The a cycle trough and the following

Design

The previous chapter has introduced several theoretical considerations such as financial frictions and market participants' treatment of risk that can explain why the phenomenon of a financial cycle, distinct from the business cycle, may exist. However, they neither provide a clear-cut definition of the financial cycle, nor a list of its ingredients. A preliminary definition of the financial cycle that grasps many of the aspects discussed in the previous chapter is that of Borio (2014b, 183) who describes the financial cycle as the ' self-reinforcing interactions between perceptions of value and risk, attitudes towards risk and financing constraints, which translate into booms followed by busts' and argues that ' these interactions can amplify economic fluctuations and possibly lead to serious financial distress'. A growing body of literature aims to pin down the features of the financial cycle relying on empirical data. A better understanding of the financial cycle is essential to use macroprudential instruments at the right dose and time. In the following discussion, the terminology of Drehmann/Borio/Tsatsaronis (2012) is used to describe the financial cycle. Expansions are defined as the period between a cycle trough and the following peak, contractions refer to the period between a peak and the following trough.

Amplitude refers to the change in the underlying variable over an expansion or a contraction. One way to systematise the empirical literature on the financial cycle is by the variables that are taken into account in measuring it. A part of the literature, especially earlier works, rely on aggregate measures of credit volumes to characterise the financial cycle and its interactions with the macroeconomy. The financial cycle in these works is understood as a credit cycle. In a much-noted paper, Schularick/Taylor (2012) investigate the

relationship between credit and macroeconomic indicators using an extensive data sample (1870 to 2008) of 14 developed countries. Based on their key finding that credit growth is a strong indicator of financial crises, they term these as ' credit booms gone wrong'. Using the same data set, Aikman/Haldane/Nelson (2015) estimate credit cycles based on the variation of a credit-to-GDP ratio and compare these to business cycles.

They identify the credit cycle as a phenomenon distinct from the business cycle, which occurs in the medium-term, at a higher amplitude than that of the short-term business cycle and whose peaks, confirming Schularick/Taylor (2012), frequently coincide with financial crises. Similarly, Mendoza/Terrones (2012) empirically study the effects of credit booms on macroeconomic aggregates and observe that credit-financed economic expansions in many cases end in financial crises. Starting from the observation that credit cycles determine the boom-bust cycles observed in the financial system, the question arises which assets are financed by the credit expansion. Consequently, another strand of literature also considers various asset price variables in measuring the financial cycle. Claessens/Kose/Terrones (2012) analyse data from 21 advanced and developing countries over an extensive period (1960 to 2007). They investigate cycles in aggregate credit, as well as house prices and equity prices.

They show that business cycle recessions are longer and deeper when they co-occur with the bust-phase of short-term cycles in credit and house prices. Equity cycles, on the other hand, show a higher frequency and are less clearly linked to the business cycle than credit or house prices which show a high degree of synchronisation. Their results also show a high degree of

synchronisation between credit and house price cycles. House price booms, when they are fuelled by credit expansions, leave borrowers highly levered and easily affected by declines in house prices or tighter financing constraints, which increases systemic risk and the possibility of negative macroeconomic outcomes associated with a financial crisis. Considering similar indicators for the three segments, in a widely cited study, Drehmann/Borio/Tsatsaronis (2012) estimate a financial cycle measure for several advanced economies combining credit and house price variables based on their insight that the two measures provide the most effective description of the financial cycle. They stress the medium-term character of the financial cycle in comparison to the short-term business cycle and document a relationship between financial cycle peaks and the occurrence of financial crises.

Extending their previous research, Jordà/Schularick/Taylor (2015) study the macroeconomic effects of equity and house price bubbles using an extensive dataset of 17 countries over 140 years. They conclude that especially housing price booms when they are fuelled by a credit boom have the potential to cause financial crises with strong output losses and slow recoveries. More recent works on the financial cycle bring methodological advancements and focus mostly on credit and house price measures, which could hint at a consensus forming on the relevant ingredients of the financial cycle. Examples are Rünstler/Vlekke (2016) and Galati et al. (2016) who, each using a sample of six countries over a period from 1970 to 2014, confirm the existence of medium-term cycles in credit and house prices with a higher amplitude and longer duration than that of business cycles.

They highlight significant heterogeneity across countries. For example, Germany, which is covered by both studies, emerges as a special case with comparatively short credit and house prices cycles. Schüler/Hiebert/Peltonen (2015) find, consistently, that financial cycles of European countries are longer than business cycles. Their findings again highlight significant heterogeneity among countries. While some countries show cycle durations comparable to the ones reported in the literature (e. g. Spain with 17 years), the average duration of financial cycles in their sample amounts to only 7 years. Their methodological approach (the filtered time series of various variables are combined with a procedure that estimates varying weights across time and countries) and the fact that they consider equity prices, which have previously been shown to exhibit rather short cycles, may explain their divergent findings.

Another way of distinguishing the different works on the financial cycle is by the method of measurement. Many studies use turning point algorithms which derive from the business cycle literature (e. g. Claessens/Kose/Terrones (2010)).

The frequently used adaption by Harding/Pagan (2002) allows identifying turning points in quarterly time series. An alternative way of measuring the financial cycle is by using frequency-based filters such as the bandpass filter proposed by Christiano/Fitzgerald (2003). This filter allows isolating cyclical patterns in a time series that correspond to a particular frequency interval removing trend and components corresponding to other frequencies.

Different from the turning point algorithm, the CF filter is usually applied to growth rates of the variables thus identifying growth cycles. Some of the existing studies do not rely exclusively on one of the two methods but apply both methods to improve the reliability of their estimates. For example, Drehmann/Borio/Tsatsaronis (2012) employ both methods and obtain comparable results independent of the method. The debate on how to best capture the financial cycle is, however, still ongoing. Both of the aforementioned methods require a pre-specification that influences the resulting estimates.

Since there is no consensus on the properties of the financial cycle yet, users of these methods face the criticism that the resulting properties of the financial cycle, in particular the longer duration, follow by construction. Rünstler/Vlekke (2016) and Galati et al. (2016) employ, based on this criticism, model-based filters that alleviate these difficulties and broadly confirm previous studies arguing that cycles in financial variables occur at lower frequencies and have longer durations than typical business cycles. In addition, Strohsal/Proaño-Acosta/Wolters (2015) compare characteristics of business cycles and financial variables for three developed countries using a frequency domain analysis. While their approach does not yield a combined measure of the cycle as the CF filter, they find that, in the post-1985 period, financial cycles have been a medium-term phenomenon with a length of about 15 years and a significantly higher amplitude than that of business cycles.

To conclude, current empirical research supports the notion that, while being closely linked to the business cycle, the financial cycle is not a mere

reflection of business cycle fluctuations but instead, following the definition of Borio (2014b) introduced above, may also mirror changes in the perception of values and risk or financing constraints in the economy. Aside from the above mentioned methodological criticism, a general limitation of the existing studies is that they appear to be satisfied with a mere description of the phenomenon of the financial cycle, barely relating their analyses to the theoretical framework explaining the mechanisms behind the financial cycle and its relation to the business cycle. 1. 1   Summary of stylised factsThis section aims to provide a concise summary of the key financial cycle characteristics described in the literature to date and serves as a benchmark for the empirical results of the following empirical analysis.

First, the key financial cycle variables (credit measures and house prices) exhibit a lower frequency and a longer duration and a higher contraction amplitude than the traditional business cycle. Expansions tend to be much longer than contractions. In contrast to the business cycle, empirical studies typically attribute durations of around 16 years to credit and house price cycles and shorter durations to equity cycles. Policy regimes influence the shape of the financial cycle.

In particular, the financial liberalisation process that started in the 1980s seems to have increased the duration of the financial cycle (Drehmann/Borio/Tsatsaronis (2012)). Second, cycles in financial variables experience a high degree of phase synchronisation within and, to some degree, across countries (Claessens/Kose/Terrones (2010)). In particular, credit volumes and house prices move together at lower frequencies within countries and can thus be used to create a combined measure that describes

the financial cycle in the most parsimonious way
(Drehmann/Borio/Tsatsaronis (2012)). Third, business cycles and financial
cycles interact and are to a certain degree synchronised, especially when it
comes to credit and house price variables. Business cycle recessions that
occur with strong financial contractions tend to be longer and deeper than
other recessions (Claessens/Kose/Terrones (2012), Jordà/Schularick/Taylor
(2013)). Strong financial expansions (credit or house price booms), when
they coincide with business cycle expansions, tend to be associated with
stronger output growth (Claessens/Kose/Terrones (2012)). Fourth, peaks in
financial cycle variables and combined measures of the cycle often occur
close to financial crises.

This holds especially for financial crises of domestic origin, financial crises
hitting countries that are not close to a financial cycle peak often result from
such peaks in other closely related countries (Drehmann/Borio/Tsatsaronis
(2012)). Credit taken by itself has been shown to be a good indicator of
financial crises over extended time horizons (Schularick/Taylor (2012)).