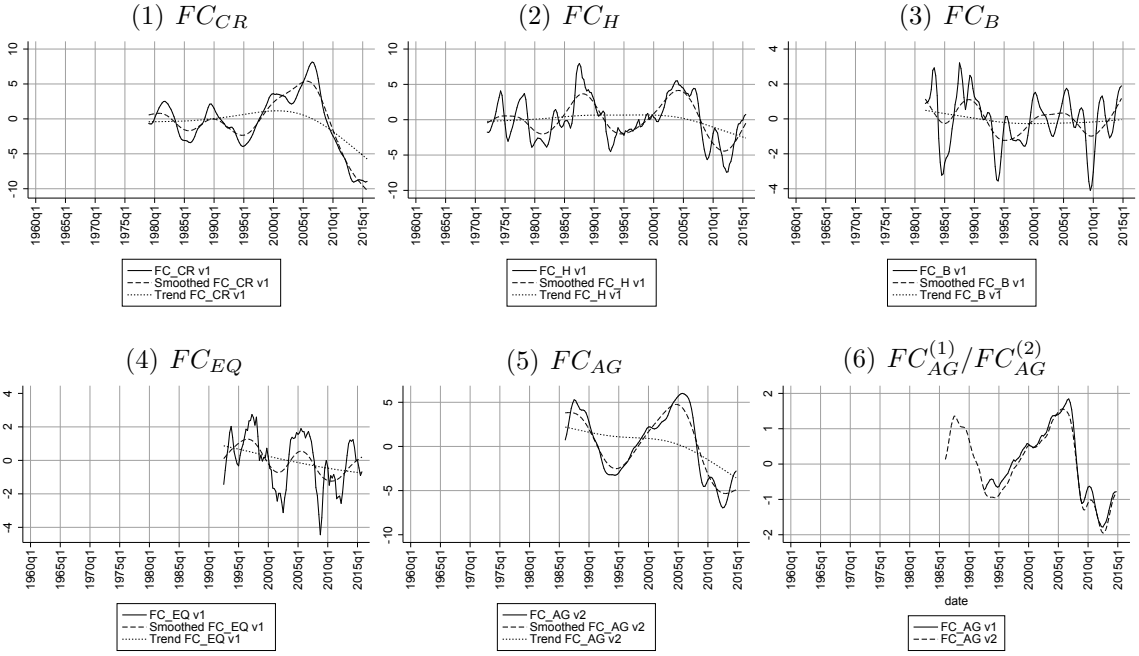


Figure 31: Financial cycles (Europe): EST

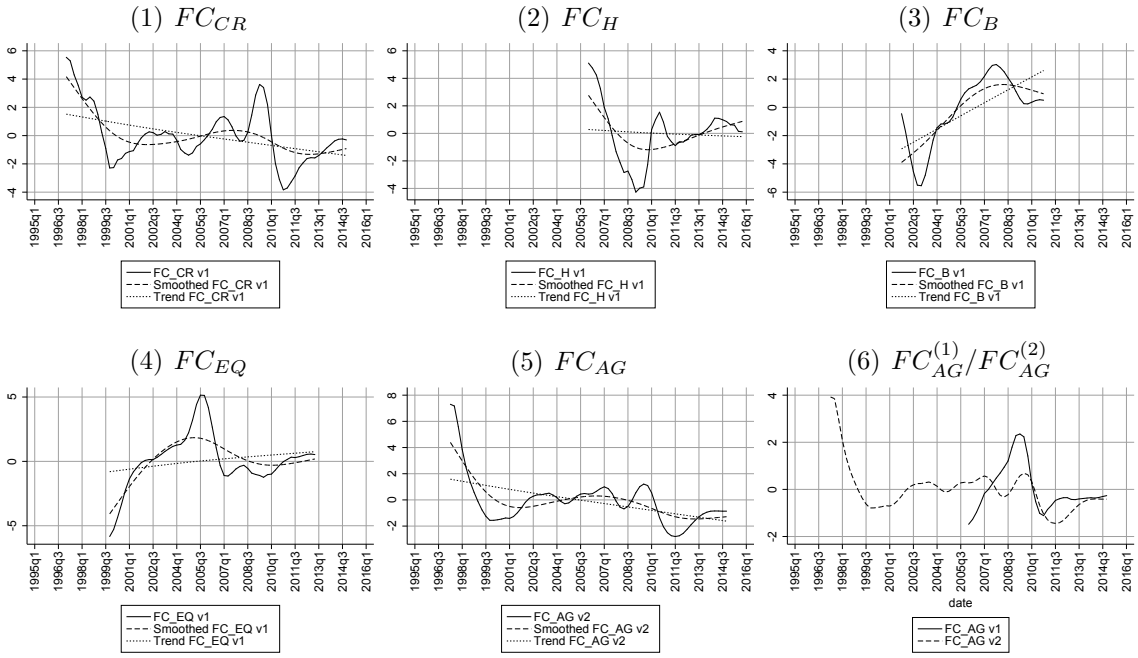


Figure 32: Financial cycles (Europe): FIN

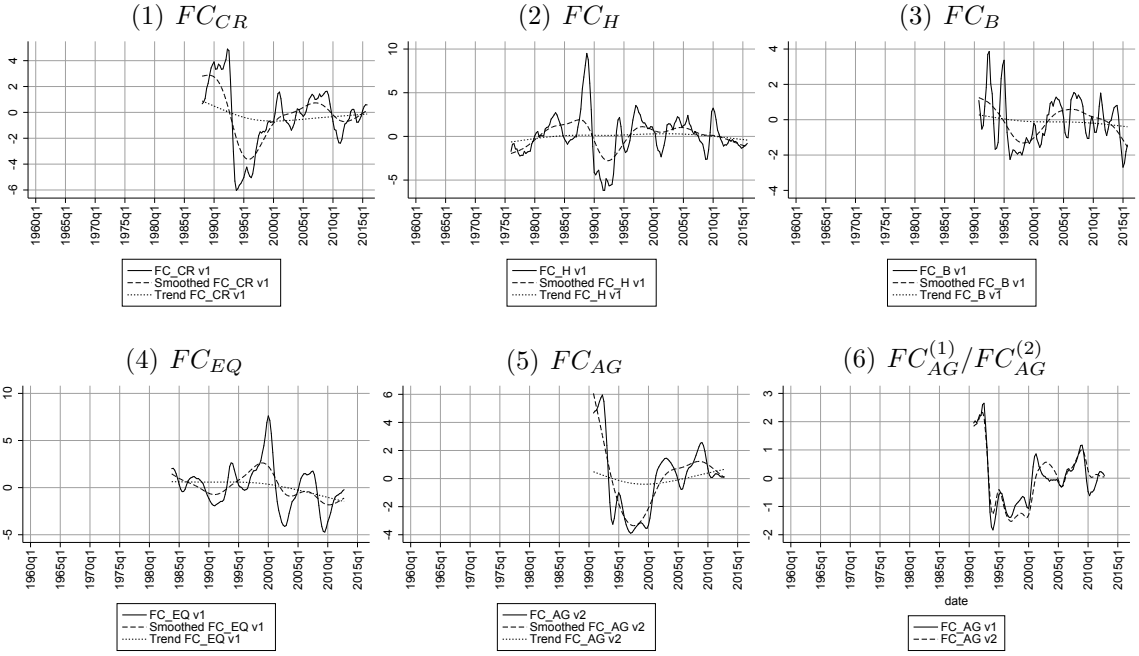


Figure 33: Financial cycles (Europe): FRA

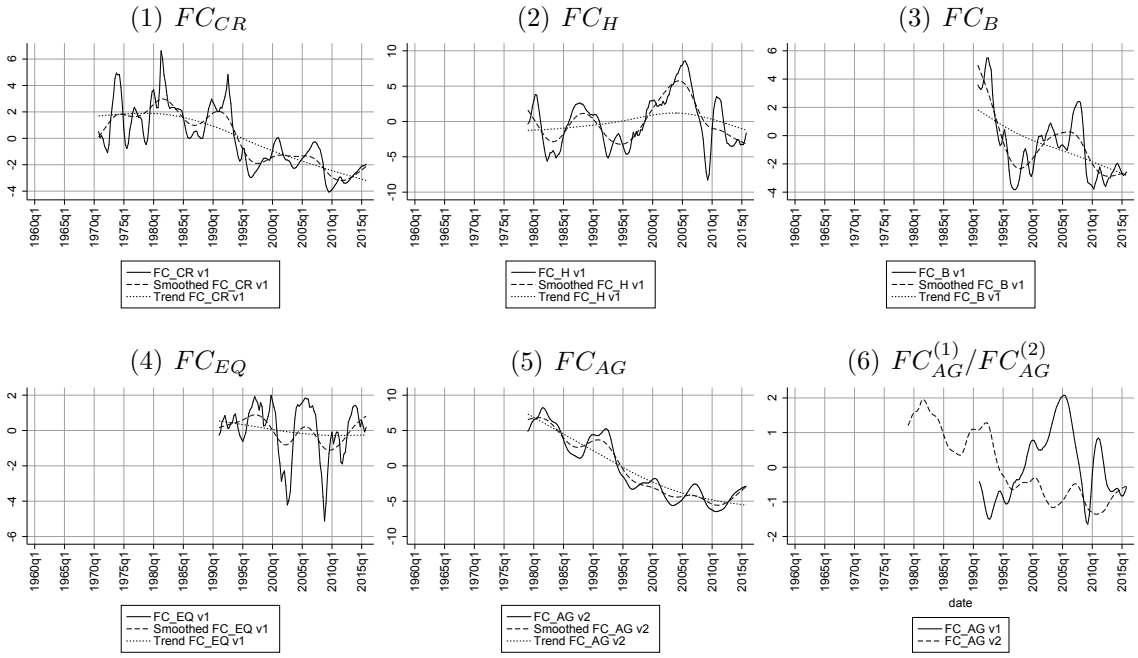


Figure 34: Financial cycles (Europe): GBR

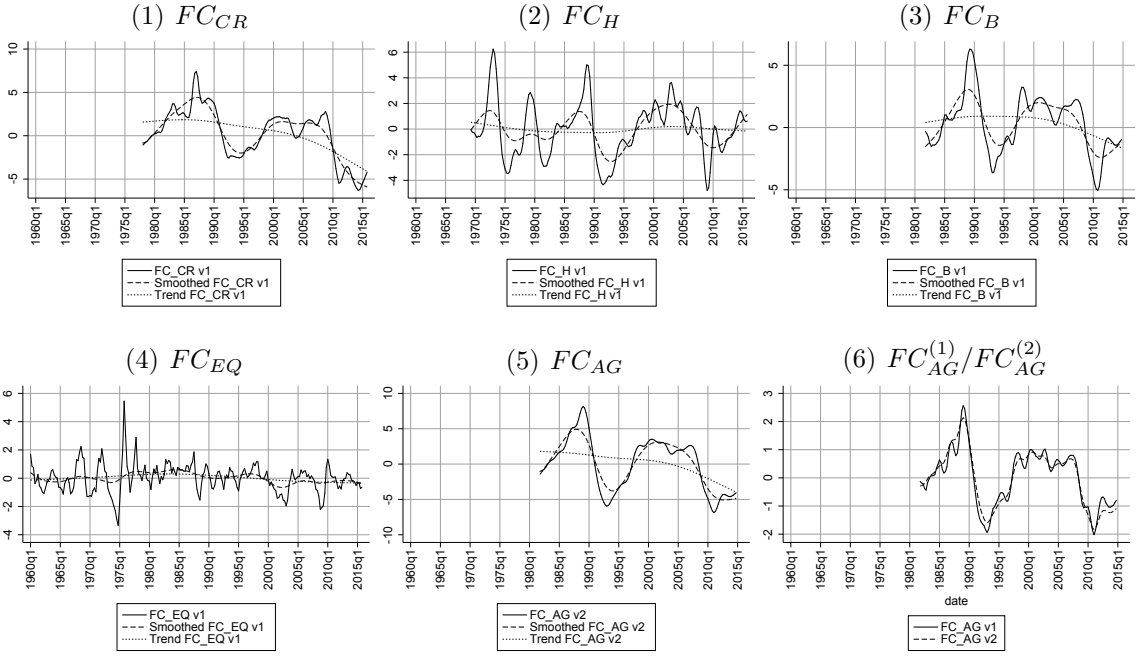


Figure 35: Financial cycles (Europe): HUN

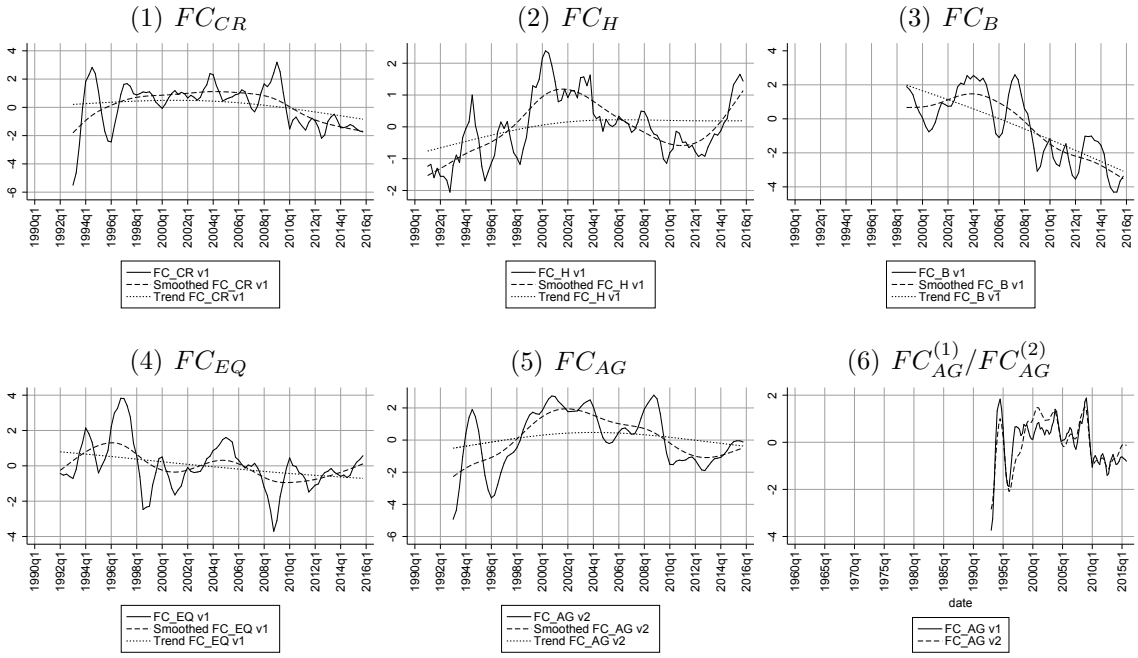


Figure 36: Financial cycles (Europe): ITA

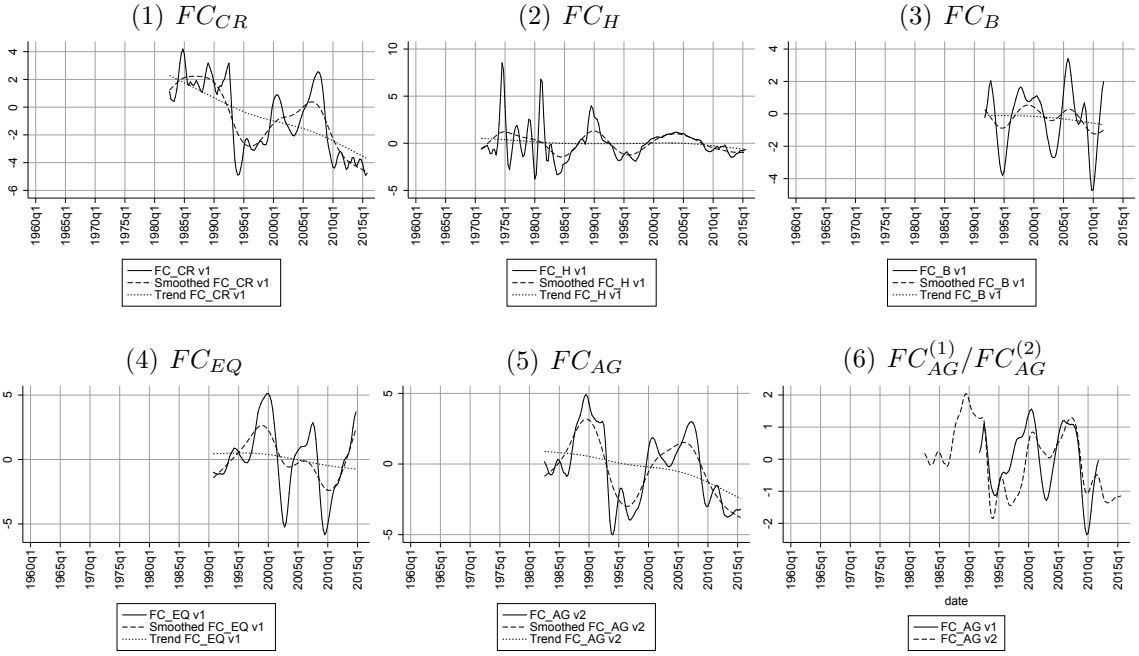


Figure 37: Financial cycles (Europe): LTU

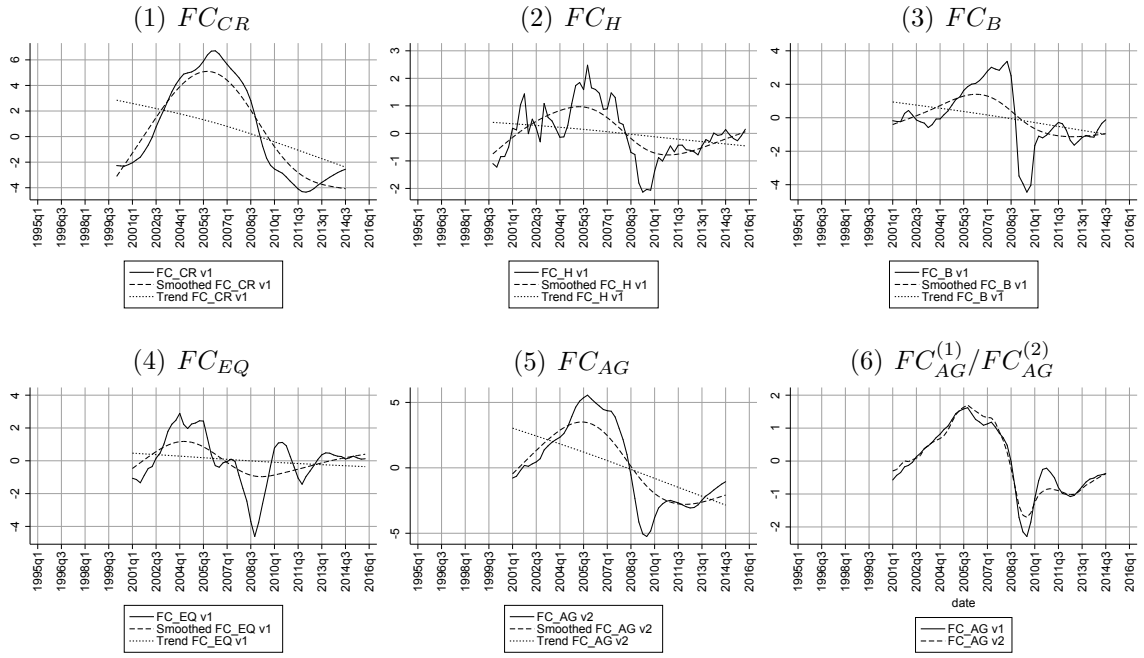


Figure 38: Financial cycles (Europe): LVA

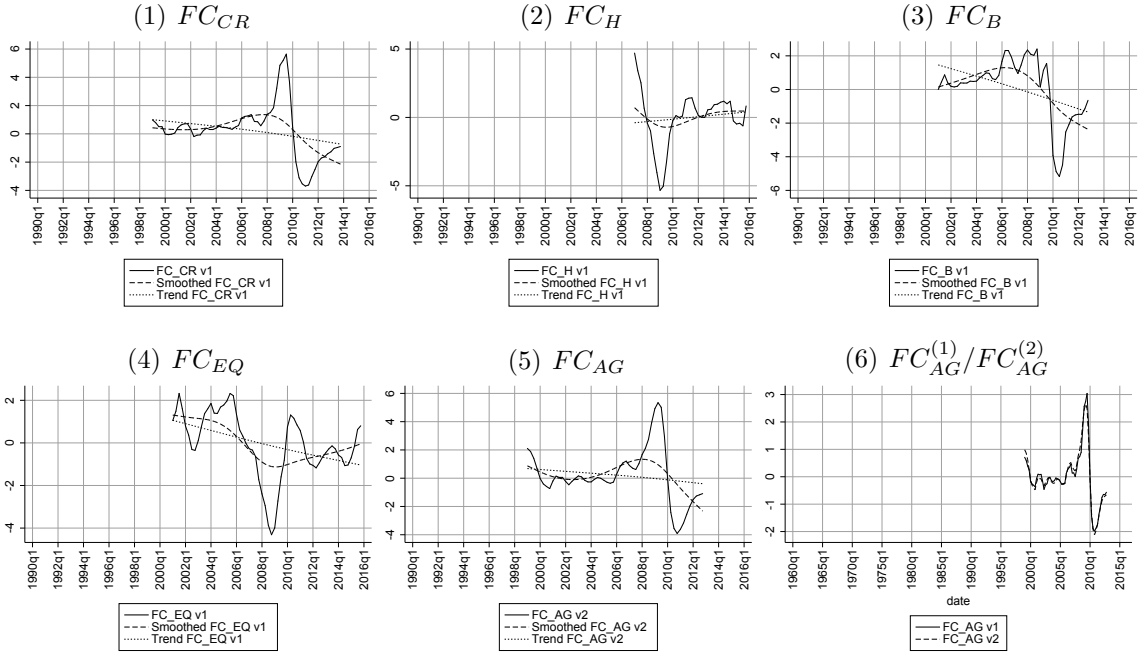


Figure 39: Financial cycles (Europe): NLD

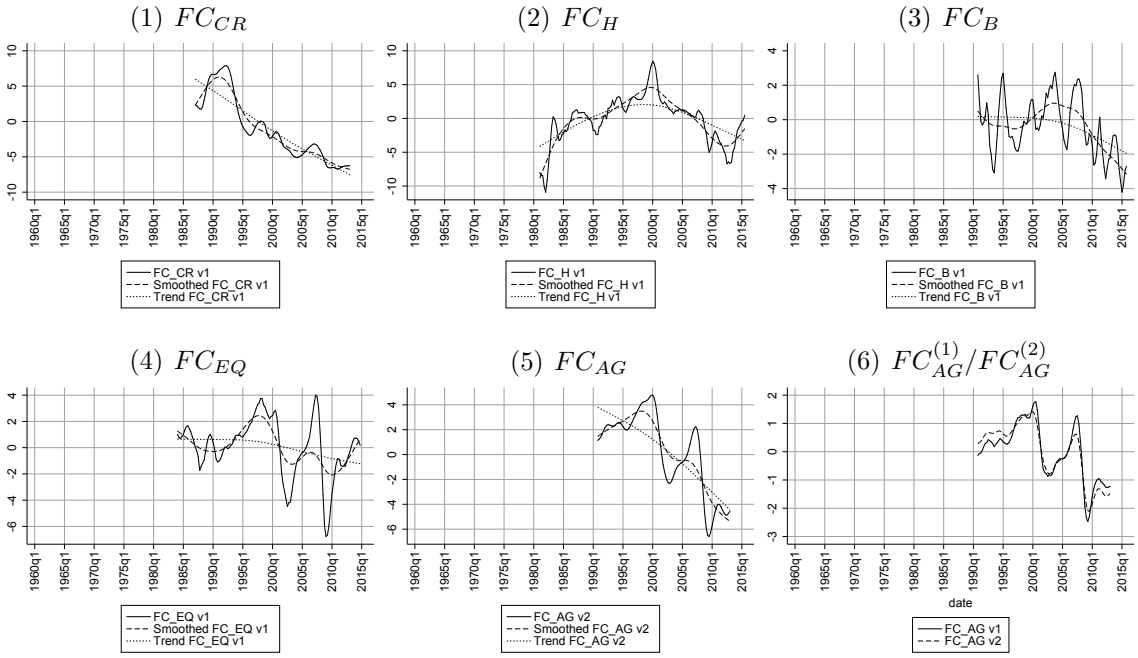


Figure 40: Financial cycles (Europe): NOR

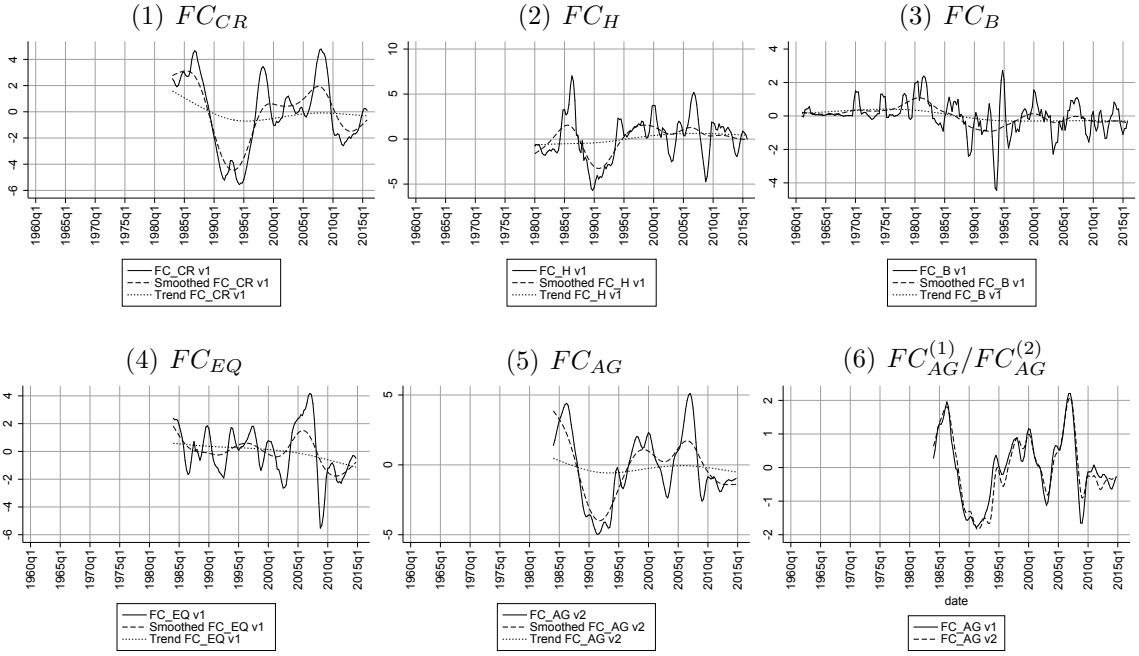


Figure 41: Financial cycles (Europe): POL

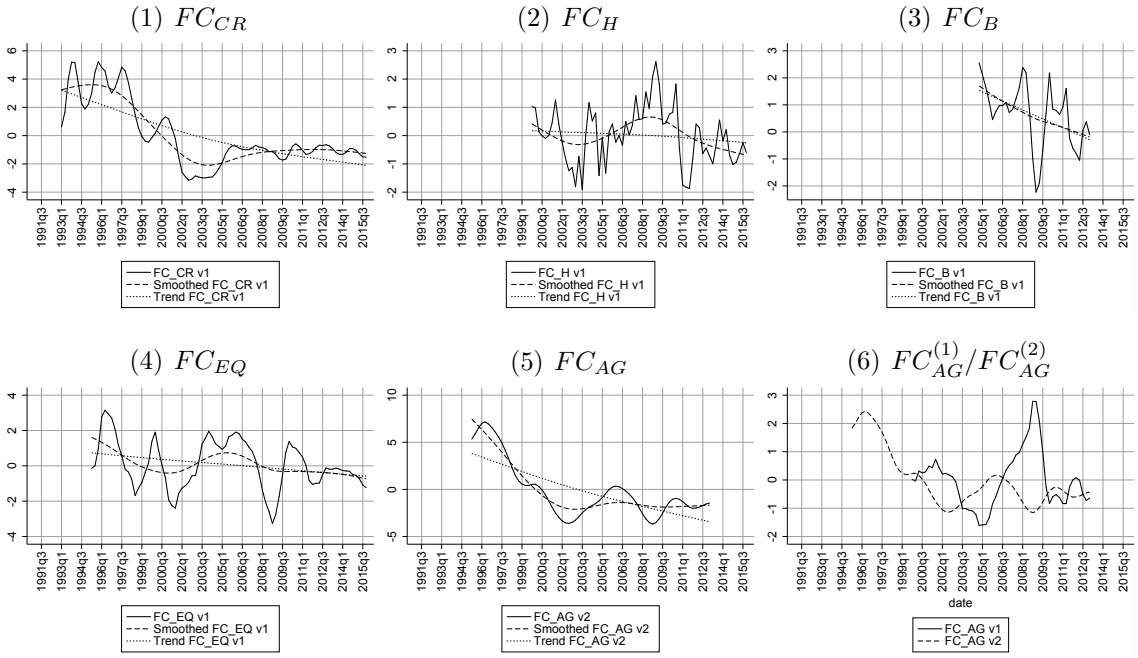


Figure 42: Financial cycles (Europe): RUS

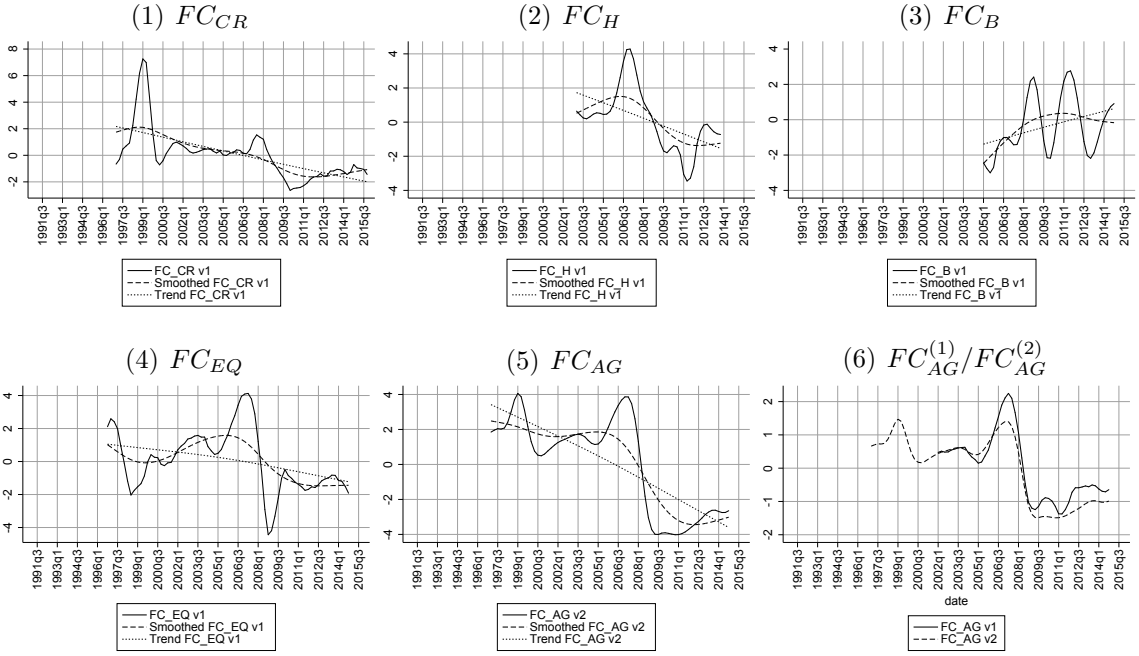


Figure 43: Financial cycles (Europe): SVK

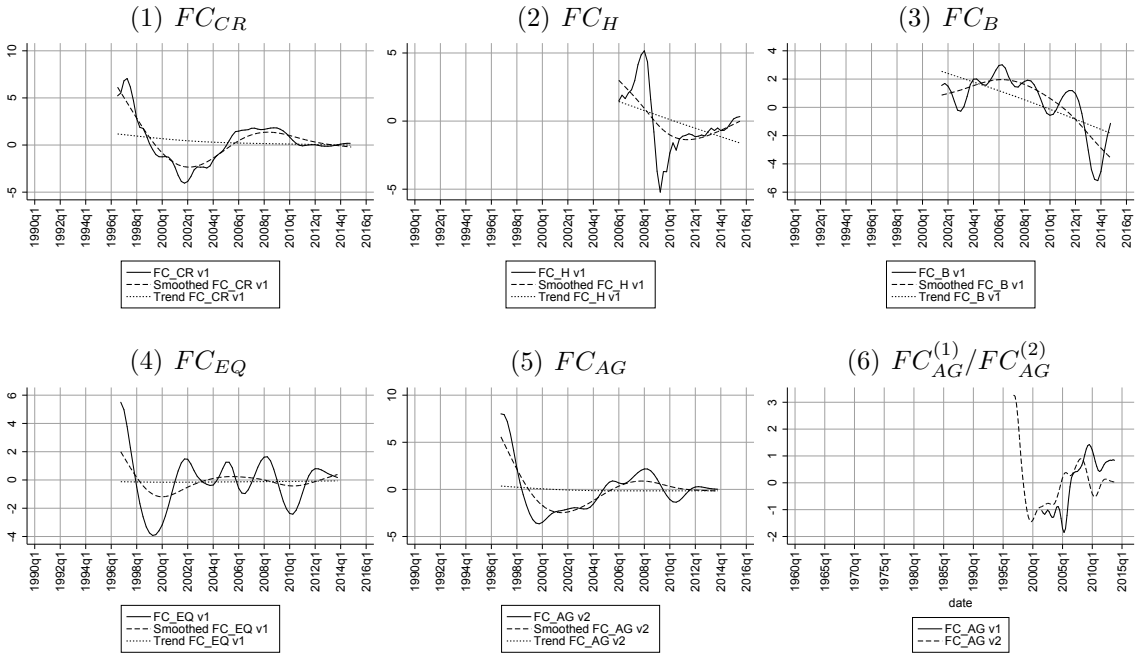
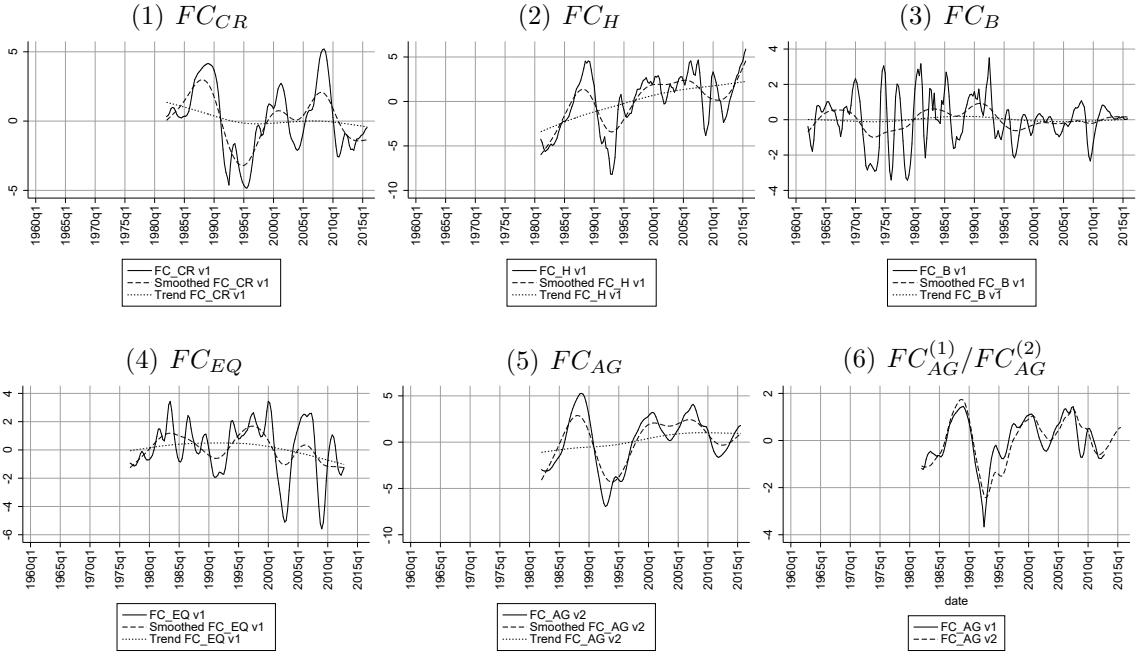


Figure 44: Financial cycles (Europe): SWE



Appendix C

Alternative versions of financial cycles, USA

The appendix includes figures with alternative versions of financial cycles (estimates, HP-smoothed cycles and trends) followed by tables with factor loadings and autoregressive coefficients from the associated dynamic factor models for the USA (other countries are reported in Adarov (2018)). The versions are denoted by superscripts (1)–(4). Financial market segments are indexed by superscripts CR, H, B, EQ.

Figure 45: Credit market financial cycles: USA

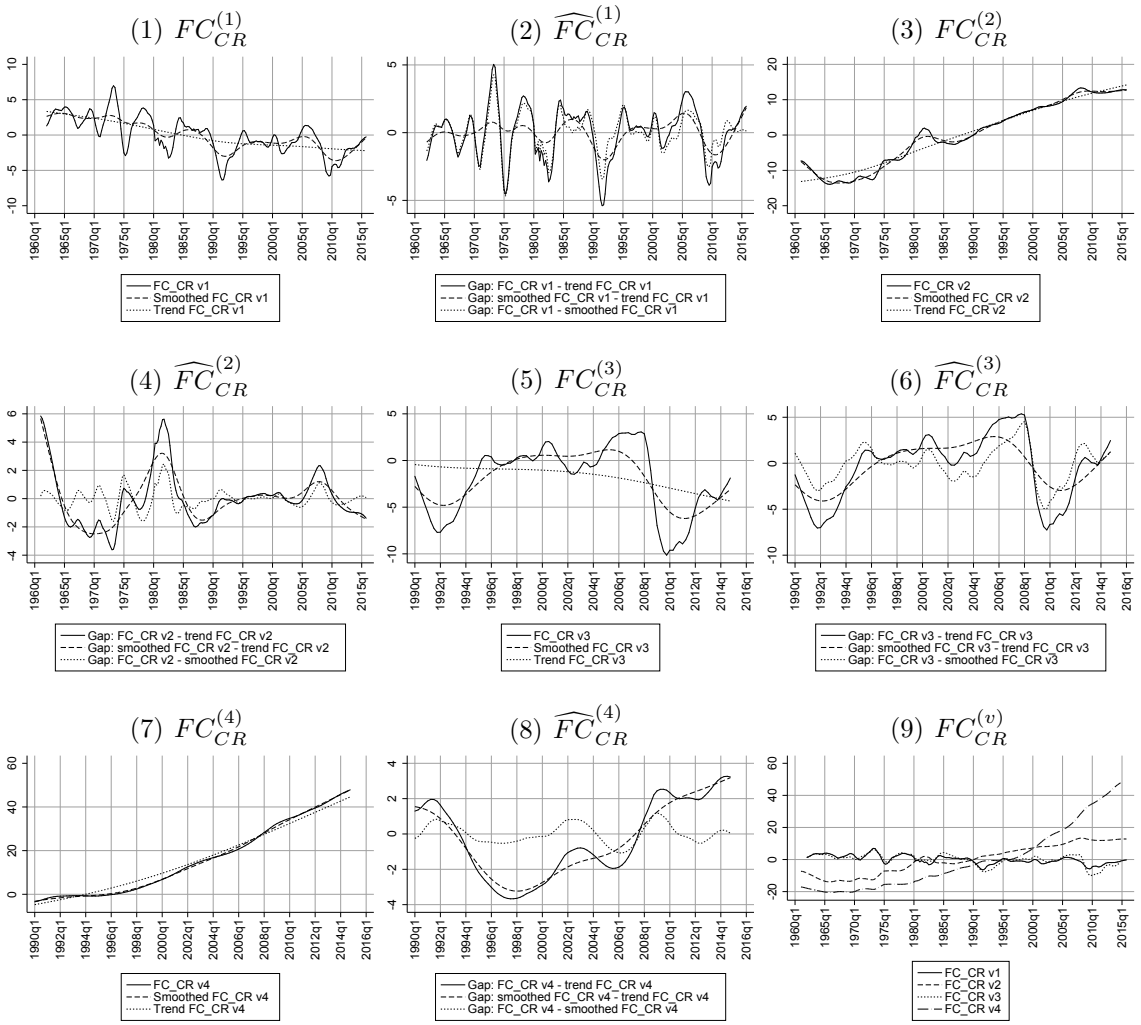


Figure 46: Housing market financial cycles: USA

Note: $FC_H^{(3)}$ is a standardized real housing price index.

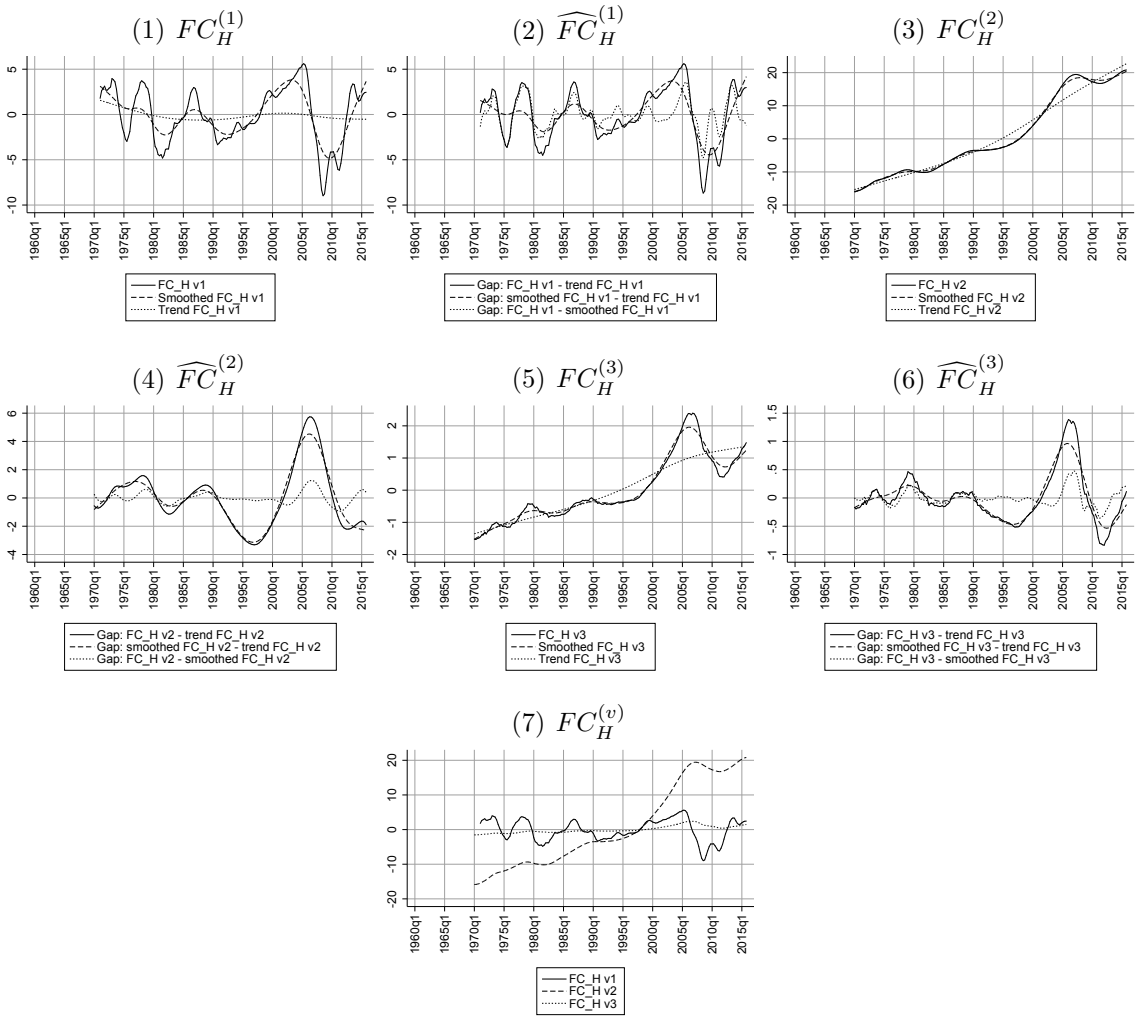


Figure 47: Bond market financial cycles: USA

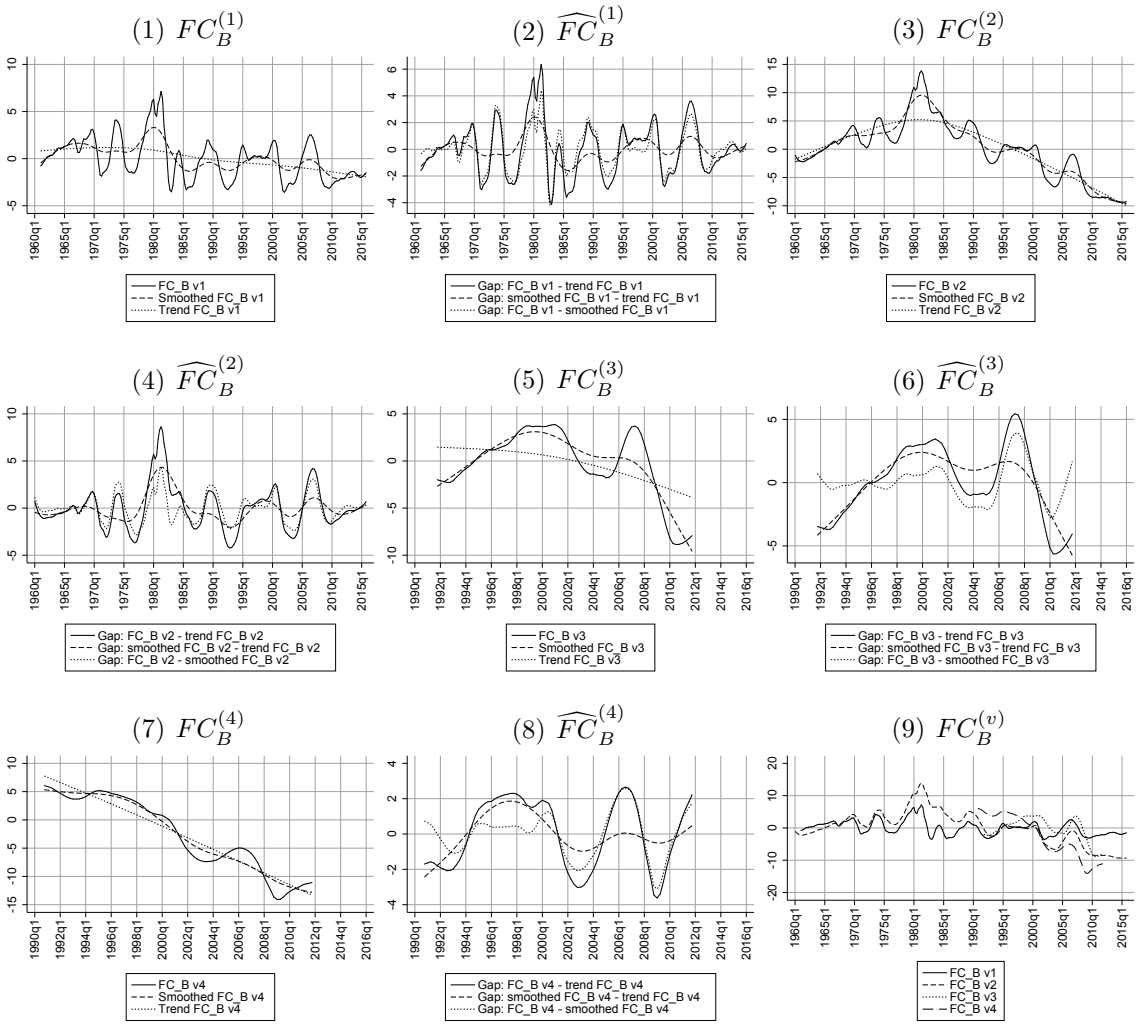


Figure 48: Equity market financial cycles: USA

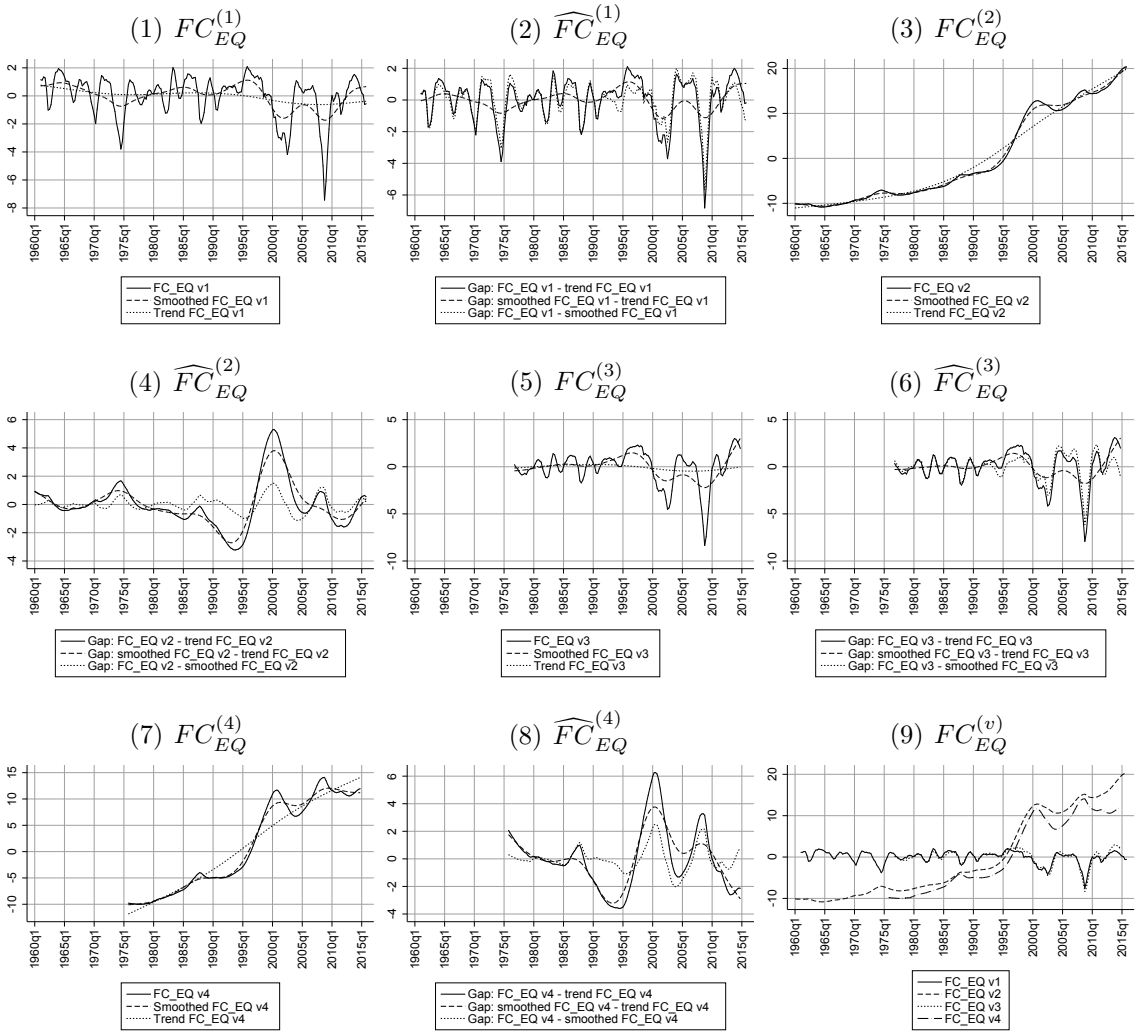


Table 38: Factor loadings, USA credit market cycles

The table shows factor loadings for the alternative versions of segment-specific financial cycles. F_{t-1} denotes the autoregressive coefficient of the financial cycle. **Attr** shows the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*. **Trans** reports the transformations of the input variables (*std*—standardization, Δyoy—year-on-year change, $std\%\Delta yoy$—year-on-year % change); **SE**—standard errors; *, **, ***—stat. significance at the 10, 5 and 1% levels.

USA $FC_{CR}^{(1)}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.93***	(0.02)		
Spread between lending interest rate and Federal funds rate	-0.25***	(0.03)	*std*	R
Spread between lending interest rate and government bond rate	-0.23***	(0.03)	*std*	R
Lending interest rate, % pa	0.13*	(0.07)	$std\Delta yoy$	P
Money market interest rate, % pa	0.16**	(0.07)	$std\Delta yoy$	P
Private credit by banks, LCU	0.32***	(0.04)	*stdyoy*	Q
Private credit by banks, % GDP	0.25***	(0.04)	$std\Delta yoy$	Q
USA $FC_{CR}^{(2)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	0.99***	(0.01)		
Lending interest rate, % pa	0.02	(0.03)	*std*	P
Money market interest rate, % pa	-0.02	(0.02)	*std*	P
Private credit by banks, USD	0.10***	(0.03)	*std*	Q
Private credit by banks, % GDP	0.01	(0.01)	*std*	Q
Spread between lending interest rate and Federal funds rate	0.08**	(0.03)	*std*	R
Spread between lending interest rate and government bond rate	0.09*	(0.04)	*std*	R
USA $FC_{CR}^{(3)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	0.96***	(0.01)		
Bank credit to bank deposits (%)	0.16***	(0.03)	$std\Delta yoy$	Q
Spread between lending interest rate and Federal funds rate	-0.14***	(0.02)	*std*	R
Spread between lending interest rate and government bond rate	-0.11***	(0.02)	*std*	R
Total credit to Households & NPISHs, % of GDP	0.13***	(0.03)	$std\Delta yoy$	Q
Total credit to NFCs, % of GDP	0.17***	(0.02)	$std\Delta yoy$	Q
Total credit to Households & NPISHs, LCU	0.22***	(0.03)	*stdyoy*	Q
Total credit to NFCs, LCU	0.24***	(0.02)	*stdyoy*	Q
Monetary Base, LCU	-0.11**	(0.05)	*stdyoy*	Q
Broad Money Liabilities, LCU	-0.01**	(0.01)	*stdyoy*	Q
Lending interest rate, % pa	0.06**	(0.03)	$std\Delta yoy$	P
Money market interest rate, % pa	0.08***	(0.03)	$std\Delta yoy$	P
M1	-0.10***	(0.03)	*stdyoy*	Q
M2	0.12***	(0.02)	*stdyoy*	Q
Ratio of Monetary Base to Broad Money, %	-0.17***	(0.04)	$std\Delta yoy$	Q
Private credit by banks, LCU	0.26***	(0.03)	*stdyoy*	Q
Deposit money banks' assets, % GDP	0.20***	(0.02)	$std\Delta yoy$	Q
Deposit money banks' assets, LCU	0.26***	(0.03)	*stdyoy*	Q
Financial system deposits, % GDP	0.07*	(0.04)	$std\Delta yoy$	Q
Financial system deposits, LCU	0.20***	(0.02)	*stdyoy*	Q
Private credit by banks, % GDP	0.23***	(0.03)	$std\Delta yoy$	Q
USA $FC_{CR}^{(4)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	1.01***	(0.00)		
Bank credit to bank deposits (%)	-0.03***	(0.00)	*std*	Q
Total credit to Households & NPISHs, % of GDP	0.05***	(0.00)	*std*	Q
Total credit to NFCs, % of GDP	0.04***	(0.00)	*std*	Q
Total credit to Households & NPISHs, LCU	0.05***	(0.00)	*std*	Q
Total credit to NFCs, LCU	0.05***	(0.00)	*std*	Q
CBS, Monetary Base, USD	0.04***	(0.00)	*std*	Q
DCS, Broad Money Liabilities, USD	0.05***	(0.00)	*std*	Q
Lending interest rate, % pa	-0.01	(0.00)	*std*	P
Money market interest rate, % pa	-0.02***	(0.00)	*std*	P
M1, USD	0.05***	(0.00)	*std*	Q
M2, USD	0.05***	(0.00)	*std*	Q
Ratio of Monetary Base to Broad Money, %	0.02***	(0.01)	*std*	Q
Private credit by banks, USD	0.05***	(0.00)	*std*	Q
Deposit money banks' assets, USD	0.05***	(0.00)	*std*	Q
Deposit money banks' assets, % GDP	-0.02***	(0.00)	*std*	Q
Financial system deposits, USD	0.05***	(0.00)	*std*	Q
Financial system deposits, % GDP	0.03***	(0.00)	*std*	Q
Private credit by banks, % GDP	0.00	(0.00)	*std*	Q
Spread between lending interest rate and Federal funds rate	0.03***	(0.00)	*std*	R
Spread between lending interest rate and government bond rate	0.03***	(0.00)	*std*	R

Table 39: Factor loadings, USA housing market cycles

The table shows factor loadings for the alternative versions of segment-specific financial cycles. F_{t-1} denotes the autoregressive coefficient of the financial cycle. **Attr** shows the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*. **Trans** reports the transformations of the input variables (*std*—standardization, Δyoy—year-on-year change, *std*%Δyoy—year-on-year % change); **SE**—standard errors; *, **, ***—stat. significance at the 10, 5 and 1% levels.

USA $FC_H^{(1)}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.95***	(0.02)		
Price to rent ratio	0.28***	(0.03)	*std*Δyoy	P
Price to income ratio	0.27***	(0.03)	*std*Δyoy	P
Real house price index, sa	0.30***	(0.02)	*stdyoy*	P
Multifamily Residential Mortgages, Assets, LCU	0.19***	(0.03)	*stdyoy*	Q
USA $FC_H^{(2)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	1.00***	(0.00)		
Multifamily Residential Mortgages, Assets, LCU	0.08***	(0.02)	*std*	Q
Price to rent ratio	0.03	(0.03)	*std*	P
Price to income ratio	-0.05***	(0.00)	*std*	P
Real house price index, sa	0.08***	(0.03)	*std*	P

Table 40: Factor loadings, USA equity market cycles

The table shows factor loadings for the alternative versions of segment-specific financial cycles. F_{t-1} denotes the autoregressive coefficient of the financial cycle. **Attr** shows the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk*. **Trans** reports the transformations of the input variables (*std*—standardization, Δyoy—year-on-year change, *std*%Δyoy—year-on-year % change); **SE**—standard errors; *, **, ***—stat. significance at the 10, 5 and 1% levels.

USA $FC_{EQ}^{(1)}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.81***	(0.05)		
Average daily stock market return	0.15***	(0.04)	*std*	P
Standard deviation of daily stock market returns	-0.39***	(0.05)	*std*	R
Average stock market index value	0.42***	(0.05)	*stdyoy*	P
USA $FC_{EQ}^{(2)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	1.00***	(0.00)		
Average daily stock market index value	0.09***	(0.01)	*std*	P
Average daily stock market return	-0.01	(0.01)	*std*	P
Standard deviation of daily stock market returns	0.04***	(0.01)	*std*	R
USA $FC_{EQ}^{(3)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	0.87***	(0.04)		
Stock market capitalization to GDP (%)	0.40***	(0.05)	*std*Δyoy	Q
Stock market turnover ratio (%)	-0.15***	(0.05)	*std*Δyoy	Q
Average daily stock market return	0.11***	(0.04)	*std*	P
Standard deviation of daily stock market returns	-0.32***	(0.05)	*std*	R
Average stock market index value	0.38***	(0.05)	*stdyoy*	P
USA $FC_{EQ}^{(4)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	1.00***	(0.00)		
Stock market capitalization to GDP (%)	0.11***	(0.01)	*std*	Q
Stock market turnover ratio (%)	0.10***	(0.01)	*std*	Q
Average daily stock market index value	0.11***	(0.01)	*std*	P
Average daily stock market return	-0.01	(0.01)	*std*	P
Standard deviation of daily stock market returns	0.05**	(0.02)	*std*	R

Table 41: Factor loadings, USA bond market cycles

The table shows factor loadings for the alternative versions of segment-specific financial cycles. F_{t-1} denotes the autoregressive coefficient of the financial cycle. **Attr** shows the market attribute the variable captures: *(P)rice, (Q)uantity, (R)isk.* **Trans** reports the transformations of the input variables (*std*—standardization, Δyoy—year-on-year change, *std*%Δyoy—year-on-year % change); **SE**—standard errors; *, **, ***—stat. significance at the 10, 5 and 1% levels.

USA $FC_B^{(1)}$	**Coef**	**SE**	**Trans**	**Attr**
F_{t-1}	0.90***	(0.04)		
10Y-3M government bond spread	-0.33***	(0.03)	*std*	R
Aaa-3M government bond spread	-0.31***	(0.03)	*std*	R
Moody's Seasoned Aaa Corporate Bond Yield	0.29***	(0.04)	*std*Δyoy	P
3-Month Treasury Bill: Secondary Market Rate	0.30***	(0.05)	*std*Δyoy	P
Nonfinancial corporate business; corporate bonds; liability, Level	-0.08	(0.06)	*stdyoy*	P
USA $FC_B^{(2)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	0.98***	(0.01)		
10Y-3M government bond spread	-0.09***	(0.02)	*std*	R
Aaa-3M government bond spread	-0.18***	(0.02)	*std*	R
Moody's Seasoned Aaa Corporate Bond Yield	0.15***	(0.01)	*std*	P
3-Month Treasury Bill: Secondary Market Rate	0.18***	(0.02)	*std*	P
Nonfinancial corporate business; corporate bonds; liability, Level	-0.14***	(0.01)	*std*	P
USA $FC_B^{(3)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	0.98***	(0.01)		
Outstanding domestic private debt securities to GDP (%)	0.22***	(0.03)	*std*Δyoy	Q
Outstanding domestic public debt securities to GDP (%)	-0.24***	(0.03)	*std*Δyoy	Q
Outstanding international private debt securities to GDP (%)	0.23***	(0.03)	*std*Δyoy	Q
Outstanding international public debt securities to GDP (%)	0.03	(0.02)	*std*Δyoy	Q
10Y-3M government bond spread	-0.18***	(0.04)	*std*	R
Aaa-3M government bond spread	-0.16***	(0.03)	*std*	R
Moody's Seasoned Baa Corporate Bond Yield	-0.05	(0.03)	*std*	P
International debt securities by all issuers, amt outstanding, mln USD	0.02***	(0.01)	*stdyoy*	Q
Debt securities by all issuers, amt outstanding, mln USD	0.16***	(0.03)	*stdyoy*	Q
Moody's Seasoned Aaa Corporate Bond Yield	0.04**	(0.02)	*std*Δyoy	P
Moody's Seasoned Baa Corporate Bond Yield Relative to Yield on 10-Year Treasury	0.09	(0.06)	*std*Δyoy	R
3-Month Treasury Bill: Secondary Market Rate	0.01	(0.03)	*std*Δyoy	P
Nonfinancial corporate business; corporate bonds; liability, Level	0.08***	(0.03)	*stdyoy*	P
USA $FC_B^{(4)}$	**Coef**	**SE**	**Trans**	**Attr**
$F_{(t-1)}$	0.99***	(0.00)		
Outstanding domestic private debt securities to GDP (%)	-0.12***	(0.02)	*std*	Q
Outstanding domestic public debt securities to GDP (%)	-0.03	(0.02)	*std*	Q
Outstanding international private debt securities to GDP (%)	-0.14***	(0.02)	*std*	Q
Outstanding international public debt securities to GDP (%)	-0.02*	(0.01)	*std*	Q
10Y-3M government bond spread	-0.05*	(0.03)	*std*	R
Aaa-3M government bond spread	-0.09***	(0.03)	*std*	R
International debt securities by all issuers, amt outstanding, mln USD	-0.15***	(0.02)	*std*	Q
Debt securities by all issuers, amt outstanding, mln USD	-0.09***	(0.01)	*std*	Q
Moody's Seasoned Aaa Corporate Bond Yield	0.07***	(0.01)	*std*	P
Moody's Seasoned Baa Corporate Bond Yield Relative to Yield on 10-Year Treasury	-0.09**	(0.04)	*std*	R
Moody's Seasoned Baa Corporate Bond Yield	-0.03	(0.03)	*std*	P
3-Month Treasury Bill: Secondary Market Rate	0.09***	(0.02)	*std*	P
Nonfinancial corporate business; corporate bonds; liability, Level	-0.10***	(0.02)	*std*	P

References

Adarov, Amat (2017) "Financial Cycles in Credit, Housing and Capital Markets: Evidence from Systemic Economies", wiiw Working Paper No. 140, December 2017.

Adarov, Amat (2018) "Estimation of Aggregate and Segment-specific Financial Cycles for a Global Sample of Countries", wiiw Statistical Report No. 7, April, 2018.

Adrian, Tobias and Hyun Song Shin (2010). "Liquidity and Leverage", Journal of Financial Intermediation, 19, pp. 418-437.

Aikman, D., Haldane, A. G. and Nelson, B. D. (2015). "Curbing the Credit Cycle." The Economic Journal, 125: 1072-1109. doi: 10.1111/ecoj.12113.

Aizenman, J., Chinn M. and Ito. H, (2015). "Monetary Policy Spillovers and the Trilemma in the New Normal: Periphery Country Sensitivity to Core Country Conditions", NBER Working Paper No. 21128, April 2015.

Angelopoulou, Eleni, Balfoussia, Hiona and Gibson, Heather D.,(2014). "Building a financial conditions index for the euro area and selected euro area countries: What does it tell us about the crisis?," Economic Modelling, Elsevier, vol. 38(C), pages 392-403.

Avouyi-Dovi, Sanvi and Matheron, Julien (2005). "Interactions between business cycles, financial cycles and monetary policy: stylised facts". p. 273-98 in Bank for International Settlements eds., Investigating the relationship between the financial and real economy, vol. 22, Bank for International Settlements

Backe Peter, Martin Feldkircher, and Tomas Slacik (2013). "Economic Spillovers from the Euro Area to the CESEE Region via the Financial Channel: A GVAR Approach" Focus on European Economic Integration, Austrian Central Bank, issue 4, pages 50-64.

Beck, Thorsten (2008). "The Econometrics of Finance and Growth", World Bank Policy Research Paper 4608 (Washington: World Bank).

Beck, Thorsten and Ross Levine (2004). "Stock Markets, Banks and Growth: Panel Evidence", Journal of Banking and Finance 28 (3): 423-42.

Beck Thorsten, Asl Demirgüç-Kunt and Ross Levine (2000). "A New Database on Financial Development and Structure", World Bank Economic Review 14, 597-605.

Beck, Thorsten, Ross Levine and Norman Loayza (2000). "Finance and the Sources of Growth", Journal of Financial Economics, Vol. 58, pp. 261-300.

Bekaert, Geert, Hoerova, Marie, and Lo Duca, Marco (2013). "Risk, uncertainty and monetary policy", Journal of Monetary Economics, Elsevier, vol. 60(7), pages 771-788.

Bernanke, B. and M. Gertler (1989). "Agency costs, net worth, and business fluctuations", American Economic Review, 79, 14-31.

Bernanke, Ben, Mark Gertler, and Simon Gilchrist (1999). "The Financial Accelerator in a Quantitative Business Cycle Framework", In Handbook of Macroeconomics. Vol. 1, ed. John B. Taylor and Michael Woodford, Chapter 21, 1341-1393. Elsevier.

Bernanke, Ben S. (2012). "The Great Moderation" Book Chapters, in: Evan F. Koenig and Robert Leeson and George A. Kahn (ed.), The Taylor Rule and the Transformation of Monetary Policy, chapter 6 Hoover Institution, Stanford University.

Borio Claudio (2013). "The Great Financial Crisis: Setting priorities for new statistics," Journal of Banking Regulation, Palgrave Macmillan, vol. 14(3-4), pages 306-317, July.

Borio Claudio (2014). "The financial cycle and macroeconomics: What have we learnt?" Journal of Banking and Finance, Elsevier, vol. 45(C), pages 182-198.

Borio Claudio, Frank Piti Disyatat, and Mikael Juselius (2013). "Rethinking potential output: Embedding information about the financial cycle," BIS Working Papers 404, Bank for International Settlements.

Borio Claudio, Piti Disyatat and Mikael Juselius (2014). "A parsimonious approach to incorporating economic information in measures of potential output," BIS Working Papers 442, Bank for International Settlements.

Brave Scott and R. Andrew Butters (2011). "Monitoring financial stability: a financial conditions index approach," Economic Perspectives, Federal Reserve Bank of Chicago, issue Q I, pages 22-43.

Brunnermeier, M. K. and Sannikov, Y. (2014). "A Macroeconomic Model with a Financial Sector", American Economic Review 104 (2), 379-421.

Bruno, Valentina and Shin, Hyun Song (2015). "Capital flows and the risk-taking channel of monetary policy", Journal of Monetary Economics, Elsevier, vol. 71(C), pages 119-132.

Bruno, Valentina and Shin, Hyun Song (2014). "Cross-Border Banking and Global Liquidity", (September 2014). BIS Working Paper No. 458.

Bry, Gerhard and Charlotte Boschan (1971). *Cyclical Analysis of Time Series: Procedures and Computer Programs*, New York, NBER.

Calvo, Guillermo A., Leonardo Leiderman, and Carmen Reinhart (1996). Capital Flows to Developing Countries in the 1990s: Causes and Effects, Journal of Economic Perspectives, vol. 10, Spring, pp. 123-139.

Cerutti, Eugenio, Claessens, Stijn and Rose, Andrew Kenan (2017). "How Important is the Global Financial Cycle? Evidence from Capital Flows", CEPR Discussion Paper No. DP12075, June 2017.

Christiano Lawrence J., Martin Eichenbaum and Charles L. Evans (2005). "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy", Journal of Political Economy, University of Chicago Press, vol. 113(1), pages 1-45, February.

Claessens, Stijn, Kose Ayhan and Marco E. Terrones (2011). "Financial cycles: What? How? When?", IMF Working Paper no WP/11/76.

Claessens, Stijn, Kose, M., Ayhan, and Terrones, Marco E. (2012). "How do business and financial cycles interact?," Journal of International Economics, Elsevier, vol. 87(1), pages 178-190.

Claessens, Stijn and Kose, Ayhan (2013) "Financial Crises Explanations, Types, and Implications," IMF Working Papers 13/28, International Monetary Fund.

Claessens, Stijn and Kose, Ayhan (2017). "Asset prices and macroeconomic outcomes: a survey," Policy Research Working Paper Series 8259, The World Bank.

Coimbra Nuno, Rey Hélène (2017). "Financial Cycles with Heterogeneous Intermediaries." Working Paper No. 23245 , National Bureau of Economic Research.

De Jong, P. (1988). The likelihood for a state space model. Biometrika 75: 165-169.

De Jong, P. (1991). The diffuse Kalman filter. Annals of Statistics 19: 1073-1083.

Dell'Arriccia, D Igan, L Laeven and H Tong (2012). "Policies for macrofinancial stability: How to deal with credit booms", IMF Discussion Note, April 2012.

Demetriades, P.O., and K.A. Hussein (1996). "Does Financial Development Cause Economic Growth? Time-series Evidence from 16 Countries", Journal of Development Economics 51(2), 387-411.

Demirgüç-Kunt, A. and R. Levine (1999). "Bank-Based and Market-Based Financial Systems: Cross-Country Comparisons", World Bank Working Paper No. 2143/

Demirgüç-Kunt, A, Erik Feyen and Ross Levine (2013). "The Evolving Importance of Banks and Securities Markets", World Bank Economic Review, World Bank Group, vol. 27(3), pages 476-490.

Drehmann Mathias, Claudio Borio, and Kostas Tsatsaronis (2012). "Characterising the financial cycle: don't lose sight of the medium term!," BIS Working Papers 380, Bank for International Settlements.

Eichengreen, Barry and Richard Portes (1987). "The Anatomy of Financial Crises", in Richard Portes and Alexander Swoboda, eds., Threats to International Financial Stability, Cambridge University Press.

Eickmeier, Sandra, Gambacorta, Leonardo and Hofmann, Boris, 2014. "Understanding global liquidity," European Economic Review, Elsevier, vol. 68(C), pages 1-18.

English William, Kostas Tsatsaronis and Edda Zoli (2005). "Assessing the predictive power of measures of financial conditions for macroeconomic variables" BIS Papers chapters, in: Bank for International Settlements (ed.), Investigating the relationship between the financial and real economy, volume 22, pages 228-52 Bank for International Settlements.

Forbes, Kristin J. and Francis E. Warnock (2012). "Capital Flow Waves: Surges, Stops, Flight and Retrenchment',' Journal of International Economics 88(2): 235–251.

Gerko Elena and Hélène Rey (2017). "Monetary Policy in the Capitals of Capital," Journal of the European Economic Association, Volume 15, Issue 4, 1 August 2017, pages 721–745.

Geweke, J. (1977). "The dynamic factor analysis of economic time series", in D.J. Aigner, and A.S. Goldberger (eds.), Latent Variables in SocioEconomic Models, Amsterdam: North-Holland.

Goldsmith, R.W. (1969). "Financial Structure and Development". Yale University Press, New Haven.

Goodhart, Charles (2008). "House Prices, Money, Credit, and the Macroeconomy". Oxford Review of Economic Policy, Vol. 24, Issue 1, pp. 180-205, 2008.

Grintzalis, Ioannis, Lodge, David and Manu, Ana-Simona, 2017. "The implications of global and domestic credit cycles for emerging market economies: measures of finance-adjusted output gaps", Working Paper Series 2034, European Central Bank.

Hamilton, James D. (1994), Time Series Analysis, Princeton University Press, Princeton.

Harding, D and A Pagan (2002). "Dissecting the cycle: a methodological investigation", Journal of Monetary Economics, vol 49, pp 365-81.

Hatzius, J, P Hooper, F Mishkin, K Schoenholtz and M Watson (2010). "Financial conditions indexes: a fresh look after the financial crisis", NBER Working Papers, no 16150.

Jones Bradley (2014). "Identifying Speculative Bubbles; A Two-Pillar Surveillance Framework" IMF Working Papers 14/208, International Monetary Fund.

Jones Bradley (2015). Asset Bubbles: Re-thinking Policy for the Age of Asset Management. IMF Working Paper No. 15/27, 2015.

Juselius Mikael, Claudio Borio, Piti Disyatat, Mathias Drehmann, 2017. "Monetary Policy, the Financial Cycle, and Ultra-Low Interest Rates,"International Journal of Central Banking, International Journal of Central Banking, vol. 13(3), pages 55-89, September.

Kaminsky, G. L. and Reinhart, C. M. 1999. The Twin Crises: The Causes of Banking and Balance-of-Payments Problems. American Economic Review, 89(3), 473-500.

Kindleberger, C. P. (1978). "Manias, Panics, and Crashes: A History of Financial Crises". Basic Books.

King, Robert and Ross Levine (1993). "Finance and Growth: Schumpeter Might Be Right." Quarterly Journal of Economics, August, 153 (3): 717-738.

Kiyotaki, N. and J. Moore (1997). "Credit cycles." Journal of Political Economy, 105, 211-248.

Laeven Luc and Fabian Valencia (2013). "Systemic Banking Crises Database," IMF Economic Review, Palgrave Macmillan;International Monetary Fund, vol. 61(2), pages 225-270, June.

Levine, R. (1997). "Financial Development and Economic Growth: Views and Agenda," Journal of Economic Literature, Vol. 35(2), pp. 688-726.

Levine, R and S Zervos (1998). "Stock markets, banks and economic growth," American Economic Review, vol 88, pp 537-58.

Levine, Ross (2002). "Bank-Based or Market-Based Financial Systems: Which Is Better?", Journal of Financial Intermediation, Elsevier, vol. 11(4), pages 398-428, October.

McKinnon, R.I. (1973). "Money and Capital in Economic Development. Brookings Institution", Washington, DC.

Minsky, Hyman P. (1978). "The Financial Instability Hypothesis: A Restatement". Hyman P. Minsky Archive. Paper 180

Minsky, Hyman P. (1982). "Can it happen again?", Essays on Instability and Finance, Armonk: M E Sharpe.

Miranda-Agrippino Silvia and Hélène Rey, 2015. World Asset Markets and the Global Financial Cycle, NBER Working Papers 21722, National Bureau of Economic Research, Inc.

Nier Erlend, Tahsin Saadi Sedik, and Tomas Mondino (2014). "Gross Private Capital Flows to Emerging Markets: Can the Global Financial Cycle Be Tamed?" IMF Working Paper No. 14/196.

Nowotny Ewald, Doris Ritzberger-Grünwald and Peter Backe (ed.), 2014. "Financial Cycles and the Real Economy", Books, Edward Elgar, number 15914.

Obstfeld, Maurice (2012). "Financial Flows, Financial Crises, and Global Imbalances", Journal of International Money and Finance, vol. 31, pp. 469-480.

Obstfeld, Maurice and Kenneth Rogoff (2010). "Global Imbalances and the Financial Crisis: Products of Common Causes", in Reuven Glick and Mark M. Spiegel, eds., Asia and the Global Financial Crisis, Federal Reserve Bank of San Francisco.

Reinhart, Carmen M., and Vincent R. Reinhart (2009). "Capital Flow Bonanzas: An Encompassing View of the Past and Present", in Jeffrey A. Frankel and Christopher Pissarides, eds., International Seminar on Macroeconomics 2008. Chicago: University of Chicago Press.

Reinhart, Carmen M., and Kenneth S. Rogoff (2009). "The Aftermath of Financial Crises." American Economic Review, 99(2): 466-72.

Reinhart, Carmen M., and Kenneth S. Rogoff (2011). "From Financial Crash to Debt Crisis." American Economic Review, 101(5), 1676-1706.

Reinhart Carmen M., and Kenneth S. Rogoff (2014). "Recovery from Financial Crises: Evidence from 100 Episodes." American Economic Review, American Economic Association, vol. 104(5), pages 50-55, May.

Rey Hélène (2015). "Dilemma not Trilemma: The global Financial Cycle and Monetary Policy Independence". NBER Working Paper No. 21162, 2015.

Rousseau, Peter L. and Paul Wachtel (2011). "What is Happening to the Impact of Financial Deepening on Economic Growth?" Economic Inquiry, Vol. 49, No.1, pp. 276-288.

Sargent, T.J., and Sims, C.A. (1977). "Business cycle modeling without pretending to have too much a priory economic theory", in C.A. Sims (ed.), New Methods in Business Cycle Research, Minneapolis: Federal Reserve Bank of Minneapolis.

Schumpeter, J.A. (1911). "The Theory of Economic Development". Harvard University Press, Cambridge, MA.
Schularick, Moritz and Alan M. Taylor (2012). "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870-2008." American Economic Review 102, 1029-61.
Schüler, Yves S., Hiebert, Paul and Peltonen, Tuomas A. (2015). "Characterising the financial cycle: a multivariate and time-varying approach" Working Paper Series 1846, European Central Bank.
Shaw, E.S. (1973). "Financial Deepening in Economic Development" Oxford University Press, London.
Stock, J.H., and Watson, M.W. (2011). "Dynamic factor models", in M.P. Clements, and D.F. Hendry (eds.), The Oxford Handbook of Economic Forecasting, Oxford: Oxford University Press.
Stremmel, Hanno (2015). "Capturing the financial cycle in Europe", Working Paper Series 1811, European Central Bank.
Strohsal, T., Proano, C. R., and Wolters, J. (2015). "Characterizing the financial cycle: Evidence from a frequency domain analysis," SFB Discussion Paper 2015-21.
Voutilainen, Ville. "Wavelet Decomposition of the Financial Cycle: An Early Warning System for Financial Tsunamis" (May 31, 2017). Bank of Finland Research Discussion Paper No. 11/2017.
Woodford, Michael (2010). "Financial Intermediation and Macroeconomic Analysis", Journal of Economic Perspectives, 24(4): 21-44.

WIIW WORKING PAPERS PUBLISHED SINCE 2015

For current updates and summaries see also wiiw's website at www.wiiw.ac.at

No. 145 Amat Adarov: Financial Cycles Around the World, March 2018

No. 144 Mario Holzner: Corporatism and the Labour Income Share. Econometric Investigation into the Impact of Institutions on the Wage Share of Industrialised Nations, March 2018

No. 143 Claudius Gräbner, Philipp Heimberger, Jakob Kapeller, Bernhard Schütz: Structural Change in Times of Increasing Openness: Assessing Path Dependency in European Economic Integration, March 2018

No. 142 Loredana Fattorini, Mahdi Ghodsi and Armando Rungi: Cohesion Policy Meets Heterogeneous Firms, March 2018

No. 141 Neil Foster-McGregor, Michael Landesmann and Isilda Mara: Migration and FDI Flows, March 2018

No. 140 Amat Adarov: Financial Cycles in Credit, Housing and Capital Markets: Evidence from Systemic Economies, December 2017

No. 139 Eddy Bekkers, Michael Landesmann and Indre Macskasi: Trade in Services versus Trade in Manufactures: The Relation between the Role of Tacit Knowledge, the Scope for Catch-up, and Income Elasticity, December 2017

No. 138 Roman Stöllinger: Global Value Chains and Structural Upgrading, September 2017

No. 137 Stefan Jestl, Mathias Moser and Anna K. Raggl: Can't Keep Up with the Joneses: How Relative Deprivation Pushes Internal Migration in Austria, September 2017

No. 136 Claudius Gräbner, Philipp Heimberger, Jakob Kapeller and Bernhard Schütz: Is Europe Disintegrating? Macroeconomic Divergence, Structural Polarisation, Trade and Fragility, September 2017

No. 135 Mahdi Ghodsi and Robert Stehrer: EU Trade Regulations and Imports of Hygienic Poultry, April 2017

No. 134 Roman Stöllinger: Tradability of Output and the Current Account: An Empirical Investigation for Europe, January 2017

No. 133 Tomislav Globan: Financial Supply Index and Financial Supply Cycles in New EU Member States, December 2016

No. 132 Mahdi Ghodsi, Julia Grübler and Robert Stehrer: Import Demand Elasticities Revisited, November 2016

No. 131 Leon Podkaminer: Has Trade Been Driving Global Economic Growth?, October 2016

No. 130 Philipp Heimberger: Did Fiscal Consolidation Cause the Double-Dip Recession in the Euro Area?, October 2016

No. 129 Julia Grübler, Mahdi Ghodsi and Robert Stehrer: Estimating Importer-Specific Ad Valorem Equivalents of Non-Tariff Measures, September 2016

No. 128 Sebastian Leitner and Robert Stehrer: Development of Public Spending Structures in the EU Member States: Social Investment and its Impact on Social Outcomes, August 2016

No. 127 Roman Stöllinger: Structural Change and Global Value Chains in the EU, July 2016

No. 126 Jakob Kapeller, Michael Landesmann, Franz X. Mohr and Bernhard Schütz: Government Policies and Financial Crises: Mitigation, Postponement or Prevention?, May 2016

No. 125 Sandra M. Leitner and Robert Stehrer: The Role of Financial Constraints for Different Innovation Strategies: Evidence for CESEE and FSU Countries, April 2016

No. 124 Sandra M. Leitner: Choosing the Right Partner: R&D Cooperations and Innovation Success, February 2016

No. 123 Michael Landesmann, Sandra M. Leitner and Robert Stehrer: Changing Patterns in M&E-Investment-Based Innovation Strategies in CESEE and FSU Countries: From Financial Normalcy to the Global Financial Crisis, February 2016

No. 122 Sebastian Leitner: Drivers of Wealth Inequality in Euro-Area Countries. The Effect of Inheritance and Gifts on Household Gross and Net Wealth Distribution Analysed by Applying the Shapley Value Approach to Decomposition, January 2016

No. 121 Roman Stöllinger: Agglomeration and FDI: Bringing International Production Linkages into the Picture, December 2015

No. 120 Michael Landesmann and Sandra M. Leitner: Intra-EU Mobility and Push and Pull Factors in EU Labour Markets: Estimating a Panel VAR Model, August 2015

No. 119 Michael Landesmann and Sandra M. Leitner: Labour Mobility of Migrants and Natives in the European Union: An Empirical Test of the 'Greasing of the Wheels' Effect' of Migrants, August 2015

No. 118 Johannes Pöschl and Katarina Valkova: Welfare State Regimes and Social Determinants of Health in Europe, July 2015

No. 117 Mahdi Ghodsi: Distinguishing Between Genuine and Non-Genuine Reasons for Imposing TBTs; A Proposal Based on Cost Benefit Analysis. July 2015

No. 116 Mahdi Ghodsi: Role of Specific Trade Concerns on TBT in the Import of Products to EU, USA, and China. June 2015

No. 115 Mahdi Ghodsi: Determinants of Specific Trade Concerns Raised on Technical Barriers to Trade. June 2015

No. 114 Sandra M. Leitner and Robert Stehrer: What Determines SMEs' Funding Obstacles to Bank Loans and Trade Credits? A Comparative Analysis of EU-15 and NMS-13 Countries. May 2015

IMPRESSUM

Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche“ (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

Postanschrift:: A 1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50
Internet Homepage: www.wiiw.ac.at

Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

wiiw

wiiw.ac.at