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Financial Cycles: What? How? When?

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Abstract: This paper provides a comprehensive analysis of financial cycles using a large database of more than 750 financial cycles in 21 advanced countries over the period 1960:1-2009:4. Specifically, we analyze cycles in credit, house prices, equity prices, and exchange rates. We report three main results. First, financial cycles tend to be long and severe, especially cycles in housing and equity markets. Second, financial cycles are highly synchronized within countries, particularly credit and house price cycles. The extent of synchronization of financial cycles across countries is high, mainly in the case of credit and equity cycles, and has been increasing over time. Third, financial cycles feed off of each other and become amplified, especially during downturns of credit and housing markets. Moreover, globally synchronized downturns tend to be associated with prolonged and more costly episodes, especially in the case of credit and equity cycles. In light of these findings, we examine the duration and amplitude of financial disruptions of the past two years.

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I. Introduction

A short history of economic developments over the past two decades vividly shows that gyrations in financial markets greatly influence economic activity around the world. Following the largest housing bubble of its modern history, Japan experienced a massive asset market crash in the early 1990s which marked the start of a "Lost Decade" of stagnant growth. After prolonged credit booms, many emerging countries in Asia faced major financial crises in the late 1990s. The synchronized equity market booms of the late 1990s in many advanced countries ended with dramatic busts and synchronized economic downturns. A number of countries enjoyed credit and housing booms over 2003-2007 as the global economy registered its best performance over the past four decades. However, these episodes also ended with severe financial market disruptions in the forms of credit crunches and asset price busts, and led to the global financial crisis, the deepest one since the Great Depression. Not surprisingly, understanding financial cycles has become a central area of research.

The objective of this paper is to provide a comprehensive empirical analysis of financial cycles. We ask three specific questions. First, *what* are the main features of financial cycles? Second, *how* synchronized are financial cycles within and across countries? Third, *when* does the coincidence of financial cycles lead to more adverse outcomes? In order to answer these questions, we employ an extensive database of financial cycles in credit, house prices, equity prices, and exchange rates for a large number of advanced countries over a long period.

We document a rich set of empirical regularities. Equity and house prices cycles tend to be the longest and more pronounced than others. Financial cycles, especially in credit and house prices, are highly synchronized within countries. The degree of synchronization across countries is the highest for credit and equity cycles and has been increasing over time. Linkages across markets are important as cross-asset interactions can amplify financial cycles. In particular, house and credit cycles feed off of each other and become magnified. Moreover, globally synchronized financial downturns tend to be associated with prolonged and deeper downturns, especially in the case of credit and equity markets.

As we review in Section II, there is a rich literature analyzing various aspects of financial market developments and their implications for the real economy. This literature started a long time ago (indeed, many of the recent events are reminiscent of similar ones centuries earlier), but gained momentum recently.[1] A number of studies examine the implications of booms in asset prices and

[1] In addition to numerous papers on the dynamics of financial markets, a number of books have been published over the past two years prompted by the interest in the global financial crisis. For example, Reinhart and Rogoff (2009), James (2009), and Ferguson (2008) analyze the latest financial crisis from different angles using the lens of history.

credit, rather than considering cycles in these variables. Others focus on financial crises—in many respects only the extreme versions of financial downturns. Those few studying financial cycles often consider only a limited set of events or financial variables (typically in the context of a few country cases or covering short periods of time). The basic lesson of this review is that our understanding of financial cycles is still rather limited.

This paper attempts to rectify this deficiency by extending the literature on financial cycles in a number of dimensions. First, our study is the first detailed, cross-country empirical analysis documenting financial cycles and the interactions between the different phases of cycles in a large number of countries over a long period of time. Second, in parallel with the business cycle literature, we use a well established and reproducible methodology for the dating of financial downturns and upturns. Furthermore, since we use quarterly data, rather than the annual data typically used in other cross-country studies, we are better able to identify and document the properties of financial cycles. Third, taking advantage of our large data set and using regression models, we can study various factors associated with the duration and amplitude of financial cycles.

Section II explains that our approach has some advantages over those used before. It is easy to provide a qualitative characterization of financial cycles.[2] Archetypical is the credit cycle, or the ease of access to credit by borrowers. A typical credit cycle starts when funds are easy to borrow, a period maybe characterized by low (real) interest rates, rising collateral values and falling lending requirements. This period is followed by tightening in the availability of funds, when interest rates go up, collateral values fall and loan provision becomes stricter, leading fewer people to borrow. While well recognized, this qualitative definition is not very useful to study cycles across a large number of countries and long periods. Hence, in order to identify cycles in financial variables, we employ a methodology widely used in determining the turning points of business cycles. Specifically, we follow the tradition of Burns and Mitchell (1946) who laid the groundwork for the analysis of the U.S. business cycles, and similarly create a chronology of financial cycles in advanced countries.

Compared to research on the identification and implications of financial crises (e.g., Reinhart and Rogoff, 2009), our methodology of dating financial cycles has some clear advantages as well. One is that we use a well-established and reproducible methodology for the dating of cycles,

[2] Starting with Fisher (1933), a number of researchers emphasize the importance of financial cycles using different types of approaches. Sinai (1992) provides a review of some of the early literature. For a simple approach to cycles in exchange rates, see Stern (1973); and for a discussion about equity price cycles, see Malkiel (2007). For an excellent analysis of financial crises, see Kindleberger (2005). The importance of financial cycles for business cycles has been an intensive area of research as well, see Bernanke, Gertler, and Gilchrist (1996), and Gilchrist and Zakrajsek (2009).

whereas crisis dating is typically based on historical records and subjective timing, especially for banking crises (in many cases the ending date of a crisis is selected in an ad hoc way). We also consider financial events that not necessarily lead to crises, yet do create stress in some financial markets with possible macroeconomic consequences. In addition, we consider four types of financial events, allowing us to investigate different financial cycles and evaluate which of these is more important, whereas a financial crisis dummy often lumps them together.

Next, section III presents our database and methodology. Our dataset includes 21 "advanced" OECD countries and covers the period 1960:1-2009:4. We focus on credit volume, house prices, equity prices, and exchange rates as financial cycles. We rely on the "classical" definition of a cycle since it provides a simple but effective way to identify cyclical turning points. Using this methodology, we determine the dates of upturns and downturns and identify more than 750 financial cycles over the period 1960:1-2007:4. To study how financial cycles have evolved over time, possibly due to ongoing globalization, we divide our sample into two distinct periods—the pre-globalization period (1960-1985) and the globalization period (1986-2008).

We also analyze the implications of financial markets' disruptions and booms. In particular, we classify an episode as a financial disruption (boom) if the change in the financial variable falls into the bottom (top) quartile of all changes during the downturn (upturn) phase of the financial cycle. Financial disruptions are named differently depending on the financial variable under consideration: a credit crunch, a house/equity price bust, or an exchange rate collapse. Similarly, booms can be in credit, house and equity prices, and exchange rates. Section III also introduces the concordance statistic used to assess the extent of synchronization of financial cycles within/across countries, and explains the empirical models employed to study the duration and amplitude of financial cycles.

Section IV documents the main features of financial cycles. Three facts are highlighted. First, downturns tend to feature sharp declines in short periods (they tend to last about five to eight quarters) and upturns in financial cycles are often much longer and slower. Second, while financial cycles can be long and deep, equity and house prices cycles in particular tend to be the longest and more pronounced than others. Third, there have been some changes in the features of financial cycles over time, especially equity price cycles have become shorter as has the duration of upturns in house prices.

We analyze the synchronization of financial cycles within and across countries next in Section V. Our results indicate that financial cycles are closely, but not perfectly correlated with each other. Cycles in credit and house prices appear to be the most highly synchronized within countries and key in understanding overall financial markets' direction, in that they most closely correspond to cycles in other financial variables. Across countries, the degree of synchronization

is the highest for credit cycles. The degree of synchronization across countries has increased over time, possibly due to financial globalization.

In section VI, we study the implications of the coincidence of financial cycles. In particular, we analyze whether financial cycles feed off of each other and become amplified. Our results indicate that the likelihood of a credit downturn (or upturn) taking place goes up substantially if there is an ongoing disruption (or boom) episode in house prices and vice versa. We also find that there are indeed feedback effects between house price and credit cycles as disruption in one market aggravates the problems of the other one, probably because of collateral constraints and the complementarity between credit and housing finance. When housing and exchange rate downturns are accompanied by financial crises, they tend to become longer and deeper. Globally synchronized financial downturns also result in longer and deeper downturns, especially in the case of credit and equity markets.

These results set the stage for the more formal empirical analysis in Section VII, where we employ various regression models to analyze the roles played by various factors in explaining the duration and amplitude of financial cycles. Using a standard duration model, we find positive duration dependence for the downturn phase of financial cycles, implying that the longer a downturn has gone on the more likely it is to end. Our regressions also suggest that credit contractions associated with house price busts last longer than other credit contractions do. Strong global credit and asset markets and greater trade and financial openness are associated with shorter financial downturns. With respect to amplitude of downturns, we find that credit downturns associated with house price busts are often deeper. In addition, when credit downturns overlap with financial crises, they become longer and deeper. Section VIII concludes with a brief discussion of results and directions for future research.

II. Financial Cycles: A Brief Review of Literature

There is an extensive literature analyzing fluctuations in financial markets. Our limited objective here is to provide a brief review of theoretical research on cycles in financial markets and to summarize empirical studies focusing on the behavior of financial variables we analyze.

II.1. How to think about financial cycles in theory?

Going back at least a century, it has been recognized that some financial variables feature cycles, i.e., periods of increases followed by declines. The extreme versions of these cycles, booms and busts, have been extensively studied in the literature. Although explaining the forces driving these extreme cycles has always been a challenge, there are two general perspectives. One emphasizes the importance of irrational behavior driven by “animal spirits” in explaining the fluctuations in financial markets. The other perspective relies on changes in market consensus with respect to perceptions of fundamentals and expectations of the future activity while acknowledging that differences between markets’ realizations and fundamentals are bounded

over the long-run.[3] While these perspectives are mostly about asset markets, they generalize to other financial markets as well.

Neither perspective is very satisfactory, however, as they seem to conflict with either some basic theories or data. This disappointment reflects that, until recently, there has been surprisingly little theoretical work that ascribes reasons for financial variables to display cyclical properties independent of cycles in the real economy. This is mostly because of the heavy reliance on the complete and efficient markets paradigms. This is clearest regarding the determination of asset prices (including equity prices, house prices, and exchange rates). Most literature starts from the premise that, in the absence of frictions and under complete markets, i.e., an Arrow-Debreu world, asset prices are driven by developments in the aggregate real economy. In these models, asset prices reflect, rather than affect, the allocation of capital across time and states of nature. Credit is the quantity counterpart to many of these links as it reflects the predominant use of interest rate dependent claims between investors and projects financed. The implication is that asset prices and credit can be cyclical to the extent that the real economy is, but otherwise ought not to have cycles. Moreover, even if asset prices are cyclical, they should not be predictable since that violates another commonly used paradigm, the efficient markets hypothesis.

Since the facts do not seem to square with the model, at least not fully, the reasons for the disconnect surely have to be found in the assumptions used. In the real world, there are many deviations, including financial market imperfections, or "frictions," that have implications for the behavior of asset prices and credit. These frictions play a central role in the transmission of shocks from the financial sector to the real economy and vice-versa. Some of these frictions also manifest themselves in the behavior of financial variables, including them displaying cycles.

Models that display cyclical properties for financial variables, yet satisfy the efficient financial markets hypothesis, include those featuring the so-called financial accelerator mechanism. Starting with Bernanke and Gertler (1989), and since then many followers, this class of models predicts a decline in net worth, induced perhaps by a fall in asset prices, to lead borrowers to reduce their spending and investment. This in turn causes activity to contract more and translates into a general equilibrium cycle of falling output and asset price deflation.[4] Conversely, these models explain the simultaneous upswing in financial and economic cycles. In these models – notably the model by Kiyotaki and Moore (1997)– movements in asset prices and credit are the endogenous and follow a logical sequence of declines and increases, both because financial variables reflect the real economy and because they are propagation mechanisms themselves.

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[3] For the first perspective, see Keynes (1936), Galbraith (1954) and Shiller (1989, 2000) among others. The second one put forward by DeLong (1992) and Siegel (1998). See Edwards, Biscarri and Perez de Gracia (2003) for a review of these in the context of equity prices. For linkages between business and financial cycles, see Sinai (1992) and Eckstein and Sinai (1986).

[4] These models provide the formal underpinnings of Fisher's (1933) "debt-deflation" mechanism of how a decline in net worth induced by falls in asset prices lead borrowers to reduce spending and investment.

Another, more recent, class of models operates on the supply side of finance. These models emphasize the importance of financial intermediaries' balance sheets for their ability to provide credit and other external financing. By doing so, they stress that conditions on the supply side of finance can influence asset prices and activity. Some of the early studies focus on banks' role in financial intermediation, with special reference to the bank lending channel for the transmission of monetary policy.[5] In response to liquidity or interest rate shocks, for example, banks' access to deposits and funding can change, and in turn they need to adjust lending practices. This can also create patterns (similar to cycles) in financial variables. With the latest financial crisis, the importance of the supply side has become even clearer. Some recent models indeed have the result that financial cycles can occur possibly independent of movements in the real economy.[6]

The non-random, albeit not necessarily cyclical, properties of asset prices have also been increasingly recognized in asset price theories. Besides some degree of predictability, the literature has also provided models for common patterns in volatility of asset prices. Some of these models have also been applied to exchange rates.[7] While exchange rates are found to be too volatile relative to fundamentals, models so far have not suggested rational cycles in exchange rates. Theoretical models on real estate cycles mostly rely on supply rigidity and uncertainty about long-term returns on housing to generate strong and persistent cyclical movements.[8] Some recent models, for example, featuring financial accelerator type mechanisms examine the dynamics of housing markets and their implications for the real economy (see Aoki, Proudman and Vlieghe (2004) and Iacoviello (2005)).

II.2. Empirical studies on financial cycles

We first briefly review studies of cycles in asset prices, exchange rates, and credit, and then summarize research about synchronization of financial cycles and conclude with an overview of studies on financial crises.

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[5] A number of papers provide early surveys of the literature on bank lending channel of monetary transmission, including Bernanke (1993), Cecchetti (1995), and Boivin, Kiley and Mishkin (2010).

[6] See Adrian and Shin (2010) for a review of this literature. Related is how changes in liquidity, the ability to quickly sell an asset for a value close to its present value of discounted expected cash flows, affect asset prices. Furthermore, financial cycles can be affected by monetary policy with easier (tighter) lending leading to faster (slower) growth in financial intermediaries' balance sheets and asset prices.

[7] Modern theories of exchange rate determination typically imply a close relationship between exchange rates and macroeconomic variables. However, the relationship between exchange rates and macroeconomic variables implied by models of exchange rate determination is only weakly supported by the data, leading to the various exchange rate puzzles (see Obstfeld and Rogoff, 2001).

[8] Edelstein and Tsang (2007), for example, relate rent, property values, and capitalization rates to demand fundamentals and housing investment and property values to supply fundamentals, and thereby generate cycles. Other models include Chinloy (1996), Abraham and Hendershott's (1996), and Dokko et al. (1999).

Cycles in asset prices and credit

Although much of the literature focuses on the highly volatile nature of asset prices, a number of papers have analyzed asset price booms and busts.[9] Borio and Lowe (2002) define asset price booms as periods in which real asset prices deviate from their trends by specified amounts. In a related paper, Bordo and Jeanne (2002) document that boom-bust episodes tend to be much more prevalent in house than in equity prices. Pagan and Sossounov (2003) classify asset prices more formally in "bear" and "bull" markets and examine their cyclical properties. They document that even a pure random walk process can generate cycles in equity prices.[10] The duration dependence of equity prices is examined by a few studies (see Ohn, Taylor, and Pagan, 2004; and Lunde and Timmermann, 2004).

Some studies use an index that combines residential property, commercial and equity prices, but these studies typically find that house price cycles are the most important in terms of economic impact.[11] Cecchetti (2006) also finds evidence for 27 countries that housing booms worsen growth prospects and that equity booms have little impact on expected mean and variance of macroeconomic performance, although they do aggravate the adverse outcomes.[12]

The cyclicality in house prices more generally is well recognized and documented. It arises because house prices are largely determined by demand factors, notably current and past income growth, which cyclicality in turn reflects the business cycle. In addition, real interest rates (or some other proxy for mortgage costs) are important for house prices. Although cyclicality is common, another finding is that the duration and amplitude of housing cycles vary widely across geographical areas and through time (see Cunningham and Kolet, 2007; Hall, McDermott and Tremewan, 2006). This in turn reflects variations in supply-demand conditions, characteristics of housing finance, and the linkages between housing and the overall economy.[13]

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[9] A long list of studies examines why asset prices are more volatile than fundamentals (Shiller (1981) is the seminal contribution; Bikhchandani and Sharma (2000) review this literature).

[10] They provide a short history of earlier work analyzing the cycles in equity prices: Slutsky (1937) and Fisher (1925), for example, argue that cycles in equity prices can emerge from stochastic variation. Malkiel (1973) observe that a random walk in equity prices can lead to cyclical dynamics.

[11] Detken and Smets (2004) and Adalid and Detken (2007), for example, also classify movements in asset prices into booms and busts on the basis of prices exceeding trend growth rates by at least 10 percent. They identify 38 (42) price booms respectively for 18 OECD countries between 1970 and 2002 (2004).

[12] Cecchetti and Li (2008) study the impact of booms in equity and house prices on the extreme tails of the distributions of fluctuations in output and price-levels.

[13] In a recent study, Igan and Loungani (2009) document the characteristics and examine the determinants of house price cycles in advanced countries and subnational regions within the United Kingdom, the United States, and the Netherlands. They find long-run price dynamics to be mostly driven by local fundamentals such as demographics and construction costs, though market structure and regulatory factors may cause short-run (upwards) deviations. Leamer (2007) analyzes various aspects of cycles in the U.S. housing market and their implications for the real economy. Borio and McGuire (2004) analyze the linkages between equity and house prices.

Some study differences in equity price cycles across markets. For example, Biscarri, Edwards, and Perez de Gracia (2003) find that bull and bear equity cycles in four Latin American and two Asian countries tend to have shorter duration and larger amplitude and volatility than those in developed countries. However, after financial liberalization Latin American stock markets behaved more similarly to stock markets in developed countries whereas Asian countries became somewhat more dissimilar.

It is well documented that exchange rates are detached from macroeconomic fundamentals in the short-run, and appear more influenced by news and factors such as the micro-structure of trading systems and order-flow. In the medium-to-long run, however, "macro" fundamentals re-assert their influence. While purchasing power parity has been found to have little explanatory value over short periods, for example, evidence is more favorable over longer periods (Flood and Taylor, 1996). This suggests some cyclical behavior, but that has not been studied in detail. However, understanding fluctuations in exchange rates is an intensive area of research, as some early studies even attempt to analyze the driving forces of cycles in exchange rates (see Stern, 1973).

Patterns of booms and busts have been studied for credit. Mendoza and Terrones (2008) report, for example, the high frequency of credit booms and show that booms generally coincide with real output, consumption, and investment rising above trend during the build up phase of credit booms and falling below trend in the unwinding phase. In the upswing, the current account tends to deteriorate, often accompanied by a surge in private capital inflows.[14]

In Claessens, Kose and Terrones (2009, 2010), we analyze the implications of episodes of financial cycles for the real economy using the data of advanced and emerging market countries. We reported there that recessions associated with financial disruption episodes, notably house price busts, are often longer and deeper than other recessions. Conversely, recoveries associated with rapid growth in credit and house prices tend to be stronger. This paper extends our earlier work in many dimensions. First, we study financial cycles and closely examine how their features differ over the different phases of the financial cycle. Second, we analyze the implications of the coincidence of financial cycles. Third, we provide an analysis of the synchronization of financial cycles. Lastly, we undertake a rigorous regression analysis of the duration and amplitude of financial cycles.

Synchronization of financial cycles across/within countries

A rich literature documents the extent of synchronization of equity, bond and other asset prices across countries and implications for gains from international diversification. The general finding is of increasing synchronization as global factors increasingly determine asset prices around the

[14] Related, Gourinchas, Valdes and Landerretche (2001) examine the real effects of credit booms.

world. This is true for developed countries, emerging economies and between the two groups (Ehrmann, Fratzscher, and Rigobon (2005)).[15] Cross-country correlations of asset prices tend to be higher than those of real fundamentals. Similar to the weak link between equity prices and firms' fundamentals, comovements appear to not (just) reflect synchronized real cycles, but also other factors.[16]

House prices also tend to move together considerably across countries, even though there are limited fundamental linkages—housing being the quintessential non-traded good. The comovement seems heavily driven by global factors, including the world interest rate, the output cycle in the United States, and global commodity prices, underscoring how international real and financial linkages can drive asset prices (see Terrones, 2004). In addition, the common factor capturing cross-country house price movements relates to mortgage-to-GDP (reflecting the deepening of mortgage markets across industrial countries) and home ownership ratios (reflecting cross country structural and policy changes aimed at fostering home ownership).

Some other studies focus on the extent of synchronization across financial cycles within countries. For example, while causality can run both ways, aggregate stock prices in advanced countries as well as in many emerging markets have been found to be affected by respective exchange rates (Phylaktis and Ravazzolo 2005).[17] Between cycles in asset prices and credit there are also important linkages across countries, in part related to business cycles. Igan, et al (2009), for example, find that house price cycles generally lead credit cycles over the long term, while in the short to medium term the relationship varies across countries.

Financial cycles and financial crises

As noted, financial cycles relate to the occurrence of financial crises (see Allen and Gale, 2007 for a review). Following a prolonged boom in economic activity fueled by credit and often accompanied by asset price increases and an overvalued currency, a financial crisis may occur (for early empirical work see Goldstein, Kaminsky and Reinhart, 2000). Indeed, systemic

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[15] Both financial reforms and real integration appear to drive the increased comovement of asset prices. Stock return correlations and market betas, for example, increase after capital account liberalization (Bekaert and Harvey (2000), Goetzman and others (2005) and Quinn and Voth (2008)). Edwards, Biscarri and Perez de Gracia (2003) find that the concordance of cycles across stock markets has increased significantly over time, especially for Latin American countries after liberalization.

[16] The high correlation, and delinking, has been attributed to co-movement in risk premiums, as investors in one market are likely exposed to other markets as well. Additionally, herding behavior among investors may increase when asset prices move significantly in one direction or another, which could amplify correlations beyond what fundamentals suggest. This high correlation is especially so during periods of financial stress. There is a large literature on financial contagion in emerging markets and in general (see Claessens and Forbes, 2000).

[17] In addition, how exchange rate movements affect bond and (individual) stock prices has been extensively modeled (Gourinchas and Rey, 2007; Caballero, Farhi and Gourinchas, 2008).

banking crises are typically preceded by sharp increases in house prices and aggregate credit (Reinhart and Rogoff, 2009). Mendoza and Terrones (2008) report that a large fraction of credit booms observed in emerging markets ended in a financial crisis. Borio and Lowe (2002) considering the interplay between asset prices and crises, and find that almost 80 percent of crises can be predicted on the basis of a credit boom at a one-year horizon, while false positive signals are issued about 18 percent of the time.

While there are relationships between financial cycles and crises, not all booms end up in a financial crisis. Moreover, the empirical relationship between financial cycles and crises is complex since the dating of a crisis can be hard. While the dating of financial cycles, in parallel with the business cycles literature, can use well-established and reproducible methodologies, this is not the case for crises. Crisis dating is often based on historical records and subjective, especially for banking crises, where in many cases the end date is selected in an ad hoc way. Related, a financial crisis dummy often lumps various types of events together, whereas they can represent different types of financial cycles. Obviously, the type of financial cycle matters for the type of financial crisis, e.g., currency crises are more likely related to exchange rate cycles and banking crises to credit cycles. Lastly, the literature on financial crisis does not consider financial events that are not crises, yet do create stress in some financial markets with possible macroeconomic consequences.

III. Database and Methodology

We construct an extensive dataset of quarterly series of financial variables for a large number of advanced countries for the longest possible time coverage. We first briefly present our dataset and explain our approach to the selection of variables to identify and characterize financial cycles. We provide additional information about the country coverage, variables in the dataset, and their sources in Appendix A.[18]

III.1. Database

Our dataset includes 21 "advanced" OECD countries and covers the period 1960:1-2009:4.[19] For most of our analyses, we use data up to 2007:4, i.e., we stop just prior to the recent wave of financial downturns. This assures we have complete financial cycles and allows us, later in the paper, to present a comparison between the latest episodes of financial downturns over the past two years and those earlier.

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[18] The Appendix will be available in the next version of the paper.

[19] The countries in our sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Switzerland, Sweden, the United Kingdom, and the United States.

To study how financial cycles have evolved over time, possibly as a result of ongoing globalization, including greater degree of trade and financial integration, we divide our sample into two distinct periods—the pre-globalization period (1960-1985) and the globalization period (1986-2008). There are three reasons for using 1985 as the demarcation. First, global trade and financial flows have increased markedly since the mid-1980s. This happened in great part as countries have intensified their efforts to liberalize external trade and financial account regimes.[20]

Second, after a period of stable growth during the 1960s, the earlier period witnessed a set of common shocks associated with sharp fluctuations in the price of oil in the 1970s and a set of synchronized, contractionary monetary policies in the major industrial economies in the early 1980s. Using 1985 as the point of demarcation allows us to differentiate the period with these common factors and shocks from that when the world saw more globalization and see how the features of financial cycles vary between the two periods. Third, the beginning of the globalization period coincides with a structural decline in the volatility of business cycles in advanced countries until the financial crisis of 2008-09, the so called period of Great Moderation.[21]

Which variables are best to use in order to study financial cycles? There is of course a long list of financial variables one can focus on. In light of the literature review presented in the previous section, we concentrate on cycles in four distinct financial market segments, which constitute the core markets for financial intermediation. While they are obviously interdependent, they are distinct helping us to provide a general perspective on fluctuations in financial aggregates. Specifically, we focus on credit volume, house prices, equity prices, and exchange rates to analyze the evolution of financial cycles.[22] We briefly discuss our choices in turn.

Our measure of credit is aggregate claims on the private sector by deposit money banks. Credit is a natural aggregate to analyze financial cycles as it is the single most important link between savings and investment. This measure is also often used in earlier cross-country studies on credit

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[20] Moreover, the beginning of the globalization period marks the start of the Uruguay Round negotiations which sped up the process of unilateral trade liberalizations in many developing countries. These factors have led to a dramatic increase in global trade flows, both in absolute terms and relative to world income, during the globalization period. For example, the ratio of world trade to world GDP has surged from less than 30 percent in 1984 to more than 55 percent now. The increase in financial flows has also been remarkable as the volume of global assets and liabilities has risen more than ten-fold during the same period (see Lane and Milesi-Ferretti, 2007). In other words, global economic linkages clearly became much stronger during the second period.

[21] See Blanchard and Simon (2001), McConnell and Perez-Quiros (2000) and Stock and Watson (2005).

[22] We do not focus on interest rates and monetary aggregates since they are used as policy tools, or derivatives of rates/aggregates based on monetary policy actions. Indeed, at least in developed countries, (real) interest rates are acyclical or countercyclical, showing their use as a policy tool–and lag the business cycle–as monetary policy operates with a lag.

dynamics (see Mendoza and Terrones, 2008). Although a disaggregated measure of credit and perhaps a measure of the price of credit, would be useful additions to our aggregate measure, it is nearly impossible to obtain such series at the quarterly frequency for most of the countries in our sample.[23] We therefore restrict ourselves to the volume measure.

The three other financial variables we use are asset prices. In addition to being ideal measures for the respective financial cycle, our survey shows that these asset prices are closely related to movements in key macroeconomic variables. The house price series we use correspond to various measures of indices of house or land prices depending on the source country. The equity prices we use are share price indices weighted with the market value of outstanding shares. And the exchange rate series we use are the real effective exchange rates as calculated by the IMF, extended backwards to 1960 using trade weights of 1980.

All the financial variables we use are at the quarterly frequency, seasonally adjusted whenever necessary, and in constant prices. Credit series are collected from the IFS, house price series are mostly from the OECD, equity prices are from the IFS and DATASTREAM, and real effective exchange rates are from IFS/INS. In addition to these variables, we use a number of other variables in our formal empirical analysis.

III.2. Methodology

In order to identify financial cycles, we borrow methods widely employed in the business cycle literature. In particular, our study is based on the "classical" definition of a business cycle which provides a simple but extremely effective procedure to identify cyclical turning points. The definition goes back to the pioneering work of Burns and Mitchell (1946) who laid the methodological foundation for the analysis of business cycles in the United States.[24]

This "classical" methodology focuses on changes in levels of (financial) variables. An alternative methodology would be to consider how a variable fluctuates around its trend, and then to identify

[23] Some recent studies examining the behavior of aggregate credit measures during recessions or financial crises (e.g., Chari, Christiano, and Kehoe (2008) and Cohen-Cole et al., (2008)) highlight the importance of going beyond aggregate measures (for example, differentiating credit to corporations from credit to households) to study the dynamics of credit markets. Unfortunately, such disaggregated credit series are not available for a large number of countries over the sample period we analyze. Similarly, while the extent of credit cycles can be measured using various interest rates, spreads, surveys of senior lending officers, and various indices of financial conditions, these measures are not available for most countries over the long sample period we study. For a smaller set of countries, Duygan-Bump and Grant (2009) provide an analysis of the dynamics of household debt using the European Community Household Panel.

[24] Moreover, it constitutes the guiding principle of the Business Cycle Dating Committees of the National Bureau of Economic Research (NBER) and of the Center for Economic Policy Research (CEPR) in determining the turning points of U.S. and European business cycles.

a "financial cycle" as a deviation from this trend (Stock and Watson, 1999). There has been a rich research program using detrended series (and their second moments, such as volatility and correlations) to study various aspects of cycles. We are very sympathetic to this approach. Our objective here, however, is to produce a well-defined chronology of financial cycles, rather than studying the second moments of fluctuations.[25] A further advantage of turning points identified by using the classical methodology is that they are robust to the inclusion of newly available data: in other methodologies, the addition of new data can affect the estimated trend, and thus the identification of a cycle.

Compared to the financial crisis literature, our approach has also some advantages in terms of the dating of events. For one, in parallel with the business cycles literature, we use a well-established and reproducible methodology for dating, whereas crisis dating is based on historical records and often subjective, especially in the case of banking crises (in many cases the ending date of a crisis is selected in an ad hoc way). Relatedly, we consider financial events that are not necessarily crises, yet did create stress in some financial markets with potentially macroeconomic consequences. In addition, we consider four types of financial events, allowing us to investigate different cycles and evaluate which of these is more important, whereas a financial crisis dummy often lumps them together.

Identification of turning points in financial cycles

The cycle dating algorithm we use is the one introduced by Harding and Pagan (2002a), which extends the so-called BB algorithm developed by Bry and Boschan (1971), to identify the turning points in the log-level of a series.[26] It requires us to search for maxima and minima over a given period of time. Then, we select pairs of adjacent, locally absolute maxima and minima that meet certain censoring rules, requiring a certain minimal duration for cycles and phases. In particular, the algorithm requires the durations of a complete cycle to be at least five quarters and each phase at least two quarters. Specifically, a peak in a quarterly financial series f_t occurs at time t if:

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[25] Furthermore, it is well-known that the results of studies using detrended series depend very much on the choice of the detrending methodology (see Canova, 1998). Several studies document the features of business cycle fluctuations using the detrended data series (see Backus and Kehoe, 1992).

[26] The algorithm we employ is known as the BBQ algorithm since it is applied to quarterly data. It has been widely used in earlier studies in the context of business cycles (King and Plosser, 1994; Watson, 1994; Artis, Kontolemis, and Osborn, 1997) as well as cycles in equity and commodity prices (Pagan and Sossounov, 2003; Cashin, McDermott, and Scott, 2002). It is possible to use alternative algorithms, such as a Markov Switching (MS) model (Hamilton, 2003). However, these alternative models present a variety of implementation challenges for the large number of countries in our sample. Moreover, Harding and Pagan (2002b) compare the MS and BBQ algorithm and conclude that the BBQ is preferable because the MS model depends on the validity of the underlying statistical framework.

$$\{[(f_t - f_{t-2}) > 0,\ (f_t - f_{t-1}) > 0]\ \textit{and}\ [(f_{t+2} - f_t) < 0,\ (f_{t+1} - f_t) < 0]\}$$

Similarly, a cyclical trough occurs at time t if:

$$\{[(f_t - f_{t-2}) < 0,\ (f_t - f_{t-1}) < 0]\ \textit{and}\ [(f_{t+2} - f_t) > 0,\ (f_{t+1} - f_t) > 0]\}$$

A complete financial cycle comprises of two phases, the contraction phase (from peak to trough) and the expansion phase (from trough to the next peak). In addition to these two phases, the recovery from recessions has been widely studied for business cycles (see Eckstein and Sinai, 1986). The recovery phase is the early part of the expansion phase and is usually defined as the time it takes for the variable (typical output) to rebound from the trough to the peak level before the decline (recession in case of output). Some associate recovery with the cumulative growth achieved after a certain time period, such as four or six quarters, following the trough (see Sichel, 1994). Given the complementary nature of these two definitions for recovery (see also IMF, 2009), we use them both.

We call the recovery phase of a financial cycle the "financial upturn" and the contraction phase the "financial downturn". We study these two phases of financial cycles because they provide a rather well-defined time window. We do not study expansions, which are typically much longer, and can be affected by many structural factors at the country level (e.g., the level of initial financial sector development greatly affects the scope for long expansions in credit, for example).

Main features of financial cycles

The main characteristics of cyclical phases are their duration and amplitude. The duration of a financial downturn (upturn), D_c, is the number of quarters, k, between a peak (a trough) and the next trough (previous peak). The amplitude of a downturn, A_c, measures the change in f_t from a peak (f_0) to the next trough (f_k), i.e., $A_c = f_k - f_0$. The amplitude of an upturn, B_c, measures the change in f_t from a trough (f_k) to the level reached in the first four quarters of an expansion (f_{k+4}), i.e., $B_c = f_{k+4} - f_k$.

Synchronization of cycles

In order to examine the extent of synchronization between business and financial cycles, we use the concordance index developed by Harding and Pagan (2002b).[27] A number of other

[27] In addition to the concordance static we employ here, recent research has typically relied on two main measures of synchronization. The first is bilateral correlations, which capture co-movements in fluctuations of the respective variable across two countries. The second is the share of variance that can

(continued)

researchers employ the same index to analyze synchronization of various types of cycles or of cycles across countries (see Artis, Kontolemis, and Osborn, 1997; Hall, McDermottt, and Tremewan, 2006; Edwards, Biscarri, and Garcia, 2003). The index, CI_{xy} for variables x and y is defined as:

$$CI_{xy} = \frac{1}{T}\sum_{t=1}^{T}[C_t^x.C_t^y + (1-C_t^x).(1-C_t^y)]$$

where

$C_t^x = \{0,$ if x is in contraction phase at time t; 1, if x is in expansion phase at time $t\}$

$C_t^y = \{0,$ if y is in contraction phase at time t; 1, if y is in expansion phase at time $t\}$

In other words, C_t^x and C_t^y are binary variables whose values change depending on the phase of the cycle the underlying series are in. Given that T denotes the number of time periods in the sample, CI_{xy} provides a measure of the fraction of time the two series are in the same phase of their respective cycles. The series are perfectly procyclical (countercyclical) if the concordance index is equal to unity (zero).

Definition of intense financial cycles

We also study the more intense forms of financial cycles, financial disruptions and booms, and consider their implications. To identify these, we rank the changes in each financial variable during downturns and upturns. We then classify an episode as a financial disruption (boom) if the change in the financial variable during the downturn (upturn) falls into the bottom (top) quartile of all changes. We call financial disruptions a crunch, bust, or collapse depending on the financial variable (i.e., credit crunch, house or equity price bust, and exchange rate collapse).[28] Similarly, for intense upturns, we have credit, house, equity price, and exchange rate booms.

In addition, we examine the features of upturns (downturns) of each financial cycle that are associated with financial disruptions (booms) of other financial variables. If an upturn (downturn) episode of a financial variable starts at the same time or after the beginning of an ongoing financial disruption (boom) episode of another financial variable, we consider that the

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be attributed to synthetic (unobservable) common factors, as in Kose, Otrok and Prasad (2003a). The concordance statistic we employ measures the synchronization of turning points.

[28] We rely on the changes in the volume of credit to identify the episodes of credit crunches, which is often defined as an excessive decline in the supply of credit that cannot be explained by cyclical changes (see Bernanke and Lown, 1991). It is difficult to separate the roles played by demand and supply factors in the determination of credit volume in the economy. Exchange rate collapses (booms) of course correspond to episodes of severe deprecations (large appreciations).

upturn (downturn) to be associated with the respective financial disruption (boom). These associations, by definition, imply a coincidence between events, but do not necessarily suggest a causal link.

Models of Duration

We also examine the duration of financial downturns by utilizing again methods often used in the business cycle literature. There is a large body of literature analyzing the duration of business cycles motivated by the objective of predicting the end date of an expansion or a recession. Although most of this literature has used simple parametric and non-parametric duration models with no covariates, recent studies have also examined whether different indicators of economic activity (including leading economic indicators, private investment, oil prices, and U.S. recession dates) help to explain the duration of expansions or recessions. [29]

There is a great variety of parametric duration models, but the Weibull model is the most commonly used in the business cycle literature (see Diebold, Rudebusch and Sichel, 1993). We also employ a survival model with the Weibull function. If D is a random variable that represents the duration of an downturn, and d is a realization of D, then the baseline Weibull survival function is $S_0(d) = \exp\{-\exp(-\beta_0)\, d^p\}$ and the baseline hazard function is $\lambda_0(d) = pd^{p-1}\exp(\beta_0)$. The hazard rate is monotone increasing when $p > 1$, monotone decreasing when $p < 1$, and constant if p=1. Given a set of covariates, $\boldsymbol{x}_j$, the Weibull survival function is: defined as $S(d|\mathbf{x}_j) = \exp\{-\exp(\beta_0 + \mathbf{x}_j\beta_x)\, d^p\}$ and the Weibull hazard rate is: $\lambda(d|\mathbf{x}_j) = pd^{p-1}\exp(\beta_0 + \mathbf{x}_j\beta_x)$.

IV. What are the Main Features of Financial Cycles?

Frequency

We identify more than 750 financial cycles over the period 1960:1-2007:4. In particular, our full sample features 114 downturns in credit, 114 in house prices, 245 equity prices, and 279 in exchange rates (Table 1A). In parallel, the full sample includes 115, 114, 251, and 291 upturns in credit, house prices, equity prices, and exchange rates, respectively. Since exchange rates and

[29] For instance, Diebold and Rudebusch (1990) study whether the U.S. business cycle exhibit duration dependence. They find that, in the case of expansions, there is evidence of positive duration dependence during the prewar period (1854-1938), but not so in the post war period (1945-1983). They also find some evidence of positive duration dependence in the case of postwar recessions. Diebold, Rudebusch and Sichel (1993) extend this analysis to examine duration dependence in the business cycles of France, Germany and Great Britain during the prewar period. They also find evidence of positive duration dependence in expansions only. Ohn et al. (2004), using discrete time tests for duration dependence, find evidence of positive duration dependence in the U.S. prewar and postwar recessions. Castro (2008) analyzes the importance of other potential factors in explaining duration dependence.

equity prices are more volatile than credit and house prices, they naturally feature more upturns and downturns than the latter ones.

The breakdown by the two sub-periods (1960–1985 versus 1986-2007) shows that there are more episodes of financial cycles in the first sub-period than that in the second one. In the case of credit, for example, the number of upturns (downturns) in the first period is 67 (65) whereas it is only 47 (50) in the second period. For house prices, there is no difference in the case of downturns, but the second sub-period includes a much larger number of upturns than the first one.[30] The sample of equity cycles is roughly equally divided between the two periods. Surprisingly, cycles in the (real effective) exchange rate are more frequent in the first sub-period, which include the Bretton Woods system of nominal fixed exchange rates.

The proportion of time spent in upturns or downturns can be a useful metric to assess the frequency of financial cycles as it is scaled by the length of the data sample. Depending on the financial variable, this metric varies considerably. For example, 30 (20) percent of the time credit experiences a downturn (upturn) episode (data in the table refer to sample means, with medians presented in brackets). These statistics are even starker for the other financial variables, 41 (31) percent for the downturns (upturns) of house prices, 45 (38) percent for equity prices, and 44 (33) percent for exchange rates. Across the two sub-periods, there are some significant changes in the proportion of time spent in different phases of cycles. The average time spent in downturns of house and equity price cycles becomes significantly shorter in the second sub-period, while the time in upturns is shorter in the second period for credit and equity price cycles. Although these numbers do not provide information about the trend in (or predictability of) financial variables, they do suggest that these financial variables' typical behavior is oscillating between the different phases of the cycle as identified by our methodology.

Duration

Besides the time spent in each cycle, we study the length of cycles in quarters (where data in the table again refer to the sample means, with medians in brackets). In terms of duration, financial variables typically feature downturns lasting about five to eight quarters. Upturns of financial cycles tend to be much longer than downturns, however, with downturns of up to 15 quarters. Episodes of equity price upturns, for instance, on average last about 22 quarters while house prices and exchange rates also take a long time to recover (about 14 quarters). In contrast, credit upturns are relatively short as they on average last about 8 quarters.

[30] House price data start in 1970 for all countries, except Austria(1986:3), Belgium(1985:1), Greece(1993:4), and Portugal (1988:1).

In terms of downturns, there are fewer differences between the two sub-periods. In contrast, all financial upturns except for credit are longer in the first period, with equity taking almost 33 quarters in the first period, compared to 10 quarters in the second period. Episodes of exchange rate upturns are also statistically significantly shorter in the second sub-sample (17 periods in the first versus 10 periods in the second). The differences between the means and medians though suggest that durations of financial cycles often exhibit rather skewed distributions. Duration of equity price upturns has a mean of 33 quarters in the first period, for example, while the median is 11 quarters. These differences are typical, i.e., the mean is (much) larger than the median across both periods.

Figures 1A-1D, which show the distributions of the durations of the downturns and upturns, provide a broader perspective of our findings. The rather wide distributions highlight why means can vary as much from medians reported above. Upturns tend to have much wider distribution than downturns as the upturns in house and equity prices can take up to 80 and 160 quarters, respectively. Some of the differences across the two sub-periods are noticeable as well in the histograms. Episodes of equity downturns and upturns, for example, are generally shorter in the second sub-period than in the first sub-period.

Amplitude and Slope

We next study amplitude of downturns and upturns of financial cycles (Table 1A). Financial cycles are often deep, with financial downturns in particular being rather sharp. A typical credit downturn episode, for example, corresponds to about a 4 percent decline in credit. Episodes of house and exchange rate downturns mean declines of about 5-6 percent in the respective asset price. Equity price downturns are often the deepest among the downturns, typically 24 percent decline for the full sample. The strength of upturns generally matches that of the downturns. In parallel to downturns, upturns in equity prices are much stronger than those in other financial variables.

The strength of downturns and upturns differs across sub-periods. Credit downturns tend to be deeper in the first sub-period, some 2 percentage points more, but declines in exchange rates are larger in the second sub-period. Credit upturns are stronger in the first sub-period as are increases in house prices, but upturns of equity prices and exchange rates are more robust in the second sub-period which coincides with the presence of much stronger global linkages.

The distributions of the amplitude of the two phases of financial cycles are also presented in Figures 1A-1D**.** These figures show how the distributions for many of the financial cycles change across the two sub-periods. For example, episodes of credit downturns are deeper and upturns are stronger in the first period, or put differently, there are more shallow downturns in the second period. This seems to be driven by the large fraction of relatively “small” episodes of

credit cycles (0-3 percent amplitude) in the second sub-period. These constitute more than 50 (20) percent of all episodes in the second (first) sub-period. This is also the case for the downturns of house prices, of which the share of the least severe (decline of 0-3 percent) increases by about 20 percentage points in the second sub-period. For equity, the fraction of the least severe downturns also increases by some 20 percentage points in the second sub-period. Credit, house and equity upturns are correspondingly geared towards less strong recoveries. The difference between the two sub-periods is noticeable in the case of exchange rates as well since the fractions of the mildest episodes of exchange rate downturns and upturns go down in the second sub-period.

We measure the speed (violence) of an episode by its slope–that is, the decrease/increase per quarter in the respective phase. Downturns and upturns of financial variables appear to exhibit similar speed, about 1 percent per quarter (Table 1A). The phases of equity price cycles, however, tend to be three to four times more violent than those in other financial variables. Across the two sub-periods, the slopes of cycles vary: episodes of downturns in credit and house prices are much faster in the first sub-period, while those of equity and exchange rate are faster in the second period. One can interpret this suggesting that these variables adjust much more quickly as the forces of globalization become more influential in the second sub-period. Conversely, equity prices and exchange rates rise more rapidly in the second sub-period, 5.6 percent and 1.1 percent per quarter rate of increase, respectively. These findings collectively suggest that cycles in most financial variables involve more rapid adjustment in the second-sub-period, reflecting perhaps more liberalized and expanded sets of arbitrage opportunities.

Changes in other Financial Variables

How do financial variables behave when one of them is in a downturn or upturn phase? In order to answer this question, we next study the movements of other financial variables when one is in a particular phase of the cycle (Table 1B). Although during downturns of credit and house prices most other financial variables also decline, not all financial variables move in the same way during all financial downturns. For example, during credit downturns, the exchange rate still appreciate, while, during house price downturns, credit continues to expand, the latter probably because of the longer duration of housing downturns than credit ones. Downturns in equity prices and exchange rates, in contrast, are not associated with declines in other financial variables. This is generally the case for both sub-periods as credit downturns coincide with declines in many financial variables in the first period.

During upturns, the picture is more uniform across financial cycles, with almost all financial variables increasing. However, there is not a strong pattern across the two sub-periods, except that the increases in other financial variables are more prevalent in the second sub-period. For

example, while equity prices decline during exchange rate upturns in the first sub-period, they increase as all other variables typically do during the second sub-period.[31]

What did we learn?

The analysis so far has shown that financial cycles in advanced countries feature a number of similarities. Downturns tend to last about five to eight quarters, but upturns of financial cycles are often much longer than downturns. Financial downturns can feature sharp declines, especially equity price downturns are often the deepest. The strength of upturns generally matches that of the downturns. Credit and house price cycles appear to be key in understanding the direction of overall financial markets, in that they most closely correspond to cycles in other financial variables. The exception is the exchange rate cycle which appears to move largely independent of other financial cycles. The differences in the distributions in the two periods across the four financial cycles are summarized in Figure 2. It shows how downturns in credit and house prices have become longer, while equity cycles have become shorter and exchange rate cycles remained the same over time. Upturns have generally become shorter during the globalization period. The amplitude of financial cycles has moderated, except for the upturns in equity prices and exchange rates.

V. How Synchronized are Financial Cycles?

In the previous section, we presented a summary of the main features of financial cycles. Although we briefly described how various financial variables behave over the course of cycles, we have yet to discuss the degree of synchronization of these cycles within and across countries. In this section, we turn our attention to the synchronization of financial cycles. We first study the extent of synchronization across financial cycles within countries. We then examine cross-country synchronization of financial cycles. Next, we present a brief discussion of how financial cycles comove with those in the United States given that a significant fraction of global financial activity takes place in the United States.

Concordance across financial cycles

Table 2 presents the degree of synchronization across the four financial variables. We first compute the concordance between financial cycles in each country, then calculate both means (above the diagonal) and medians (below the diagonal) statistics of the concordance across countries. We also compute the same statistics for each sub-period, reporting first medians

[31] We also examine the country-specific features of financial cycles, but for the sake of brevity we do not present the details of these results here (see Tables A1-A8).

(second panel) and then means (third panel), with the second period measures of concordance above the diagonal and the first period measures below the diagonal.

The extent of synchronization between financial cycles varies, but since the means and medians are very similar the results are not driven by outliers. Cycles in credit and house prices appear to be the most highly synchronized, with a median and mean of 0.68, i.e., in 68 percent of the time the two are in the same phase.[32] The concordance statistic for cycles in equity prices and exchange rate is the lowest. In general, cycles in exchange rates tend to display the lowest degree of concordance.

We next study the two sub-periods and check for the statistical significance of difference in the concordance index between these sub-periods. When using medians, the concordance in the second period varies between 0.46 and 0.74 compared to 0.44 to 0.69 in the first period. Generally, the concordance in the second period is higher than in the first period. For both the pairs of credit and equity prices, and those of house and equity prices, the median concordance is statistically significantly higher in the second sub-period than in the first one, 0.63 versus 0.51 and 0.60 versus 0.53, i.e., cycles in equity prices are more typically in the same phase as those in credit and house prices in the second than in the first period. These findings are mostly confirmed when using the means of the country concordance statistics. These results suggest that as financial markets become more sophisticated, linkages across different segments of these markets have also become stronger.

Concordance of financial cycles across countries

To what extent are financial cycles synchronized? To address this question we next study the extent of synchronization of financial cycles across countries (Table 3A). We first compute the concordance statistic for each country pair and then calculate the relevant statistic for each financial variable over the full sample. The highest degree of synchronization across countries is between cycles in credit and the least between cycles in exchange rate. It is difficult to interpret the synchronization of exchange rate cycles across countries since the exchange rate refers to a relative price. Financial cycles in equity prices are close in concordance to those in credit. Although housing is a non-tradable asset, the extent of synchronization across countries is high, about 60 percent, indicating that global house price cycles are in tandem in 60 percent of the time. These results are broadly consistent with the notion that credit and equity markets are the most closely integrated across borders.

We also examine the evolution of synchronization over time. Given that global financial linkages become stronger over time, one would expect some changes in the extent of synchronization of

[32] The results at the country level are available from the authors upon request.

financial cycles. There is indeed an increase in the degree of synchronization of cycles during the second period. In the cases of cycles in housing, equity and exchange rate, these differences across the two sub-periods are statistically significant for most cases. This confirms the findings of some earlier studies reporting a higher degree of comovement across financial variables over time driven by stronger global linkages (see Kose, Prasad and Terrones, 2003).

Concordance with financial cycles in the U.S.

In Table 3B, we present the degree of synchronization of countries' financial cycles with those in the United States. The extent of concordance with the US financial cycles is very similar to the overall concordance reported above. The ranking among financial cycles and the differences between the two sub-periods are also similar to those reported above, with the exception of the exchange rate cycles which are less synchronized with those of the US in the second period. This likely reflects that many exchange rates were nominally fixed with respect the dollar for a good part of the first period, making the real exchange rate cycles more synchronized with that of the cycles in the U.S. real exchange rate. These findings suggest that the financial cycles in the U.S. have much influence on the behavior of global financial cycles.

These results are no surprise, given the relative importance of the US financial markets in the global financial markets. In particular, U.S. financial markets have been and remain by far the largest, reflecting not only the size of the economy but also their depth and sophistication (see Helbling et. al, 2007).[33] Changes in U.S. asset prices tend to have strong signaling effects worldwide, and spillovers from U.S. financial markets have been important, especially during periods of market stress. In particular, correlations across national stock markets are highest when the U.S. stock market is declining. This suggests that international portfolio diversification might not be as effective during bear markets in financial centers, a fact highlighted by the most recent global financial crisis.

We next examine the coincidence of financial disruptions across countries using a simple measure based on the fraction of countries experiencing the same event at the same time (Figure 3). It is important to note that the results of Figure 3 are not compatible with the statistics reported in Table 3 since the former captures the fraction of countries in downturns, the latter measures the extent of synchronization of full financial cycles across countries. Figure 3 shows that downturns in credit markets bunched in about four periods during 1960-2007: the mid

[33] Helbling et. al (2007) also report that reflecting the size and depth of its financial markets, as well as its increasing net external liabilities, claims on the United States typically account for the lion's share of extra-regional foreign portfolio assets of the rest of the world. At the same time, the share of foreign portfolio liabilities held by U.S. investors typically also exceeds the holdings of investors elsewhere, except for the euro area, where intraregional holdings are more important. This illustrates the extent of important international financial linkages with U.S. markets.

1970s, the early 1980s, the early 1990s, and the early 2000s. These periods coincide with episodes of highly synchronized recessions. In the first three of these four periods, more than 40 percent of countries experienced downturns in credit markets at the same time.

Despite the fact that housing is a non-tradable asset, downturns in housing markets also exhibit a surprisingly high degree of coincidence across countries as there are at least five episodes during which more than 60 percent of countries simultaneously experience housing downturns. The extent of coincidence of housing market downturns rises especially during highly synchronized recession episodes. Equity prices exhibit the highest degree of coincidence reflecting the extensive integration of financial markets. In particular, there are a number of periods during which equity markets in more than 80 percent countries experience simultaneous downturns. It is important to note that the results of Figure 3 are not compatible with the statistics reported in Table 3 the former captures the fraction of countries in downturns, while the latter measures the extent of synchronization of full financial cycles across countries.

What did we learn?

Financial cycles are closely, but not perfectly correlated with each other. Cycles in credit and house prices appear to be the most highly synchronized within countries, and exchange rate cycles the least. The degree of synchronization across financial cycles has increased over time, possibly due to financial globalization. Similarly, across countries, the degree of synchronization is the highest between credit cycles (and the least between exchange rate cycles), with the degree of synchronization increasing over time.

VI. When do Financial Cycles Become More Intense?

Do financial cycles feed off of each other and then become amplified? To answer this question, we first analyze the implications of intense episodes of financial cycles, i.e., financial disruptions and booms. This is followed by a brief analysis of the main features of downturns and upturns of each financial variable when they are accompanied by episodes of disruptions and booms in other financial variables.

VI.1. Intense Financial Cycles: Financial Disruptions and Booms

As we explain in Section III, financial disruptions (booms) are defined to correspond to the bottom (top) quartile of all events in financial downturns (upturns) by amplitude. Financial disruptions can take different forms: a credit crunch, a house/equity price bust, or a collapse in exchange rate. Similarly, financial booms can take the form of a boom in credit, house/equity

price, and exchange rate. We restrict our analysis of the sample of financial disruptions and booms to the full sample period rather than analyzing the sub-periods.[34]

Financial disruptions

Table 4A summarizes the main features of financial disruptions. We identify 28 credit crunches, 28 house price busts, 61 equity price busts, and 69 exchange rate collapses. By design, compared with other downturns, financial disruptions tend to result in much larger declines in financial variables. Credit crunches, house price busts and exchange rate collapses lead to respectively roughly four, seven, and four times larger drops than other downturns, while equity busts are twice as large. They also last longer. Disruptions in credit, house and equity prices last some two times longer than other downturns in these variables. Moreover, disruption episodes are not only much longer, they are also more violent with much faster declines per quarter as evidenced by their higher slope coefficients.

In terms of duration, episodes of downturns (busts) of house prices last the longest of all. The duration of a typical house price bust is about 18 quarters whereas a credit crunch and equity bust last about 10-12 quarters. While less persistent than house price downturns, drops in equity prices are much larger. In particular, a typical episode of a house price downturn (bust) leads to a 6 (28) percent drop in house prices, while an equity price downturn (bust) tends to result in a 24 (51) percent fall in equity prices. Downturns in equity prices are much more violent than those in other financial variables with a much higher slope.

We again see that house price declines in case of credit busts; also in case of exchange rate collapses we see a decline in house prices. There are little similar movements in the other financial variables though, during these and other financial cycles. During equity busts and exchange rate collapses, for example, credit actually expands and more so than during other equity price and exchange rate downturns. This may again reflect that these busts last long, during which time other financial variables are able to recover and transition into a different phase.

Financial booms

We next analyze the main features of episodes of financial booms (Table 4B). Our sample of financial booms includes 24 credit booms, 28 booms in house prices, 63 booms in equity prices, and 70 booms in exchange rates. By design, episodes of financial booms are associated with much larger increases in the respective financial variables. These boom episodes also take place

[34] By focusing on the full sample, we can document more meaningful results since we have a larger number of observations. The results for sub-samples are available from the authors upon request.

over relatively shorter time periods than in case of other upturns. The change in the specific financial variable over the course of a boom is about three to four times larger than it is during other upturns. Similarly, the slope of a typical boom episode is two to three times higher than that of other financial upturns. Almost all of these differences are statistically significant.

Compared with booms in other financial variables, house prices take the longest time to reach their previous peak (13 quarters, albeit not different from other housing upturns) and credit booms the shortest time (4 quarters). Not surprisingly, equity prices register the largest gain during boom periods (about 46 percent compared to about 8-12 percent for the other financial variables). Importantly, there are some common movements. House prices, for example, tend to grow faster during episodes of credit booms than during other upturns. While not always statistically significantly different, the greater increases in credit, house and equity prices are common to all booms. Only the exchange rate does not move in tandem with other financial variables in non-exchange rate booms.[35] Figure 4 provides a summary of our findings with respect to intense financial cycles. Financial disruptions are longer, deeper and more violent than financial downturns. Financial booms are shorter, stronger, and faster than financial upturns.

Figures 5A and 5B present how financial variables behave around their respective disruptions.[36] Credit crunches are generally preceded by a period of rapid expansion in credit, but are most often accompanied by slowdowns in asset prices. The median (year-to-year) credit growth is 5 to 6 percent just before the peak of credit expansion is reached and then slows down sharply over the crunch period, by more than 10 percentage points from the peak, falling to -6 percent and not returning to positive levels until 10 quarters after the credit crunch started. The rapid decline in credit during this period likely reflects both lower demand, e.g., decrease in investment, but also a fall in supply due to bank capital shortfalls and other adverse supply side effects.

House prices follow a similar path and remain on the decline for long periods during a bust episode, typically much more than three years. The fall in equity prices is also sharp and prolonged as prices do not start to recover within the three year period following the start of the bust. Exchange rates also exhibit a similar pattern and after a sharp fall, stay subdued for a prolonged period of time. Booms in financial variables appear to follow more or less a similar trajectory. After a trough in a financial variable, the growth accelerates over the following four quarters, but then stabilizes in most financial variables.

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[35] The exchange rate drops by less than 1 percent when there is an episode of credit, house price or equity boom whereas it increases by less than 1 percent for the non-boom periods.

[36] We focus on patterns in the year-on-year growth in each variable over a 6-year window—12 quarters before and 12 quarters after a peak of an expansion. All panels include the median growth rates, i.e., the typical behavior, along with the top and bottom quartiles. As before, the bottom quartile denotes the worst 25 percent of all credit crunches and the top quartile the best 25 percent.

VI.2. Implications of Coincidence of Financial Cycles

Having documented the general coincidence of each financial cycle with the other financial cycles, we can now investigate whether downturns and upturns in a specific financial variable become more intense when they coincide with disruptions and booms in other financial variables. We also consider how the features of financial cycles change during episodes of financial crises. This exercise helps us to understand whether financial cycles feed off of each other and become more pronounced. We consider each financial variable separately to identify what combinations of financial cycles have the most impact on other financial variables, differentiating every time upturns and downturns.

As explained in section III, we consider a downturn (upturn) in the former to be associated with the financial disruption (boom) in the latter if a downturn (upturn) episode in a financial variable starts at the same time or after the beginning of an ongoing financial disruption (boom) episode of another financial variable. To provide a sense of distributions, we also examine those upturns (downturns) coinciding with severe financial disruptions (strong financial booms). These severe disruption (strong boom) episodes consist of the bottom (top) 12.5 percent of all downturns (upturns) in financial variables, or, in other words, the bottom (top) half of all disruptions (booms). Although we have a large sample of financial cycles, some of these combinations are relatively rare events.

Likelihood of Downturns and Upturns

Before we present the implications of downturns and upturns associated with financial disruptions and booms, we briefly examine how the likelihood of the former set of episodes changes conditional on having the latter ones. The unconditional probability of being in a downturn or an upturn in any given quarter varies across financial variables. For credit, the unconditional probability of being in downturn (upturn) phase is around 27 (21) percent (Table 5). For other financial variables, the likelihood of being in a downturn varies from 40 percent (house price) to 45 percent (equity price), with the probability of being in upturn to vary from 30 percent (exchange rate) and 39 percent (equity price).

If there is a financial disruption (or a boom) episode in the same quarter, the probability of having a downturn (or an upturn) increases substantially for most financial variables. For example, the likelihood of a credit downturn (or upturn) taking place goes up to about 48 percent if there is also a disruption (or boom) episode in house prices. Similarly, if a credit disruption (boom) is already underway, the probability of having a downturn (upturn) in house prices rises to 78 (46) percent. The likelihood of downturns and upturns also increase for the cases of equity prices and exchange rates, but less starkly so, when these events coincide with disruptions and booms in credit and housing markets.

Credit Cycles

We start with the coincidence of credit downturns with other financial downturns (Table 6A). We find that credit downturns that overlap with house price busts are longer and deeper than other credit downturns. This suggests that the two cycles indeed feed off of each other. When credit downturns overlap with equity price busts, there is no difference in length compared to other downturns, but these credit declines are significantly more severe than others. Interestingly, when credit downturns coincide with exchange rate collapses, no statistically significant differences emerge. Lastly, when credit downturns are accompanied with financial crises, they are much longer, deeper, and more violent than other downturns are, but these differences are not statistically significant. Furthermore, house prices register much larger declines during credit downturns accompanied with financial crises.

We next study the coincidence of credit upturns with booms in other financial variables (Table 6B). We again find that dynamics in the housing market relate most to credit cycles: credit upturns that overlap with house price booms tend to be longer, stronger, and faster than other upturns. During these episodes, equity prices also register sharper increases. Otherwise, there are very few statistically significant differences in outcomes when credit upturns are accompanied with booms in other financial variables.

House Price Cycles

The coincidence of housing downturns with disruptions in other financial variables lead to similar results as those reported for credit downturns (Table 7A). Housing downturns that overlap with credit crunches are similar to other house price downturns in most dimensions. There appear to be stronger associations between housing downturns and equity price busts. When the two overlap, there is a difference in length compared to other downturns (albeit not significant), and housing declines are much deeper and more intense than other downturns do (with these differences statistically significant). When housing downturns overlap with exchange rate collapses, no statistically significant difference emerges, suggesting that developments in exchange rate markets are more independent. As expected when housing downturns are associated with financial crises, they become longer and deeper than other downturns. These episodes also witness substantially larger declines in equity prices and exchange rates.

Results with respect to the coincidence of house price upturns with booms in other financial variables also indicate that such episodes become longer and stronger when they overlap with booms in credit and equity markets (Table 7B). For example, the increases in house prices during upturns associated with booms in credit and equity markets are two to three times larger than other upturns. Equity prices also register much larger changes, 43 percent versus 6 percent. However, when upturns in house prices coincide with booms in exchange rates, there is no statistically significant difference in outcomes.

Equity Price Cycles

We next examine the coincidence of equity downturns with disruptions in other financial variables (Table 8A). Downturns in equity prices do not become significantly longer and deeper when they are accompanied with disruptions in other financial variables. Interestingly, these episodes are shorter and shallower when they coincide with house price busts. The coincidence of equity price upturns with booms in other financial variables shows even fewer statistically significant differences (Table 8B). We only find that such upturns have a smaller increase in equity prices when they combine with exchange rate upturns. Otherwise, besides the specific price upturns, there are no statistically significant difference in financial outcomes.

Exchange Rate Cycles

Lastly, we consider the implications of the coincidence of exchange rate downturns with disruptions in other financial variables (Table 9A). Exchange rate downturns that overlap with credit crunches are more costly and violent when credit crunches are in the severe category. However, when combined with disruptions in house and equity markets, downturns in exchange rates do not appear to be much different than other downturns. The combination of exchange rate declines and financial crises are much worse than other downturns, in terms of amplitude and violence of such episodes. As one would expect, the coincidence of exchange rate upturns with booms in other financial variables displays no statistically significant differences across various events (Table 9B).

Impact of Coincidence of Downturns across Countries

Lastly, we investigate the implications of coincidence of financial cycles across countries. We consider a synchronized downturn as a case when more than 40 percent of the countries experience the same event and highly synchronized event when more than 50 percent experience the same event. In case of synchronized equity cycles, the percentages are respectively 80 percent and 90 percent.

The results, reported in Table 10, show that the synchronized financial downturns have adverse implications than other downturns are. They are longer, typically twice as long, and much more severe, (in case of highly synchronized equity downturns, prices drop by some 40 percent, compared to 18 percent in other downturns). Many of the other financial aggregates also perform worse. House prices, for example, drop much more during synchronized credit downturns, while credit grows less during synchronized housing downturns.

What did we learn?

Figures 6A-6D summarize these patterns by showing the changes in other financial variables for each financial cycle. The figures highlight how the combinations of financial cycles can vary the intensity of a specific financial cycle, especially for downturns. House price and credit cycles feed the most of each other in a perverse way, while equity downturns can actually mitigate the other financial cycles in some cases. This is to be expected in that credit and housing finance are more complements or linked by collateral constraints, while credit and equity financing can be substitutes. When housing and exchange rate downturns are associated with financial crises, they become deeper. Interestingly, exchange rate cycles are more independent from other cycles, especially for upturns. This suggests that exchange rate movements can be neutral to, if not help to mitigate other financial cycles. We also document that synchronized financial cycles feature much stronger adverse effects, with significantly larger declines.

VII. Duration and Amplitude of Financial Cycles: A Formal Analysis

We examine next the roles played by various financial and economic factors in shaping financial downturns and upturns. In particular, as noted earlier, the coincidence of downturns (upturns) with financial disruptions (booms) seems to be important in shaping the duration and amplitude of financial cycles. Some other factors, including the degree of trade and financial openness, as well as the state of the global financial markets are also expected to influence the length and severity of financial cycles. We therefore explore the nature of linkages among various financial markets and their effects on cyclical characteristics using various regression models.

Duration of financial downturns

Duration of financial downturns varies substantially across different variables, with house price downturns being the longest and credit downturns the shortest. There is also a great variation across countries. The diversity of duration outcomes may reflect the nature of the financial variable, the country-specific factors as well as the coincidence of the specific financial downturn with other financial disruptions.

A number of studies on business cycles document that recessions are more likely to end, the longer they have gone on.[37] So, we first examine whether there is positive duration dependence in the case of financial downturns as well. We next analyze what financial conditions and country characteristics affect the likelihood of a credit/asset price downturn ending. To address these questions, we use the Weibull duration model presented in Section III. This is the simplest parametric model that allows us to provide answers to these questions. Not surprisingly it is also the most commonly used duration model in the business cycle literature. Since we have multiple

[37] See for instance, Diebold and Rudebusch (1991), Ohn, Taylor and Pagan (2004) and Castro (2008).

downturns for each country, we can use panel regressions with fixed-effects to account for country-specific factors. This differentiates our exercise from most other studies on business and financial cycles where a limited number of observations per country does not allow the use of fixed effects. Instead, other studies employ various controls to account for country specific features, but since it is hard to capture all of them in a parsimonious fashion, this approach is subject to omitted variable bias.

Table 11 reports the estimation results of the Weibull duration model. Since it uses country fixed-effects, it assumes that country specific-factors have a proportional impact on the baseline hazard function, common to all countries in the sample. We find evidence of positive duration dependence for all financial cycles as the estimate of p, the Weibull distribution parameter, is always positive, when not using any other variables (columns 1, 3 5, and 7; between 1.47, in the housing price case, and 1.78, in the exchange rate case). In all cases we can reject the H_o: p=1 against H_1: p >1. Thus, the longer it has gone on, a financial downturn is more likely to end. These findings echo those obtained examining the properties of business cycles.

We next consider a number of other variables, running bivariate regressions, i.e., controlling one variable at a time. Results are reported in a way that each coefficient refers to one regression, and the ranges for the p values are reported at the end of each column (columns 2, 4, 6, and 8). In order to understand the link between financial disruptions and the duration of a financial downturn, we first include as regressors a set of four dummy variables, which take the value of one, if the financial downturn coincides with a financial disruption and zero otherwise. Of all types of financial disruptions we study, only house price busts seem to be significantly associated with the duration of credit and equity price downturns (columns 2 and 6, row 2). This confirms our earlier findings with respect to the coincidence of credit downturns and house price disruptions. In particular, house price busts tend to have a negative and statistically significant effect on the duration of a credit downturn and a positive and statistically significant effect on the duration of an equity price downturn. This confirms that credit contractions associated with house price busts often last longer than other credit contractions do. The fact that equity price downturns associated with house price busts last shorter than other equity price downturns do, might suggest that developments in these two assets markets are offsetting, perhaps as they are substitute forms of financing or investing.

We next investigate the extent to which other factors affect the duration of financial downturns. These factors include global financial conditions—as proxied by the global growth rate of the respective credit or asset prices (with the exception of exchange rates) in the first year of the downturn, as well as domestic price dynamics—as proxied by the average inflation rate in the run up to the downturn. We also investigate the role of trade and financial openness. We again estimate the duration models using each covariate separately.

Three results stand out. First, strong global credit and asset markets in the period immediately after the beginning of a downturn shift the hazard rate down. This implies that countries tend to

emerge faster from these contractions when global financial market conditions are more favorable. This echoes our findings with respect to the adverse effects of synchronized downturns. The global effect on the duration of a house price downturn, however, is not statistically significant. Second, inflationary pressures in the run up to a credit and equity price downturn shifts the hazard rate up, thus making an exit from these downturns less likely. Third, greater trade and financial openness are significantly associated with shorter financial downturns, particularly in housing and equity markets.

Next we explore the role of financial crises, the duration of the previous expansion and globalization. We again estimate the model with just these variables one by one. We find that financial crises delay the exit from a credit downturn, but hasten the delay from equity price and exchange rate downturns. The latter may reflect, besides that financial crisis are more often defined by developments in credit markets than in other financial markets, that the equity price and exchange rate tend to adjust faster after a crisis. When the duration of the previous expansion is longer, the exit from a house price downturn is often less likely. Lastly, when we introduce the globalization dummy, we find that the exit from an equity price bust is more likely during the globalization period. These findings are consistent with the empirical regularities we reported earlier with the respect the decline in the duration of equity downturns during the globalization period.

Amplitude of financial downturns

Using the same approach, we next study the determinants of the amplitude of a financial downturn. We use the parsimonious set of variables utilized in the duration analysis and again perform panel regressions with fixed effects. The set of simple bivariate regressions (Table 12) confirms that credit contractions associated with a house price bust are deeper (column 1) while equity price contractions associated with a house price bust are shallower (column 3). These results are similar to the empirical regularities we reported earlier about the adverse implications of coincidence of credit downturns with disruptions in housing markets. In addition, these findings are consistent with those reported for duration, implying that associations appear to affect both length and severity of downturns. There is also evidence that a house price downturn associated with an equity price bust is more severe, suggesting an equity price disruption can have an amplified effect.

We next examine the impacts of global and domestic conditions on the amplitude of financial downturns. We find that favorable global financial conditions tend to mitigate the severity of a financial downturn, particularly for credit and equity price episodes. In contrast, inflationary pressures in the run up to a financial downturn tend to accentuate its severity. Trade and financial openness both help moderate house and equity price downturns.

When we study the effects of financial crises, the amplitude of the previous expansion and the role of globalization, we find that a financial crisis is associated with a deeper credit downturn,

while the amplitude of the previous expansion makes the depth of the downturn smaller for all except the equity episodes. During the globalization period, equity price downturns are less severe, but other downturns are not statistically significantly different.

Expanded regression models

We also run a number of multivariate models, where we include various factors at the same time. We do not report the details of these findings here for the sake of brevity. These additional regressions confirm that favorable global financial conditions help countries emerge faster from credit and equity price downturns and that trade openness helps reduce the duration of credit, house, and equity prices, respectively. In contrast, high inflation seems to slow the exit from a credit downturn and financial openness the exit from a house price downturn. The coincidence of a house price bust with a credit downturn increases the duration of the latter episode. Credit downturns associated with financial crises are longer. There is also evidence that globalization might be associated with shorter episodes of equity price downturns, beyond the effects already captured by trade and financial openness.

We also examine if the findings for amplitude change once we control for the same set of core global and domestic factors. Our results indicate that the main findings from the simple set up remain broadly unchanged. For example, we find evidence that credit and house price downturns are more severe when accompanied by financial crises.

Amplitude of financial recoveries

We next explore the factors correlated with the amplitude of a financial recovery, that is, the increase in credit or asset prices within the first four quarter after the trough of a financial downturn. We again employ simple panel regressions with country fixed effects (Table 13). To capture the impact of financial booms, we introduce dummy variables representing financial upturns associated with financial booms. In general, there is no significant evidence that credit (asset price) recoveries associated with booms are stronger. However, there is evidence that global financial conditions tend to help financial recoveries, particularly in the case of equity prices.

VIII. Conclusion

The 2007-2009 global crisis is the latest in a long list of events shaped by cycles in financial markets over the past two decades. The crisis has instantly made the study of financial cycles a central topic of research. Although there have been many studies covering various aspects of fluctuations in financial markets, research has yet to provide a comprehensive analysis of financial cycles using objective methods, such as those well-known to business cycle analyses, and utilizing extensive cross-country evidence over a long time period. The objective of this paper is to fill this gap.

We examine financial cycles from a variety of perspectives. First, we document their main characteristics: frequency, duration, amplitude, and slope. We differentiate financial cycles by severity, investigate financial disruptions and booms, and consider temporal changes in the main features of financial cycles. Second, we document the synchronization of financial cycles within and across countries. Third, we analyze the changes in the nature of financial cycles when they are accompanied by other cycles (or crises) to help understand whether financial cycles feed off of each other and become longer lasting and more severe. For this we also conduct formal econometric analyses of what affect the main features of financial cycles.

Our analysis also allows us to provide a perspective on the implications of financial disruptions following the recent global financial crisis. In particular, we compare the recent financial downturns (those starting after 2007) with their historical counterparts.[38] The comparison (Figure 7 and Table 14) shows that the latest financial downturns are generally shorter than those historically observed, with differences statistically significant for credit, house prices and exchange rates. In terms of amplitude, the picture is more mixed. The completed credit downturns have generally been less deep, but those still ongoing look to become deeper than historical has been the case (and given that many are still ongoing, it is likely that credit downturns would eventually become more severe than previous episodes). In terms of house prices, the latest downturns are surely deeper than historical episodes (albeit differences are not significant). The latest equity downturns are also much deeper than historical cases, with a drop of 54 percent, almost double the median decline seen before. The violence of the latest downturns matches these comparisons, with house and equity prices declines being much more intense (slope being twice as large and significantly different from earlier cases). This confirms our results that synchronized financial downturns, like the latest ones stemming from the recent global financial crisis, are more violent and deeper than other downturns are.

Where do we go from here? There is a number of interesting research avenues to be explored. For one, we plan to undertake a more detailed econometric analysis of the "determinants" of the duration and amplitude of financial cycles, focusing on country, institutional and financial market characteristics that can help explain the nature of financial cycles. Second, we also want to conduct a more comprehensive study of the upturn and expansion phases of financial cycles.

Moreover, our analysis provides much input for issues of policy debate. Specifically, it provides much data to rigorously analyze a number of issues very relevant to the long-standing policy debate on asset price and credit booms. These policy interests arise from the harm asset price and credit booms can do to the real economy when they burst. It is widely recognized that, while not all booms end up in disaster, many asset price booms and fast credit expansions have been followed by busts with adverse real economic consequences and episodes of financial distress. We plan to explore these differences and possible policy implications in our future research.

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[38] Since not all current financial disruptions are completed (in that the downturns in some financial variables have not yet reached a trough and started to increase again), we provide two sets of statistics: for those downturns since 2007 fully completed and for all downturns, including those still ongoing.

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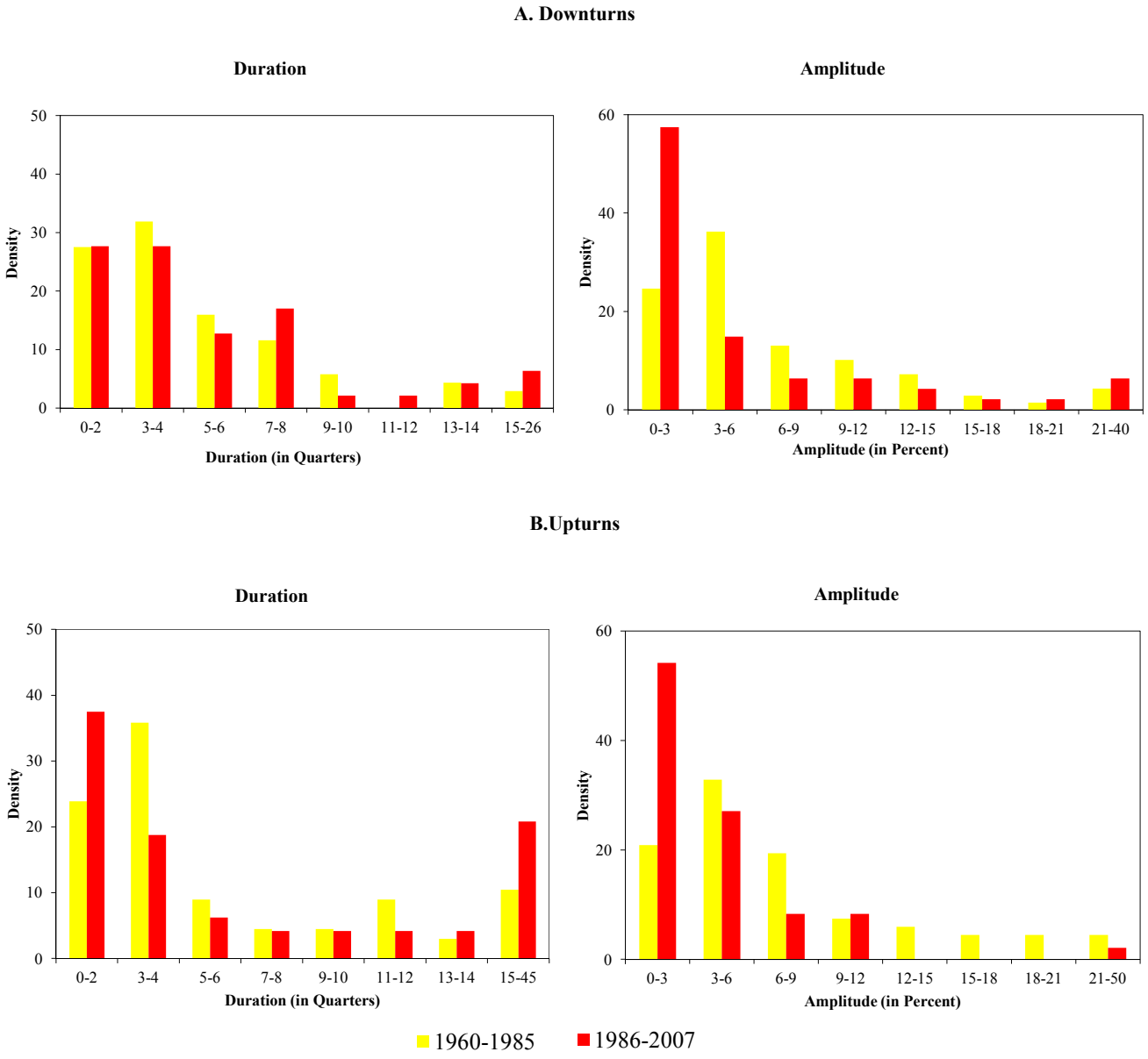
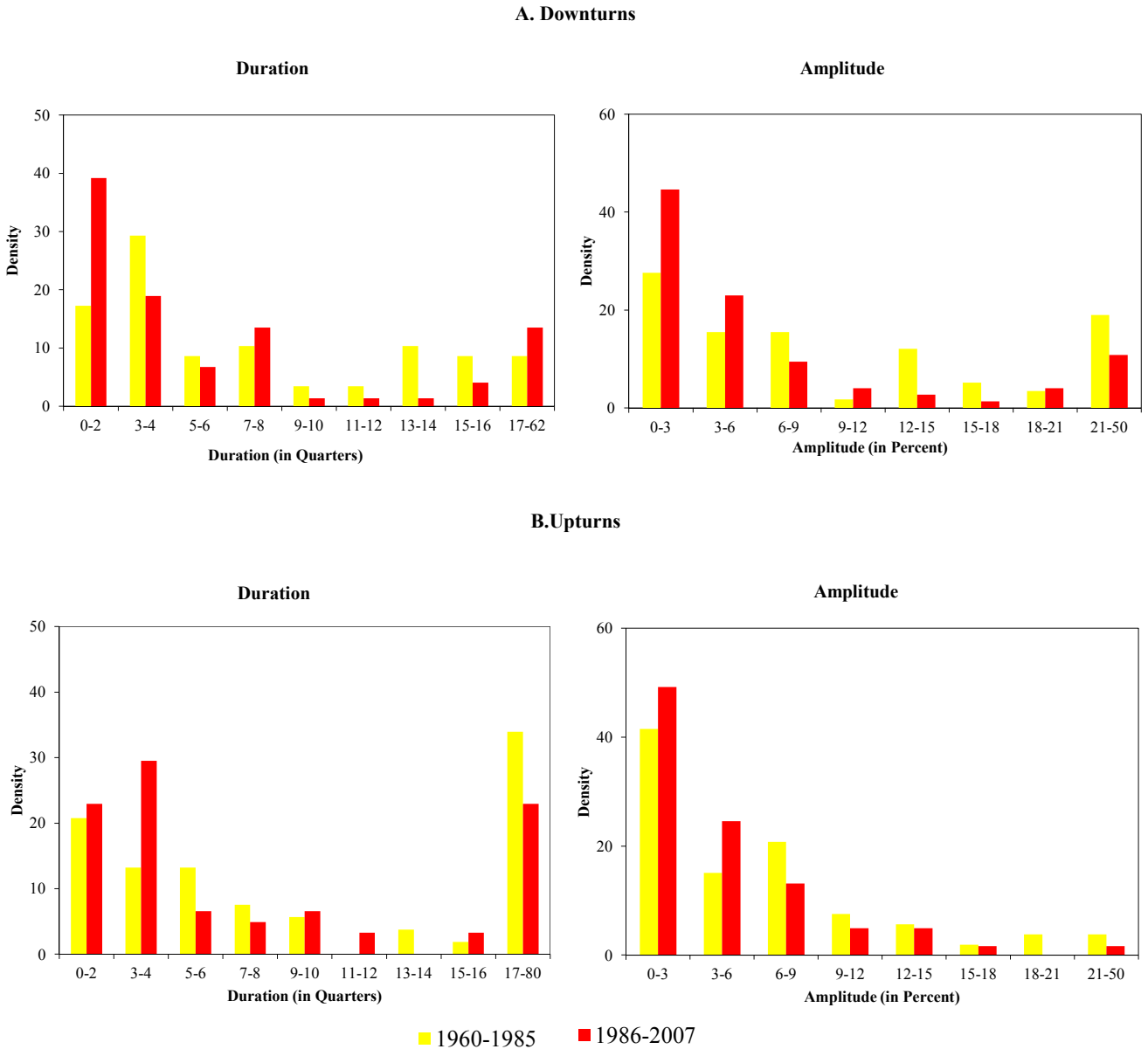
Figure 1A. Distributions of Duration and Amplitude: Credit Cycles



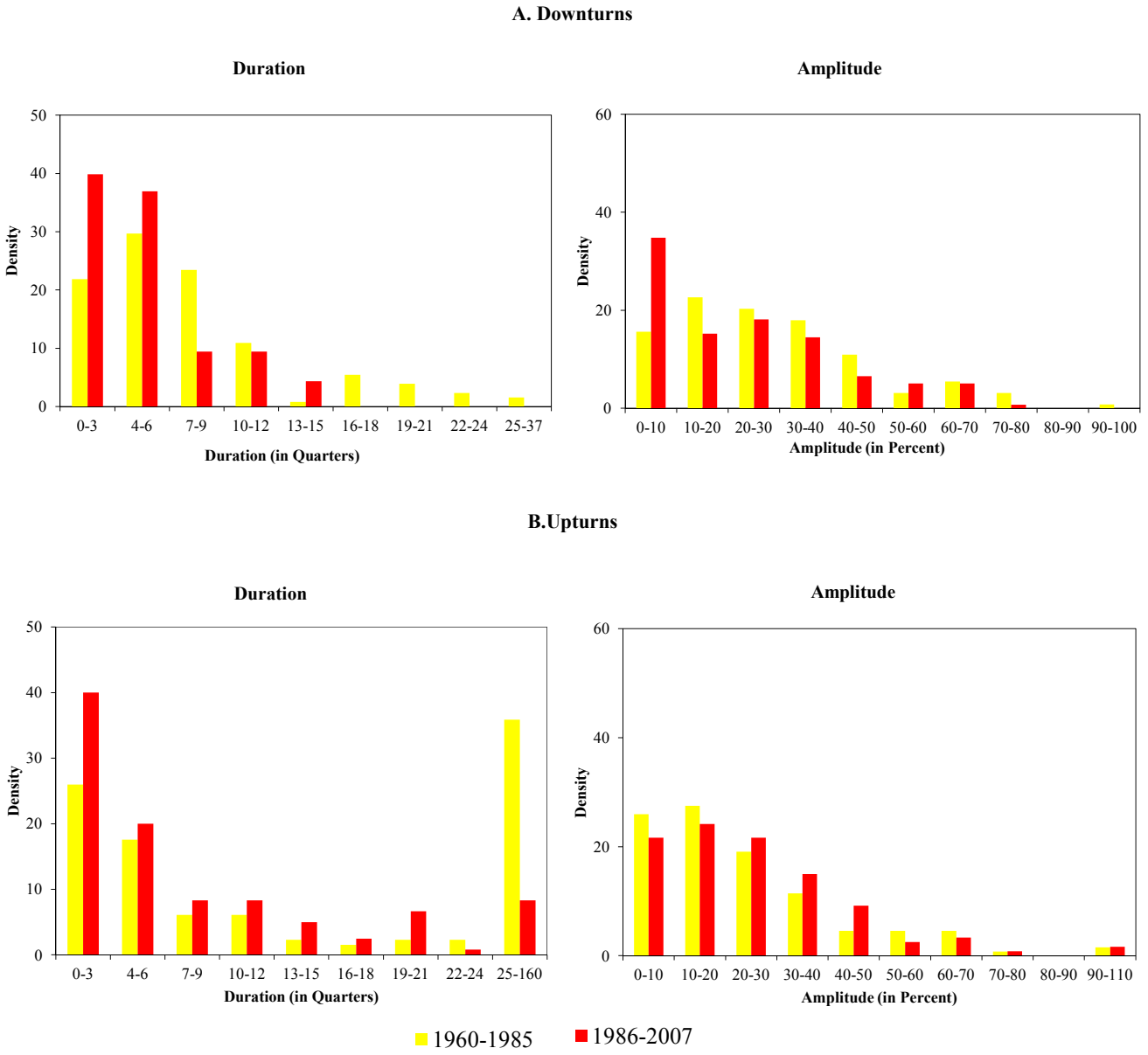
Notes : Duration for the downturns is calculated as the time from peak to trough. For upturns, the duration is calculated as the time it takes to attain the level reached at the previous peak. The amplitude for downturns is the peak to trough decline in credit. The amplitude of an upturn is calculated as the percentage change in credit for the four quarters after the trough. The x-axis for each graph provides the ranges of values for duration and amplitude, respectively. The y-axis is the density of each range as a part of the total, i.e. the height of the bar represents the percentage of observations for which the duration or amplitude falls within the range specified on the x-axis. The last of the sample subsets on the x-axis is larger than the rest and shows the percentage of extreme values.

Figure 1B. Distributions of Duration and Amplitude: House Price Cycles



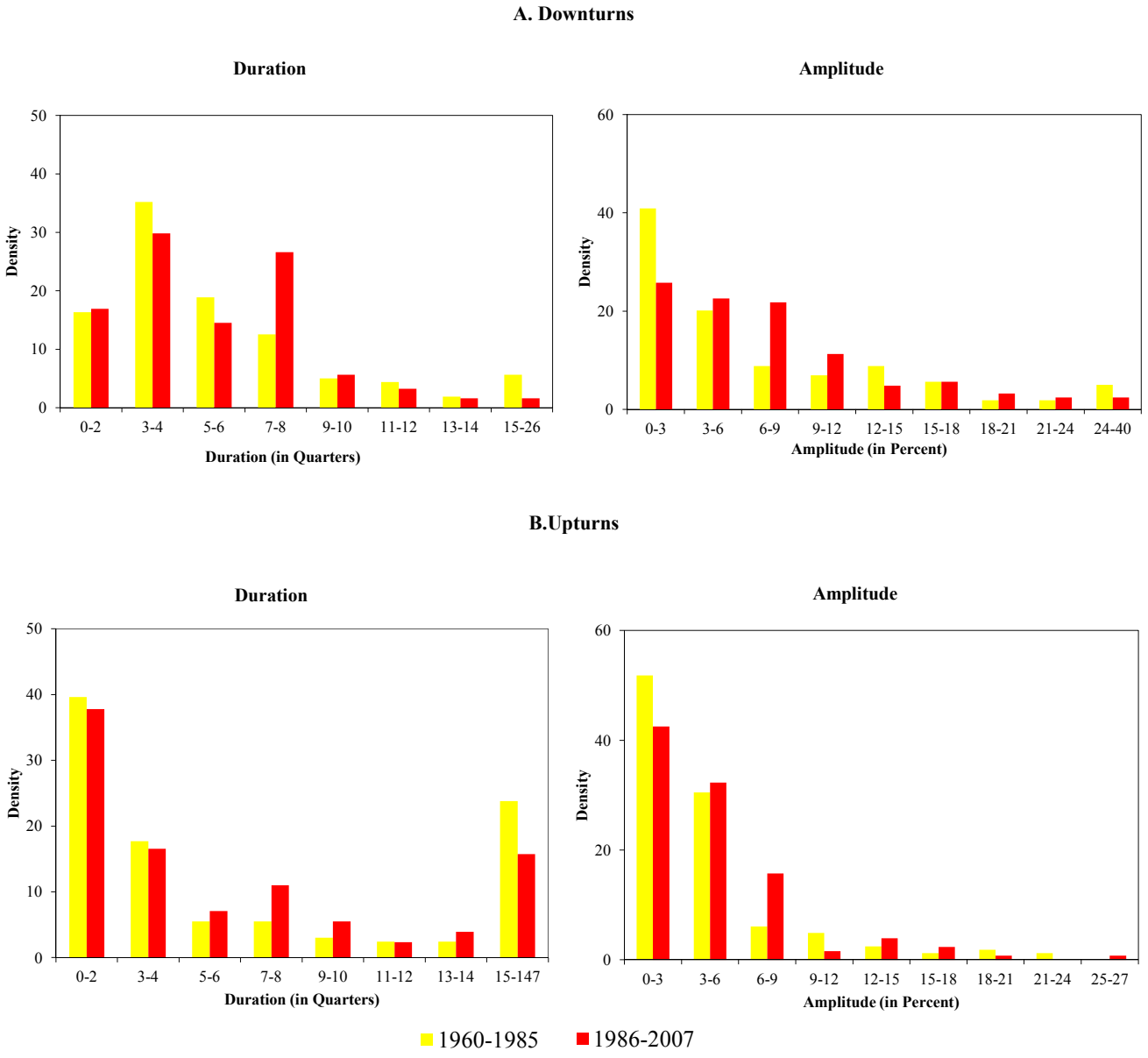
Notes : Duration for the downturns is calculated as the time from peak to trough. For upturns, the duration is calculated as the time it takes to attain the level reached at the previous peak. The amplitude for downturns is the peak to trough decline in house price. The amplitude of an upturn is calculated as the percentage change in house price for the four quarters after the trough. The x-axis for each graph provides the ranges of values for duration and amplitude, respectively. The y-axis is the density of each range as a part of the total, i.e. the height of the bar represents the percentage of observations for which the duration or amplitude falls within the range specified on the x-axis. The last of the sample subsets on the x-axis is larger than the rest and shows the percentage of extreme values.

Figure 1C. Distributions of Duration and Amplitude: Equity Price Cycles



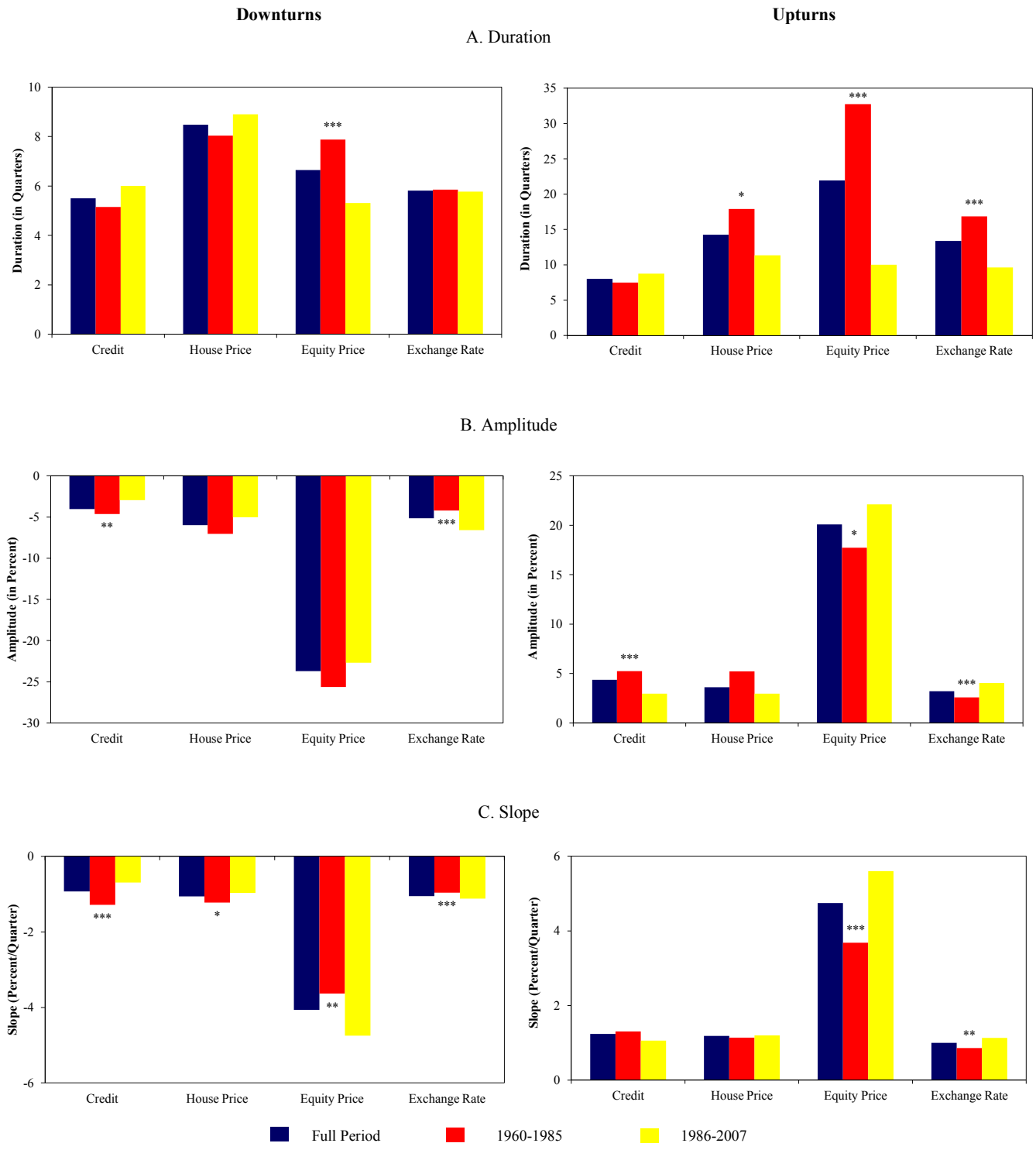
Notes : Duration for the downturns is calculated as the time from peak to trough. For upturns, the duration is calculated as the time it takes to attain the level reached at the previous peak. The amplitude for downturns is the peak to trough decline in equity price. The amplitude of an upturn is calculated as the percentage change in equity price for the four quarters after the trough. The x-axis for each graph provides the ranges of values for duration and amplitude, respectively. The y-axis is the density of each range as a part of the total, i.e. the height of the bar represents the percentage of observations for which the duration or amplitude falls within the range specified on the x-axis. The last of the sample subsets on the x-axis is larger than the rest and shows the percentage of extreme values.

Figure 1D. Distributions of Duration and Amplitude: Exchange Rate Cycles



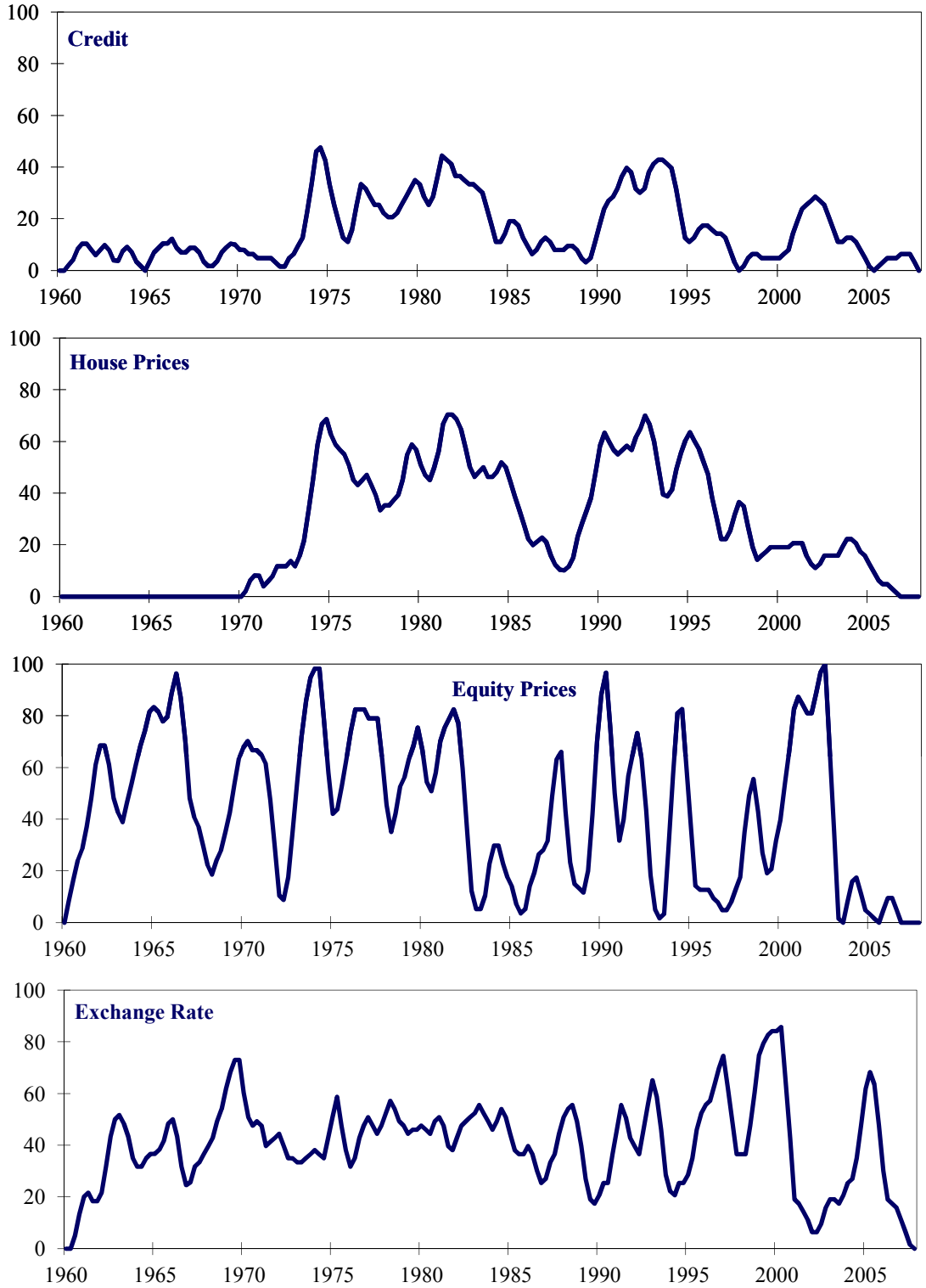
Notes : Duration for the downturns is calculated as the time from peak to trough. For upturns, the duration is calculated as the time it takes to attain the level reached at the previous peak. The amplitude for downturns is the peak to trough decline in exchange rate. The amplitude of an upturn is calculated as the percentage change in exchange rate for the four quarters after the trough. The x-axis for each graph provides the ranges of values for duration and amplitude, respectively. The y-axis is the density of each range as a part of the total, i.e. the height of the bar represents the percentage of observations for which the duration or amplitude falls within the range specified on the x-axis. The last of the sample subsets on the x-axis is larger than the rest and shows the percentage of extreme values.

Figure 2. Financial Cycles: Sub-Samples



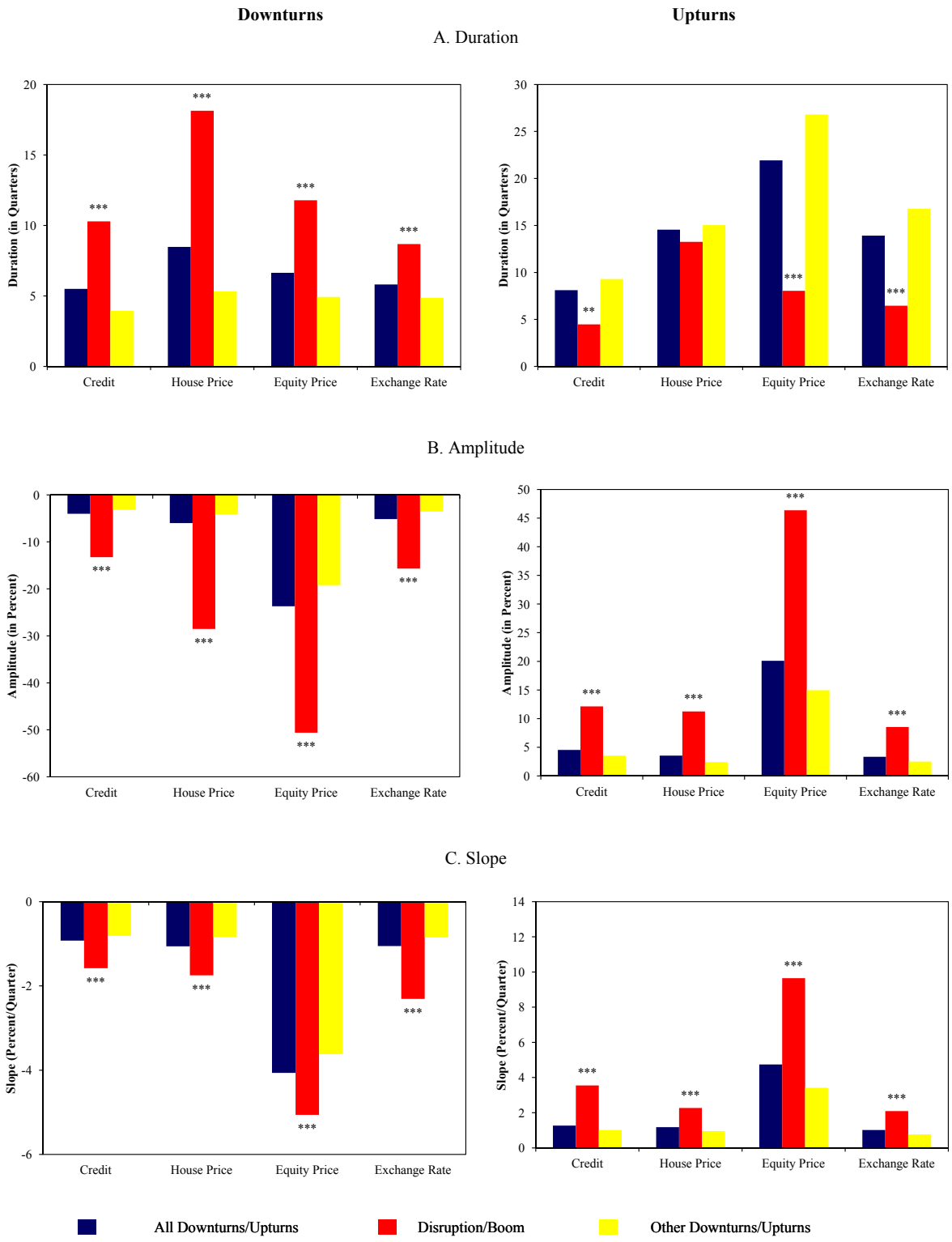
Notes : Means are shown for duration, whereas medians are shown for amplitude and slope. Duration for downturns is the number of quarters between peak and trough. Duration for recoveries is the time it takes to attain the level at the previous peak after the trough. The amplitude for the downturns is calculated based on the decline in each respective variable during the peak to trough decline in the financial variable. The amplitude for the recoveries is calculated based on the one year change in each respective variable after the trough in each respective financial variable. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which the financial variable has reached the level at its last peak, divided by the duration. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between the 1960-1985 sub-sample relative to the 1986-2007 sub-sample.

Figure 3. Coincidence of Financial Downturns Across Countries
(in percent)



Notes: Share of countries experiencing episodes of credit, house price, equity price, and exchange rate downturns.

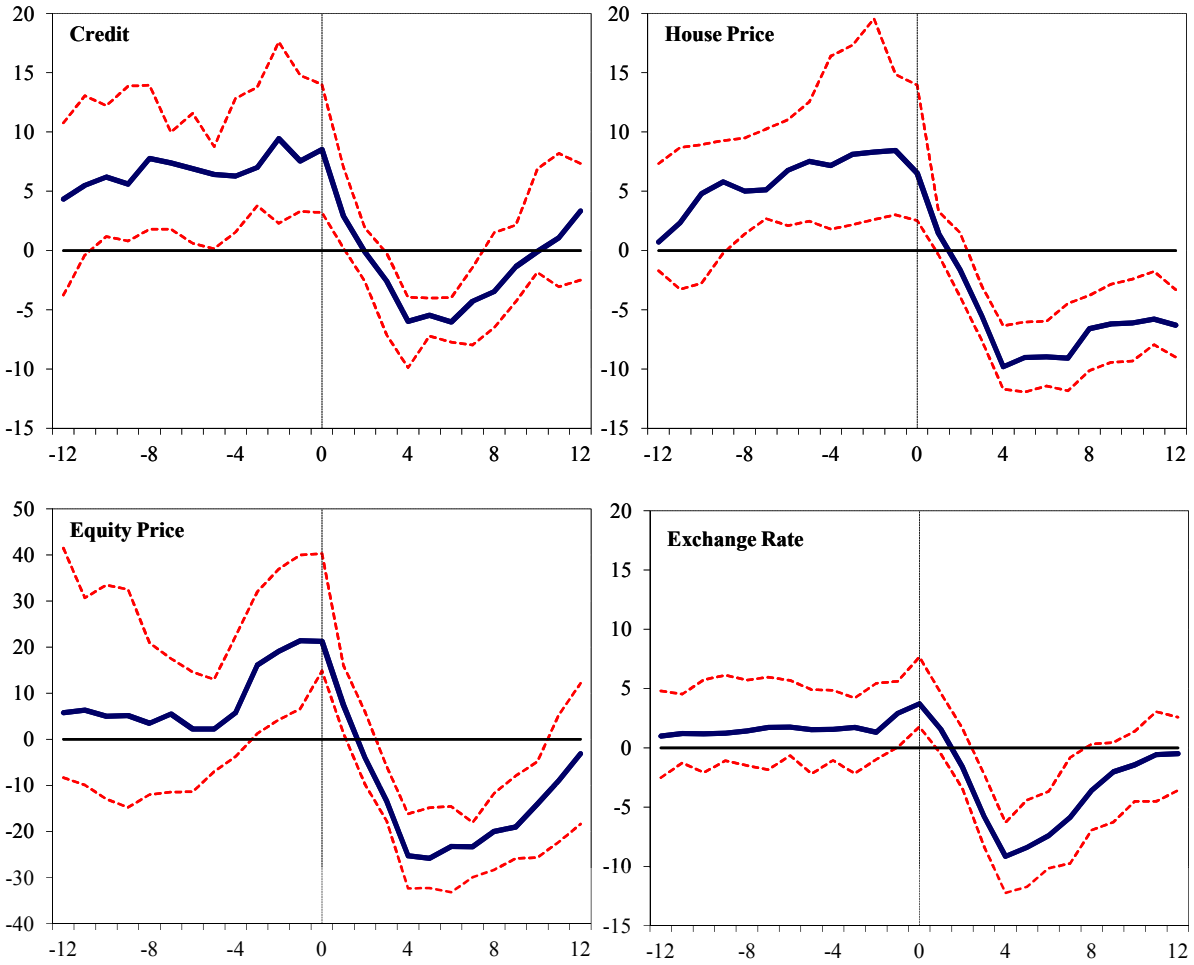
Figure 4. Financial Cycles: Downturns/ Upturns and Disruptions



Notes : Means are shown for duration, whereas medians are shown for amplitude and slope. Duration for downturns is the number of quarters between peak and trough. Duration for recoveries is the time it takes to attain the level at the previous peak after the trough. The amplitude for the downturns is calculated based on the decline in each respective variable during the peak to trough decline in the financial variable. The amplitude for the recoveries is calculated based on the one year change in each respective variable after the trough in each respective financial variable. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which the financial variable has reached the level at its last peak, divided by the duration. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between disruptions (booms) and other downturns (upturns).

Figure 5A. Evolution of Financial Disruptions

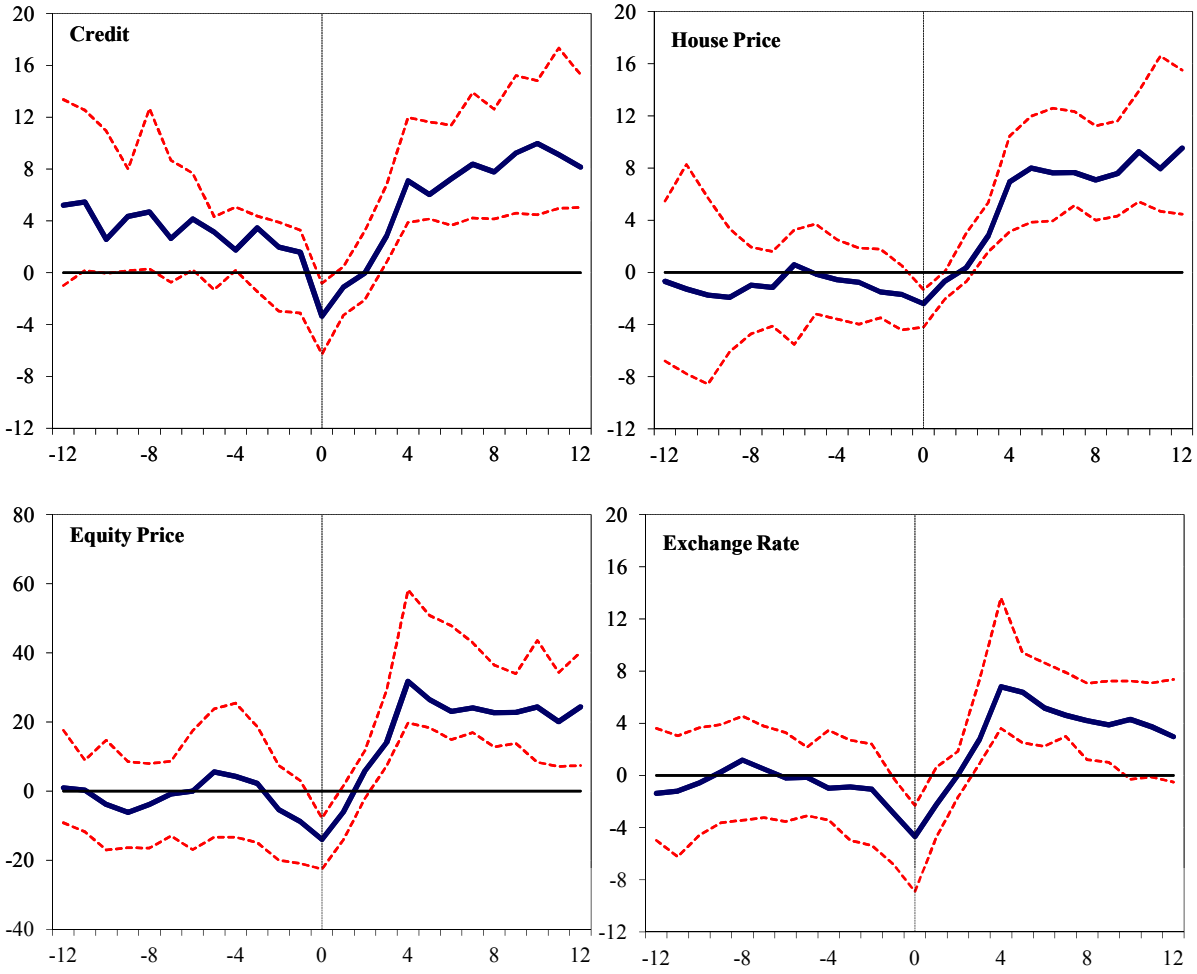
(Percent change from a year earlier; zero denotes peak; x-axis quarter)



Notes: In each panel, the solid line denotes the median year-over-year growth rate of the respective variable during respective financial disruptions, while dotted lines correspond to the upper and lower quartiles. Zero is the quarter at which a financial disruption begins.

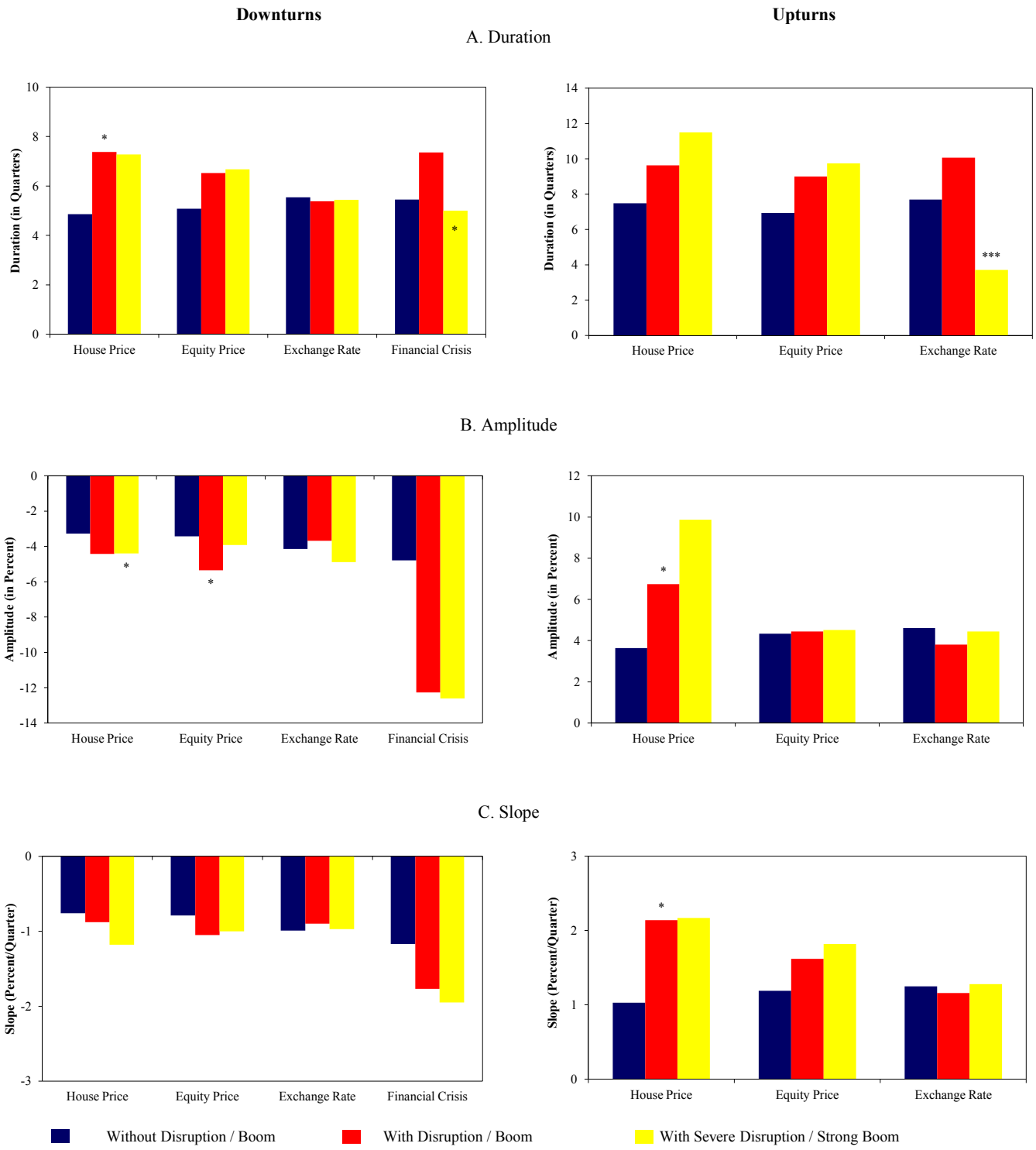
Figure 5B. Evolution of Financial Booms

(Percent change from a year earlier; zero denotes trough; x-axis quarter)



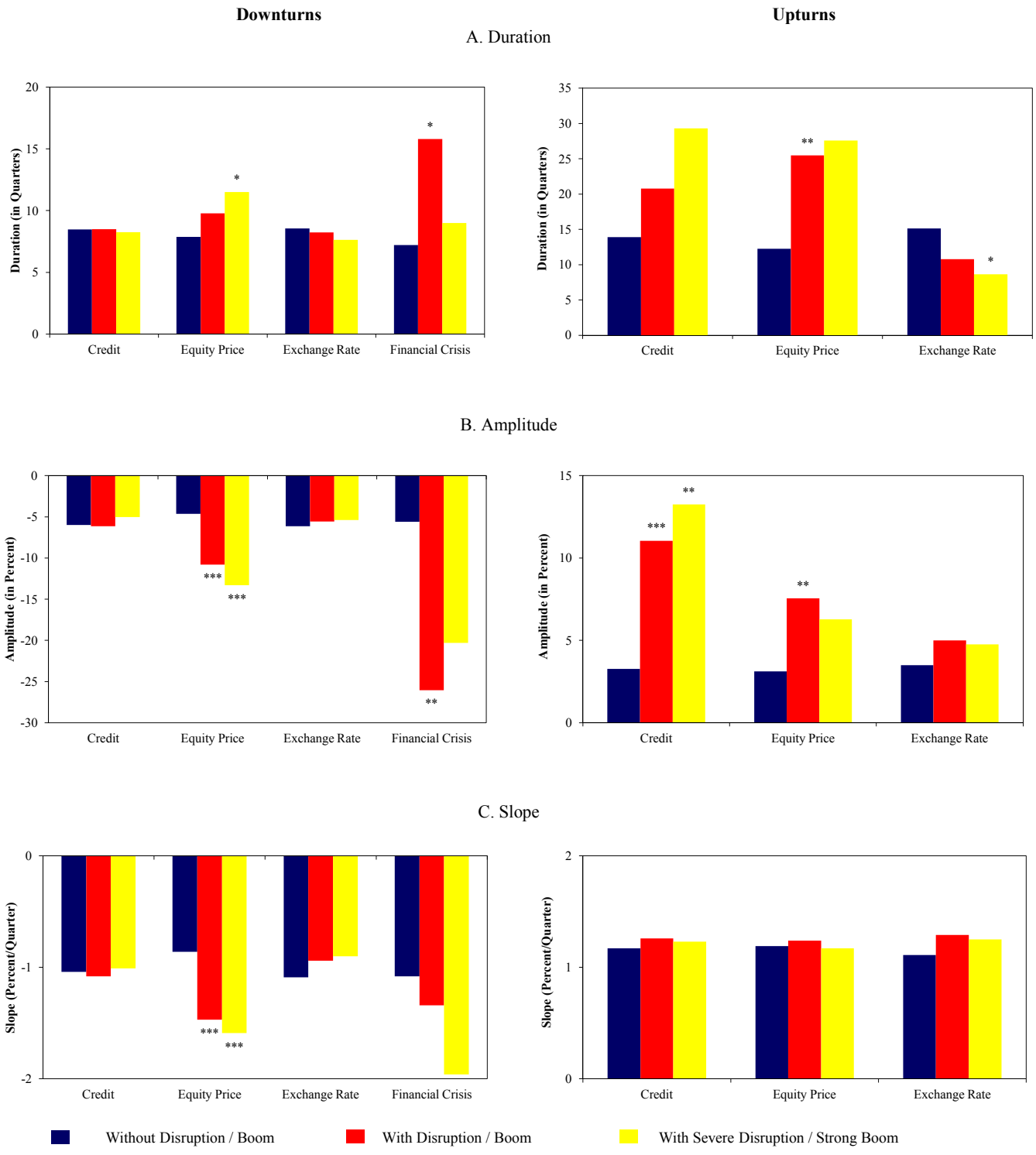
Notes: In each panel the solid line denotes the median year-over-year growth rate of the respective variable during respective financial booms, while the dotted lines correspond to the upper and lower quartiles. Zero is the quarter at which a boom begins.

Figure 6A. Credit Cycles Associated with Disruptions and Booms



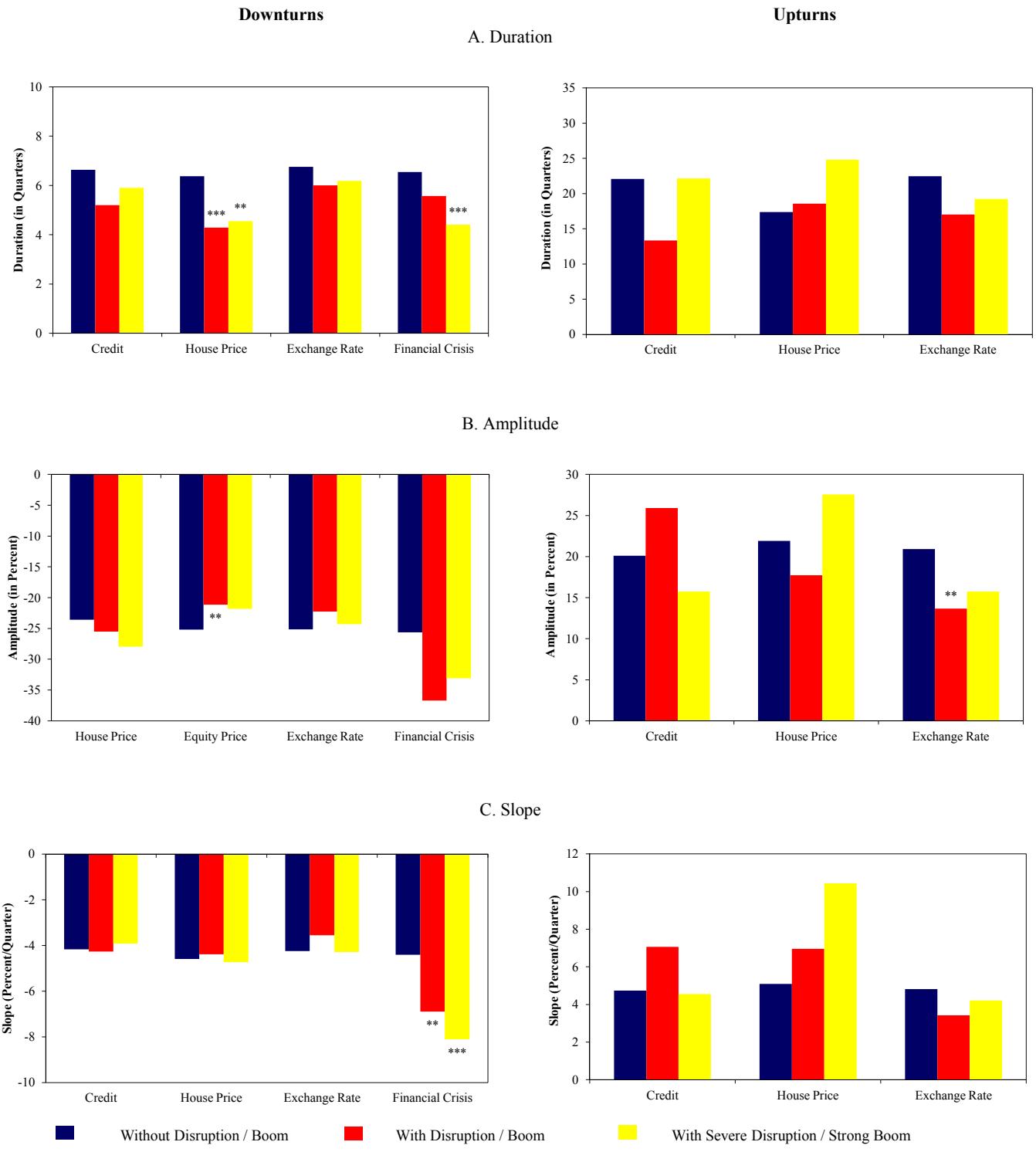
Notes : Means are shown for duration, whereas medians are shown for amplitude and slope. Duration for downturns is the number of quarters between peak and trough. Duration for upturns is the time it takes to attain the level at the previous peak after the trough. The amplitude for the downturns is calculated based on the decline in credit during the peak to trough decline credit. The amplitude for the upturns is calculated based on the one year change in credit after the trough. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which credit has reached the level at its last peak, divided by the duration. The horizontal axis shows the disruption (boom) that the downturn (upturn) is associated with. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between credit downturns (upturns) with a disruption (boom) and without, and between credit downturns (upturns) with a severe disruption (strong boom) and without a disruption (boom).

Figure 6B. House Price Cycles Associated with Disruptions and Booms



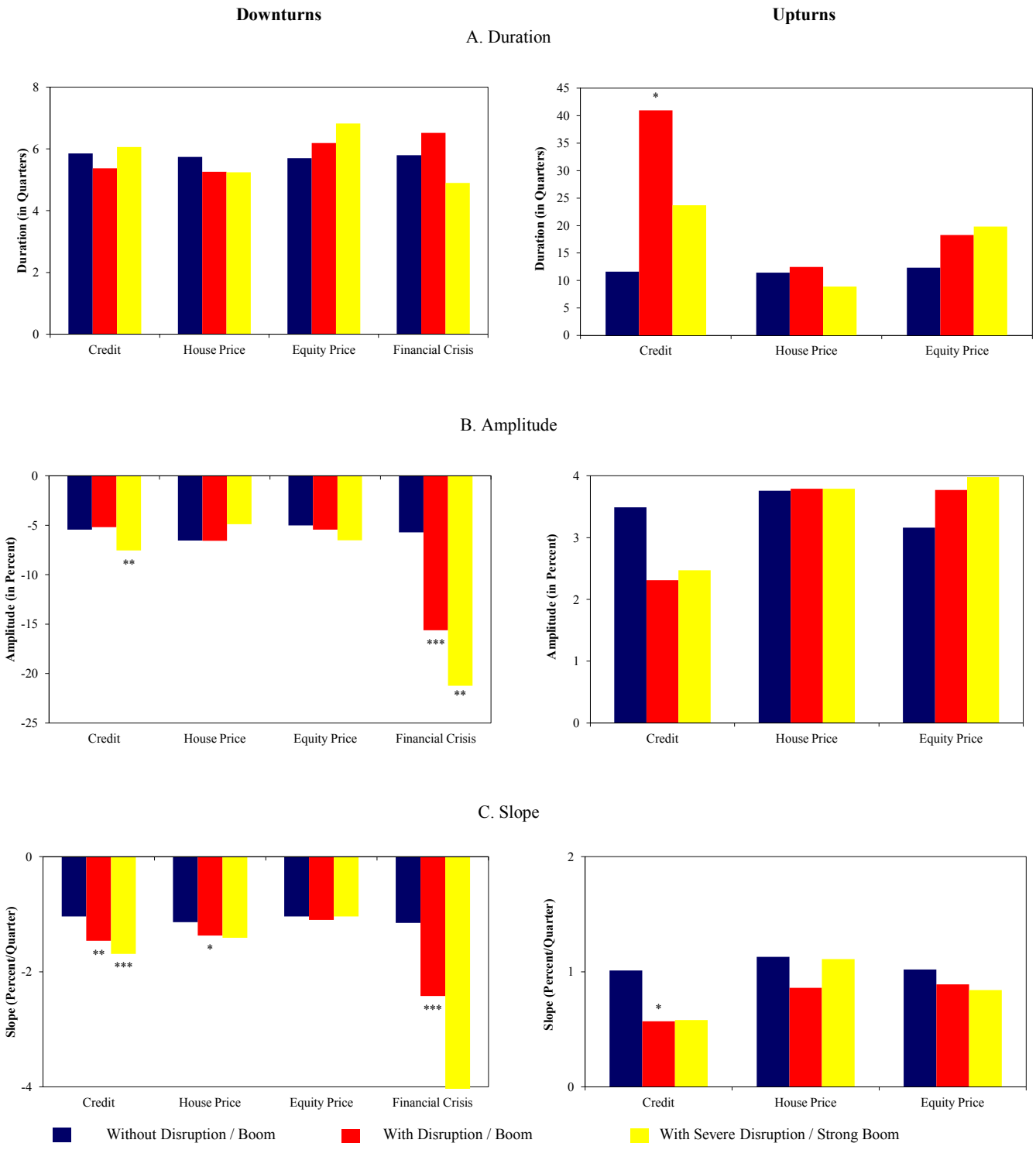
Notes : Means are shown for duration, whereas medians are shown for amplitude and slope. Duration for downturns is the number of quarters between peak and trough. Duration for upturns is the time it takes to attain the level at the previous peak after the trough. The amplitude for the downturns is calculated based on the decline in house price during the peak to trough decline house price. The amplitude for the upturns is calculated based on the one year change in house price after the trough. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which house price has reached the level at its last peak, divided by the duration. The horizontal axis shows the disruption (boom) that the downturn (upturn) is associated with. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between house price downturns (upturns) with a disruption (boom) and without, and between house price downturns (upturns) with a severe disruption (strong boom) and without a disruption (boom).

Figure 6C. Equity Prices Cycles Associated with Disruptions and Booms



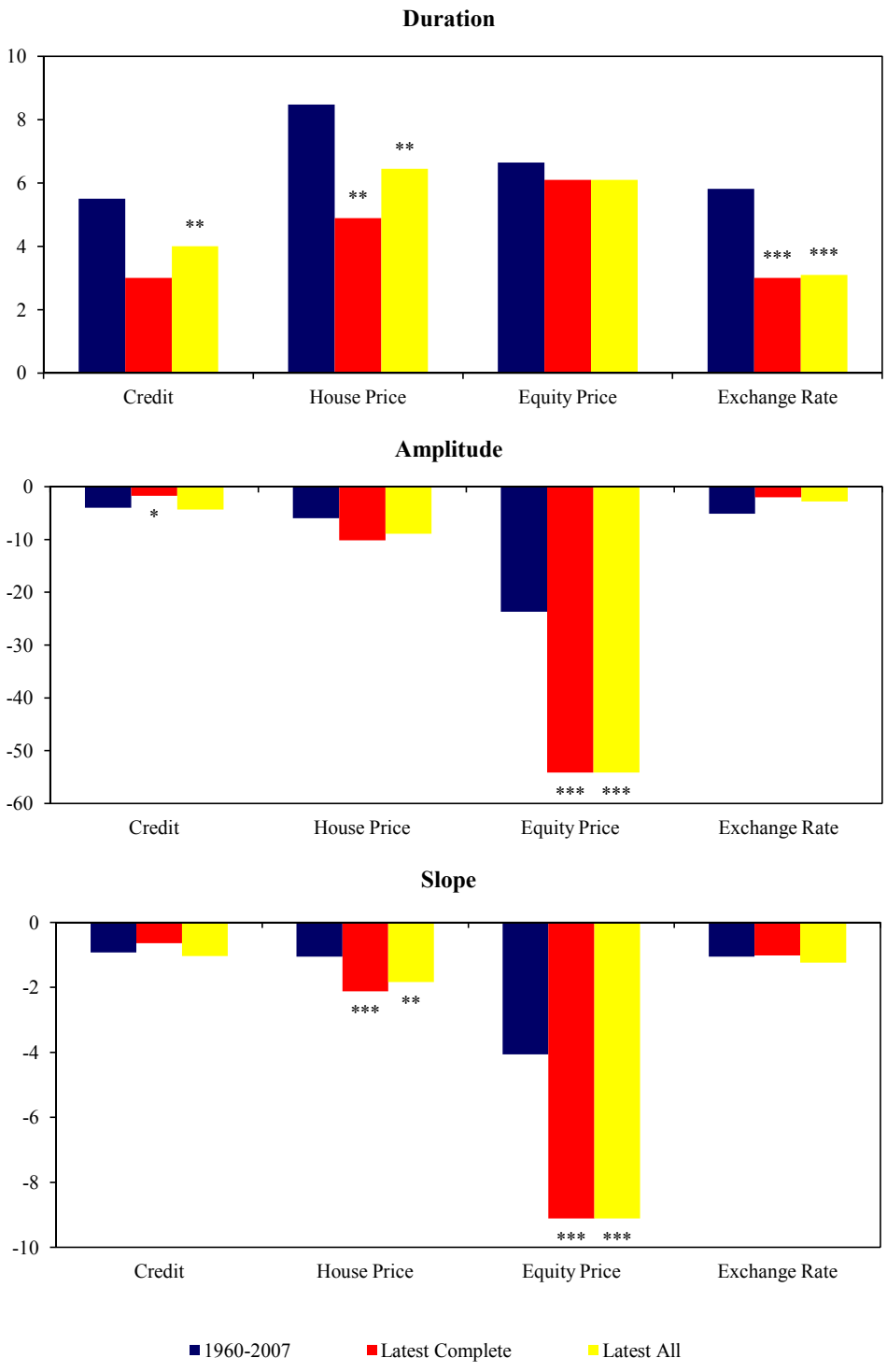
Notes : Means are shown for duration, whereas medians are shown for amplitude and slope. Duration for downturns is the number of quarters between peak and trough. Duration for upturns is the time it takes to attain the level at the previous peak after the trough. The amplitude for the downturns is calculated based on the decline in equity price during the peak to trough decline equity price. The amplitude for the upturns is calculated based on the one year change in equity price after the trough. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which equity price has reached the level at its last peak, divided by the duration. The horizontal axis shows the disruption (boom) that the downturn (upturn) is associated with. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between equity price downturns (upturns) with a disruption (boom) and without, and between equity price downturns (upturns) with a severe disruption (strong boom) and without a disruption (boom).

Figure 6D. Exchange Rate Cycles Associated with Disruptions and Booms



Notes : Means are shown for duration, whereas medians are shown for amplitude and slope. Duration for downturns is the number of quarters between peak and trough. Duration for upturns is the time it takes to attain the level at the previous peak after the trough. The amplitude for the downturns is calculated based on the decline in exchange rate during the peak to trough decline exchange rate. The amplitude for the upturns is calculated based on the one year change in exchange rate after the trough. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which exchange rate has reached the level at its last peak, divided by the duration. The horizontal axis shows the disruption (boom) that the downturn (upturn) is associated with. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between exchange rate downturns (upturns) with a disruption (boom) and without, and exchange rate downturns (upturns) with a severe disruption (strong boom) and without a disruption (boom).

Figure 7. Financial Cycles: Historical vs Latest Episodes



Notes: For duration, means are plotted. For slope and amplitude, medians are plotted. Duration for downturns is the number of quarters between peak and trough. The amplitude for the downturns is calculated based on the decline in each respective variable during the peak to trough decline in the financial variable. The slope of the downturn is the amplitude from peak to trough divided by the duration. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance is based on the difference between means or medians of the 1960-2007 downturns and the latest downturns.

Table 1A. Financial Cycles: Basic Features

	Downturns					Upturns				
	Number	Time in Downturn	Duration	Amplitude	Slope	Number	Time in Upturn	Duration	Amplitude	Slope
Credit										
Full Period	114	0.30	5.50	-4.03	-0.93	115	0.20	8.00	4.36	1.23
		[0.30]	*[4.00]*	*[-6.68]*	*[-1.25]*		*[0.23]*	*[4.00]*	*[6.44]*	*[2.01]*
1960-1985	67	0.30	5.15	-4.64**	-1.28***	65	0.25**	7.47	5.24***	1.30
		[0.23]	*[4.00]*	*[-7.00]*	*[-1.46**]*		*[0.24**]*	*[4.00]*	*[8.08***]*	*[2.23]*
1986-2007	47	0.30	6.00	-2.94	-0.69	50	0.16	8.74	2.97	1.06
		[0.25]	*[4.00]*	*[-6.23]*	*[-0.96]*		*[0.14]*	*[4.00]*	*[4.23]*	*[1.69]*
House Price										
Full Period	114	0.41	8.47	-5.99	-1.06	114	0.31	14.25	3.62	1.19
		[0.40]	*[6.00]*	*[-10.85]*	*[-1.22]*		*[0.32]*	*[6.50]*	*[5.64]*	*[1.54]*
1960-1985	56	0.55***	8.04	-7.04	-1.22*	47	0.33	17.89*	5.21	1.14
		*[0.56***]*	*[6.00]*	*[-12.07]*	*[-1.40**]*		*[0.31]*	*[8.00]*	*[7.21*]*	*[1.70]*
1986-2007	58	0.34	8.90	-5.02	-0.97	67	0.33	11.34	2.97	1.20
		[0.29]	*[5.50]*	*[-9.67]*	*[-1.04]*		*[0.32]*	*[5.00]*	*[4.55]*	*[1.42]*
Equity Price										
Full Period	245	0.45	6.64	-23.70	-4.07	251	0.38	21.93	20.09	4.75
		[0.44]	*[5.00]*	*[-27.38]*	*[-4.70]*		*[0.39]*	*[7.00]*	*[24.08]*	*[5.99]*
1960-1985	127	0.57***	7.88***	-25.63	-3.63**	127	0.38	32.77***	17.74*	3.68***
		*[0.59***]*	*[6.00***]*	*[-28.97]*	*[-4.11**]*		*[0.37]*	*[11.00***]*	*[22.55]*	*[5.12**]*
1986-2007	118	0.35	5.31	-22.68	-4.75	124	0.41	10.01	22.11	5.60
		[0.35]	*[4.00]*	*[-25.67]*	*[-5.35]*		*[0.42]*	*[5.00]*	*[25.66]*	*[6.96]*
Exchange Rate										
Full Period	279	0.44	5.81	-5.14	-1.06	291	0.33	13.38	3.23	1.00
		[0.45]	*[5.00]*	*[-7.63]*	*[-1.37]*		*[0.31]*	*[5.50]*	*[4.32]*	*[1.35]*
1960-1985	151	0.46	5.85	-4.22***	-0.96***	151	0.29*	16.84***	2.59***	0.86**
		[0.45]	*[4.00]*	*[-7.07]*	*[-1.26*]*		*[0.29*]*	*[5.00]*	*[3.70**]*	*[1.16**]*
1986-2007	128	0.42	5.77	-6.58	-1.12	140	0.38	9.62	4.05	1.13
		[0.42]	*[5.00]*	*[-8.29]*	*[-1.51]*		*[0.35]*	*[6.00]*	*[5.01]*	*[1.55]*

Notes : The statistics for "Amplitude" and "Slope" refer to sample medians. Means are in brackets. For the statistics "Time in Downturn", "Time in Upturn", and "Duration" means are shown with medians in brackets. Time in Upturn (Downturn) refers to the ratio of the number of quarters in which the financial variable is in an upturn (downturn) over the given sample period. Duration for downturns is the number of quarters between peak and trough. Duration for upturns is the time it takes to attain the level at the previous peak after the trough. The amplitude for the downturns is calculated based on the decline in each respective variable during the peak to trough decline in the financial variable. The amplitude for the upturns is calculated based on the one year change in each respective variable after the trough in each respective financial variable. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which the financial variable has reached the level at its last peak, divided by the duration. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between the 1960-1985 period and the 1986-2007 period.

Table 1B. Financial Cycles: Financial Variables

	Downturns				Upturns			
	Credit	House Price	Equity Price	Exchange Rate	Credit	House Price	Equity Price	Exchange Rate
Credit								
Full Period	-4.03	-2.76	-3.60	0.89	4.36	-0.55	5.78	-0.02
	[-6.68]	*[-3.73]*	*[-1.49]*	*[1.36]*	*[6.44]*	*[0.52]*	*[8.57]*	*[-1.20]*
1960-1985	-4.64**	-4.02	-9.40***	0.75	5.24***	-1.10	4.97	-0.60
	[-7.00]	*[-4.57]*	*[-7.77**]*	*[1.73]*	*[8.08***]*	*[-0.61]*	*[5.75]*	*[-1.53]*
1986-2007	-2.94	-1.23	2.91	1.24	2.97	0.24	6.17	1.20
	[-6.23]	*[-2.86]*	*[7.25]*	*[0.85]*	*[4.23]*	*[1.69]*	*[12.34]*	*[-0.75]*
House Price								
Full Period	3.53	-5.99	-0.29	-0.11	4.87	3.62	7.76	-0.01
	[4.00]	*[-10.85]*	*[6.82]*	*[-0.46]*	*[5.72]*	*[5.64]*	*[12.27]*	*[0.22]*
1960-1985	2.77	-7.04	-3.79	-0.13	4.24	5.21	3.77	-0.24
	[2.82]	*[-12.07]*	*[4.16]*	*[0.60]*	*[5.61]*	*[7.21*]*	*[9.52]*	*[0.14]*
1986-2007	4.02	-5.02	1.05	0.26	4.96	2.97	9.62	0.25
	[5.13]	*[-9.67]*	*[9.39]*	*[-1.49]*	*[5.80]*	*[4.55]*	*[14.20]*	*[0.28]*
Equity Price								
Full Period	5.51	1.31	-23.70	1.06	5.22	1.39	20.09	0.20
	[9.62]	*[2.19]*	*[-27.38]*	*[1.21]*	*[5.68]*	*[2.44]*	*[24.08]*	*[0.15]*
1960-1985	6.72**	-0.50***	-25.63	0.56	5.51	0.69*	17.74*	0.04
	*[11.75**]*	*[0.46]*	*[-28.97]*	*[0.80]*	*[5.93]*	*[0.86**]*	*[22.55]*	*[0.17]*
1986-2007	4.89	2.55	-22.68	1.88	4.85	2.29	22.11	0.64
	[7.46]	*[3.22]*	*[-25.67]*	*[1.66]*	*[5.44]*	*[3.45]*	*[25.66]*	*[0.12]*
Exchange Rate								
Full Period	6.73	2.09	6.42	-5.14	5.37	1.73	2.86	3.23
	[10.10]	*[3.11]*	*[12.80]*	*[-7.63]*	*[5.32]*	*[2.27]*	*[5.21]*	*[4.32]*
1960-1985	6.57	0.33***	0.61***	-4.22***	5.53	0.14**	-3.95***	2.59***
	[10.82]	*[0.61**]*	*[3.80***]*	*[-7.07]*	*[5.14]*	*[0.75**]*	*[-0.15***]*	*[3.70**]*
1986-2007	6.85	3.21	12.63	-6.58	5.31	2.48	8.66	4.05
	[9.30]	*[4.65]*	*[22.45]*	*[-8.29]*	*[5.51]*	*[3.17]*	*[10.66]*	*[5.01]*

Notes: All statistics correspond to sample medians. Means are in brackets. The amplitude for the downturns is calculated based on the decline in each respective variable during the peak to trough decline in the financial variable. The amplitude for the upturns is calculated based on the one year change in each respective variable after the trough in each respective financial variable. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between the 1960-1985 period and the 1986-2007 period.

Table 2. Synchronization of Cycles Within Countries

A. Full Sample *(Mean and Median)*

		Mean			
		Credit	House Price	Equity Price	Exchange Rate
Median	Credit	…	0.68	0.57	0.53
	House Price	0.68	…	0.55	0.53
	Equity Price	0.57	0.57	…	0.46
	Exchange Rate	0.52	0.55	0.46	…

B. Sub-samples (*Median*)

		1986-2007			
		Credit	House Price	Equity Price	Exchange Rate
1960-1985	Credit	…	0.74	0.63***	0.56
	House Price	0.69	…	0.60*	0.55
	Equity Price	0.51	0.53	…	0.46
	Exchange Rate	0.52	0.58	0.44	…

C. Sub-samples (*Mean*)

		1986-2007			
		Credit	House Price	Equity Price	Exchange Rate
1960-1985	Credit	…	0.70	0.62***	0.56
	House Price	0.66	…	0.58	0.55
	Equity Price	0.52	0.53	…	0.47
	Exchange Rate	0.51	0.54	0.45	…

Notes : Each cell represents the mean or the median of the concordance statistics of the respective two cycles within countries. Concordance is calculated as the fraction of time that the two cycles are in the same phase. Part A presents the means and medians of concordances within countries for the full sample, where the numbers above the diagonal are the means, and the numbers below the diagonal are the medians. Parts B and C compare the means and medians of the concordance statistics for the sub-periods, where the numbers above the diagonal are the means (medians) for the 1986-2007 sub-sample, and the numbers below the diagonal are the means (medians) for the 1960-1985 sub-sample. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between the 1960-1985 period and the 1986-2007 period.

Table 3A. Synchronization of Cycles Across Countries

	Full Sample	1960-1985	1986-2007
Credit			
Mean	0.75	0.73	0.67
Median	0.75	0.75	0.73
Max	0.82	0.81	0.82
Min	0.67	0.58	0.00
Standard Deviation	4.14	6.72	23.28
House Price			
Mean	0.59	0.58	0.60
Median	0.59	0.58**	0.63
Max	0.66	0.62	0.70
Min	0.44	0.00	0.36
Standard Deviation	6.46	23.40	9.36
Equity Price			
Mean	0.70	0.63***	0.75
Median	0.71	0.63***	0.76
Max	0.77	0.71	0.80
Min	0.63	0.00	0.66
Standard Deviation	3.53	19.30	4.21
Exchange Rate			
Mean	0.55	0.51***	0.60
Median	0.56	0.51***	0.65
Max	0.61	0.56	0.69
Min	0.43	0.47	0.37
Standard Deviation	4.61	2.47	8.58

Notes: Each cell refers to the concordance statistic for the respective cycles across countries. Concordance is calculated as the fraction of time that two cycles are in the same phase. First the concordance statistic for each country pair is computed and then the relevant statistic for each financial variable over the full sample is calculated. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between the 1960-1985 period and the 1986-2007 period.

Table 3B. Synchronization with Financial Cycles in the U.S.

	Full Sample	1960-1985	1986-2007
Credit			
Mean	0.75	0.75	0.73
Median	0.75	0.77	0.74
Max	0.82	0.88	0.88
Min	0.65	0.58	0.47
Standard Deviation	5.56	7.88	9.85
House Price			
Mean	0.66	0.62	0.68
Median	0.69	0.64*	0.72
Max	0.84	0.75	0.84
Min	0.42	0.38	0.31
Standard Deviation	12.06	10.76	15.31
Equity Price			
Mean	0.66	0.62***	0.71
Median	0.67	0.61***	0.69
Max	0.77	0.81	0.82
Min	0.55	0.42	0.60
Standard Deviation	6.66	9.78	5.89
Exchange Rate			
Mean	0.43	0.48***	0.37
Median	0.43	0.46	0.35
Max	0.61	0.77	0.49
Min	0.32	0.33	0.28
Standard Deviation	8.40	12.48	6.62

Notes: Each cell refers to the concordance of the respective financial cycle with the U.S. cycle. Concordance is calculated as the fraction of time that the two cycles are in the same phase. First the concordance statistic for each country and the U.S. is computed and then the relevant statistic for each financial variable over the full sample is calculated. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between means or medians for the 1960-1985 period and the 1986-2007 period.

Table 4A. Financial Dowturns and Disruptions

	Financial Downturn				Other Financial Variables			
	Number of Events	Duration	Amplitude	Slope	Credit	House Price	Equity Price	Exchange Rate
A. Credit Downturns	114	5.50	-4.03	-0.93	-4.03	-2.76	-3.60	0.89
Credit Crunch	28	10.29***	-13.26***	-1.58***	-13.26***	-12.11***	0.97	1.42
Other Credit Downturns	86	3.94	-3.18	-0.81	-3.18	-1.82	-4.53	0.89
B. House Price Downturns	114	8.47	-5.99	-1.06	3.53	-5.99	-0.29	-0.11
House Price Busts	28	18.14***	-28.52***	-1.75***	1.94	-28.52***	6.10	-1.42
Other House Price Downturns	86	5.33	-4.14	-0.84	4.15	-4.14	-0.29	0.54
C. Equity Price Downturns	245	6.64	-23.70	-4.07	5.51	1.31	-23.70	1.06
Equity Price Busts	61	11.79***	-50.62***	-5.06***	12.07***	4.59	-50.62***	3.44***
Other Equity Price Downturns	184	4.93	-19.20	-3.62	4.80	0.85	-19.20	0.58
D. Exchange Rate Downturns	279	5.81	-5.14	-1.06	6.73	2.09	6.42	-5.14
Exchange Rate Collapses	69	8.68***	-15.69***	-2.31***	7.22	-1.63**	6.00	-15.69***
Other Exchange Rate Downturns	210	4.87	-3.56	-0.85	6.10	2.41	6.99	-3.56

Table 4B. Financial Upturns and Booms

	Financial Upturn				Other Financial Variables			
	Number of Events	Duration	Amplitude	Slope	Credit	House Price	Equity Price	Exchange Rate
A. Credit Upturns	96	8.11	4.53	1.27	4.53	-0.63	4.53	0.15
Credit Booms	24	4.48**	12.13***	3.55***	12.13***	4.14***	6.63	-0.76
Other Credit Upturns	72	9.30	3.54	1.02	3.54	-1.56	4.53	0.78
B. House Price Upturns	111	14.54	3.54	1.18	4.85	3.54	7.42	0.01
House Price Booms	28	13.25	11.24***	2.27***	4.53	11.24***	7.76	-0.25
Other House Price Upturns	83	15.03	2.40	0.96	4.90	2.40	7.39	0.77
C. Equity Price Upturns	251	21.93	20.09	4.75	5.22	1.39	20.09	0.20
Equity Price Booms	63	8.05***	46.36***	9.65***	4.42**	0.06**	46.36***	-0.74*
Other Equity Price Upturns	188	26.80	14.96	3.42	5.48	2.36	14.96	0.50
D. Exchange Rate Upturns	274	13.92	3.33	1.01	4.82	1.36	1.21	3.33
Exchange Rate Booms	70	6.46***	8.53***	2.09***	4.96	0.85	3.19	8.53***
Other Exchange Rate Upturns	204	16.79	2.49	0.77	4.82	1.50	0.96	2.49

Notes : All statistics except "Duration" correspond to sample medians. For "Duration" means are shown. Duration for downturns is the number of quarters between peak and trough. Duration for upturns is the time it takes to attain the level at the previous peak after the trough. The amplitudes for downturns is calculated based on the decline in each respective variable during the downturn. The amplitude for the upturns is calculated based on the one year change in each respective variable after the trough in the financial variable. The slope of the downturns is the amplitude from peak to trough divided by the duration. The slope of the upturns is the amplitude from the trough to the quarter at which the financial variable has reached the level at its last peak, divided by the duration. Disruptions (Crunches, Busts, and Collapses) are the worst 25% of downturns as calculated by the amplitude. Booms are the top 25% of upturns as calculated by the amplitude. Only downturns (upturns) that are (part of) a completed phase are ranked as a disruption (boom) or other. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between financial disruptions (booms) and other financial downturns (upturns).

Table 5. Likelihood of Financial Cycles

(in percent)

	A. Downturns			
Probability of	Credit	House Price	Equity Price	Exchange Rate
Unconditional	26.96	40.52	45.46	44.10
Conditional On				
Credit Crunch	100	78.01	51.98	43.40
House Price Bust	48.09	100	46.26	44.88
Equity Price Bust	38.61	49.16	100	34.89
Exchange Rate Collapse	26.68	51.03	45.94	100

	B. Upturns			
Probability of	Credit	House Price	Equity Price	Exchange Rate
Unconditional	21.12	31.36	38.68	29.75
Conditional On				
Credit Boom	100	45.76	51.97	33.71
House Price Boom	47.37	100	54.07	48.33
Equity Price Boom	26.19	38.73	100	41.88
Exchange Rate Boom	23.79	37.01	42.15	100

Notes: The unconditional probability of a downturn (upturn) is based on the fraction of time in which a downturn (upturn) occurs during the sample. The conditional probabilities refer to the fraction of time in which there is a downturn (upturn) given a financial disruption (boom).

Table 6A. Credit Downturns Associated with Financial Disruptions

	Credit				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	House Price	Equity Price	Exchange Rate
A. Credit Downturns without House Price Busts	51	4.86	-3.27	-0.76	0.60	-9.40	1.24
Credit Downturns with House Price Busts	32	7.38*	-4.42	-0.88	-7.19***	5.25***	0.61
Credit Downturns with Severe House Price Busts	18	7.28	-4.40*	-1.18	-8.45***	5.25**	0.61
B. Credit Downturns without Equity Price Busts	65	5.08	-3.42	-0.79	-2.76	-0.65	0.75
Credit Downturns with Equity Price Busts	33	6.52	-5.35*	-1.05	-2.99	-18.56***	0.71
Credit Downturns with Severe Equity Price Busts	18	6.67	-3.92	-1.00	-2.63	-25.96***	0.19
C. Credit Downturns without Exchange Rate Collapses	85	5.54	-4.14	-0.99	-1.82	-5.43	1.52
Credit Downturns with Exchange Rate Collapses	29	5.38	-3.68	-0.90	-4.05	2.22**	-0.81***
Credit Downturns with Severe Exchange Rate Collapses	18	5.44	-4.88	-0.97	-3.38	5.14*	-3.25***
D. Credit Downturns without Financial Crises	99	5.25	-3.97	-0.91	-2.25	-5.97	0.88
Credit Downturns with Financial Crises	15	7.13	-4.61	-1.39	-5.17	10.48***	2.54
Credit Downturns with Severe Financial Crises	7	3.43*	-3.20	-1.54	-5.17	10.48**	2.54

Table 6B. Credit Upturns Associated with Financial Booms

	Credit				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	House Price	Equity Price	Exchange Rate
A. Credit Upturns without House Price Booms	77	7.48	3.64	1.03	-0.85	5.70	-0.58
Credit Upturns with House Price Booms	8	9.63	6.74*	2.14*	7.17***	15.76	1.33
Credit Upturns with Strong House Price Booms	4	11.50	9.87	2.17	9.79***	20.22*	2.64
B. Credit Upturns without Equity Price Booms	85	6.94	4.33	1.19	-0.74	3.72	-0.27
Credit Upturns with Equity Price Booms	13	9.00	4.44	1.62	1.22	36.71***	-1.16
Credit Upturns with Strong Equity Price Booms	8	9.75	4.52	1.82	1.29	51.14***	-1.30
C. Credit Upturns without Exchange Rate Booms	99	7.70	4.61	1.25	-0.38	5.67	-0.27
Credit Upturns with Exchange Rate Booms	14	10.07	3.80	1.16	-1.38	7.01	0.15
Credit Upturns with Strong Exchange Rate Booms	7	3.71***	4.44	1.28	-1.47	8.15	-0.58

Notes : All statistics except "Duration" correspond to sample medians. For "Duration" means are shown. Duration for credit downturns is the number of quarters between peak and trough. Duration for credit upturns is the time it takes to attain the level of credit at the previous peak after the trough. The amplitude for the credit downturns is calculated based on the decline in each respective variable during the peak to trough decline in credit. The amplitudes for credit upturns is calculated based on the one year change in each respective variable after the trough in credit. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the credit upturns is the amplitude from the trough to the quarter at which credit has reached the level at its last peak, divided by the duration. Disruptions (Busts and Collapses) are the worst 25% of downturns calculated by the amplitude. Severe disruptions are the worst 12.5% of downturns, or the worst 50% of disruptions, as calculated by amplitude. Financial crises are those crises as defined by Reinhart and Rogoff (2009). The severe financial crises are the worst 50% of financial crises as measured by output decline during the credit decline. Booms are the top 25% of upturns as calculated by the amplitude. Strong booms are the top 12.5% of upturns, or top 50% of booms, as calculated by the amplitude. Only credit downturns and upturns with data for each respective associated variable are included. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between credit downturns with a financial disruption and without, and between credit downturns with a severe financial disruption and without a financial disruption.

Table 7A. House Price Downturns Associated with Financial Disruptions

	House Price				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	Credit	Equity Price	Exchange Rate
A. House Price Downturns without Credit Crunches	104	8.47	-5.99	-1.04	4.15	-0.29	-0.42
House Price Downturns with Credit Crunches	10	8.50	-6.14	-1.08	-4.57***	-0.03	2.98
House Price Downturns with Severe Credit Crunches	8	8.25	-5.01	-1.01	-5.55***	-0.03	2.98
B. House Price Downturns without Equity Price Busts	78	7.87	-4.63	-0.86	3.53	3.59	0.66
House Price Downturns with Equity Price Busts	36	9.78	-10.80***	-1.47***	3.75	-21.19***	-0.42
House Price Downturns with Severe Equity Price Busts	18	11.50*	-13.30***	-1.59***	4.99	-36.90***	-1.70
C. House Price Downturns without Exchange Rate Collapses	88	8.55	-6.14	-1.09	3.09	-3.07	1.88
House Price Downturns with Exchange Rate Collapses	26	8.23	-5.58	-0.94	5.13	5.64*	-7.32***
House Price Downturns with Severe Exchange Rate Collaı	19	7.63	-5.39	-0.90	4.91	4.76	-7.32***
D. House Price Downturns without Financial Crises	102	7.37	-5.54	-1.04	3.34	-0.29	0.54
House Price Downturns with Financial Crises	12	17.83*	-26.72**	-1.18	4.33	-4.79	-6.23
House Price Downturns with Severe Financial Crises	6	9.17	-8.41	-1.10	6.49	-17.09	-8.82*

Table 7B. House Price Upturns Associated with Financial Booms

	House Price				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	Credit	Equity Price	Exchange Rate
A. House Price Upturns without Credit Booms	109	13.92	3.27	1.17	4.72	8.00	0.29
House Price Upturns with Credit Booms	5	20.80	11.05***	1.26	8.67*	3.77	-1.51*
House Price Upturns with Strong Credit Booms	3	29.33	13.25**	1.23	8.67*	3.77	-0.24
B. House Price Upturns without Equity Price Booms	98	12.24	3.11	1.19	4.91	5.93	0.79
House Price Upturns with Equity Price Booms	16	25.50**	7.55**	1.24	3.69	42.33***	-2.42***
House Price Upturns with Strong Equity Price Booms	10	27.60	6.27	1.17	6.99	62.17***	-3.18**
C. House Price Upturns without House Price Booms	92	15.15	3.50	1.11	4.30	8.34	-0.64
House Price Upturns with House Price Booms	22	10.77	4.99	1.29	5.93	4.74	3.54***
House Price Upturns with Strong House Price Booms	11	8.64*	4.76	1.25	6.52	3.89	3.88***

Notes : All statistics except "Duration" correspond to sample medians. For "Duration" means are shown. Duration for house price downturns is the number of quarters between peak and trough. Duration for house price upturns is the time it takes to attain the level of house price at the previous peak after the trough. The amplitude for the house price downturns is calculated based on the decline in each respective variable during the peak to trough decline in house price. The amplitudes for house price upturns is calculated based on the one year change in each respective variable after the trough in house price. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the house price upturns is the amplitude from the trough to the quarter at which house price has reached the level at its last peak, divided by the duration. Disruptions (Busts and Collapses) are the worst 25% of downturns calculated by the amplitude. Severe disruptions are the worst 12.5% of downturns, or the worst 50% of disruptions, as calculated by amplitude. Financial crises are those crises as defined by Reinhart and Rogoff (2009). The severe financial crises are the worst 50% of financial crises as measured by output decline during the house price decline. Booms are the top 25% of upturns as calculated by the amplitude. Strong booms are the top 12.5% of upturns, or top 50% of booms, as calculated by the amplitude. Only house price downturns and upturns with data for each respective associated variable are included. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between house price downturns with a financial disruption and without, and between house price downturns with a severe financial disruption and without a financial disruption.

Table 8A. Equity Price Downturns Associated with Financial Disruptions

	Equity Price				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	Credit	House Price	Exchange Rate
A. Equity Price Downturns without Credit Crunches	222	6.63	-23.57	-4.17	5.89	2.15	1.16
Equity Price Downturns with Credit Crunches	15	5.20	-25.52	-4.27	-3.72***	-4.92***	0.59
Equity Price Downturns with Severe Credit Crunches	10	5.90	-27.97	-3.92	-5.28***	-5.29**	-1.98
B. Equity Price Downturns without House Price Busts	153	6.37	-25.18	-4.59	5.57	3.03	1.54
Equity Price Downturns with House Price Busts	34	4.29***	-21.14**	-4.39	2.48***	-4.59***	1.08
Equity Price Downturns with Severe House Price Busts	22	4.55**	-21.82	-4.73	2.48***	-4.97***	1.25
C. Equity Price Downturns without Exchange Rate Collapses	209	6.75	-25.15	-4.24	5.89	1.73	2.00
Equity Price Downturns with Exchange Rate Collapses	36	6.00	-22.27	-3.55	4.31**	-1.44	-5.10***
Equity Price Downturns with Severe Exchange Rate Collapses	22	6.18	-24.31	-4.29	4.13*	-0.09	-7.61***
D. Equity Price Downturns without Financial Crises	229	6.72	-23.45	-3.98	5.76	2.13	1.09
Equity Price Downturns with Financial Crises	16	5.56	-25.57	-5.83**	3.27	-2.24**	0.41
Equity Price Downturns with Severe Financial Crises	8	4.38***	-28.95	-6.69***	2.23**	-5.11***	0.84

Table 8B. Equity Price Upturns Associated with Financial Booms

	Equity Price				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	Credit	House Price	Exchange Rate
A. Equity Price Upturns without Credit Booms	233	22.07	20.09	4.73	5.03	1.39	0.38
Equity Price Upturns with Credit Booms	12	13.33	25.91	7.06	9.57**	0.80	-0.87
Equity Price Upturns with Strong Credit Booms	6	22.17	15.74	4.55	15.69***	1.80	0.25
B. Equity Price Upturns without House Price Booms	190	17.39	21.90	5.09	4.44	0.82	0.79
Equity Price Upturns with House Price Booms	13	18.58	17.73	6.96	5.46	10.14***	-0.67
Equity Price Upturns with Strong House Price Booms	6	24.83	27.55	10.43	3.07	11.90***	-2.30
C. Equity Price Upturns without Exchange Rate Booms	226	22.47	20.91	4.81	5.21	1.80	0.00
Equity Price Upturns with Exchange Rate Booms	25	17.04	13.67**	3.42	5.36	-0.01	4.40***
Equity Price Upturns with Strong Exchange Rate Booms	13	19.25	15.73	4.21	3.40	-2.55**	8.40***

Notes : All statistics except "Duration" correspond to sample medians. For "Duration" means are shown. Duration for equity price downturns is the number of quarters between peak and trough. Duration for equity price upturns is the time it takes to attain the level of equity price at the previous peak after the trough. The amplitude for the equity price downturns is calculated based on the decline in each respective variable during the peak to trough decline in equity price. The amplitudes for equity price upturns is calculated based on the one year change in each respective variable after the trough in equity price. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the equity price upturns is the amplitude from the trough to the quarter at which equity price has reached the level at its last peak, divided by the duration. Disruptions (Busts and Collapses) are the worst 25% of downturns calculated by the amplitude. Severe disruptions are the worst 12.5% of downturns, or the worst 50% of disruptions, as calculated by amplitude. Financial crises are those crises as defined by Reinhart and Rogoff (2009). The severe financial crises are the worst 50% of financial crises as measured by output decline during the equity price decline. Booms are the top 25% of upturns as calculated by the amplitude. Strong booms are the top 12.5% of upturns, or top 50% of booms, as calculated by the amplitude. Only equity price downturns and upturns with data for each respective associated variable are included. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between equity price downturns with a financial disruption and without, and between equity price downturns with a severe financial disruption and without a financial disruption.

Table 9A. Exchange Rate Downturns Associated with Financial Disruptions

	Exchange Rate				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	Credit	House Price	Equity Price
A. Exchange Rate Downturns without Credit Crunches	242	5.85	-5.44	-1.04	7.32	2.41	6.20
Exchange Rate Downturns with Credit Crunches	27	5.37	-5.18	-1.46**	-2.37***	-2.92***	7.33
Exchange Rate Downturns with Severe Credit Crunches	18	6.06	-7.55**	-1.69***	-2.19***	-3.07**	7.33
B. Exchange Rate Downturns without House Price Busts	159	5.74	-6.55	-1.14	7.41	4.30	7.86
Exchange Rate Downturns with House Price Busts	43	5.26	-6.58	-1.37*	1.25***	-5.07***	9.19
Exchange Rate Downturns with Severe House Price Busts	25	5.24	-4.88	-1.41	1.34***	-7.53***	3.51
C. Exchange Rate Downturns without Equity Price Busts	211	5.70	-5.01	-1.04	7.13	2.14	9.43
Exchange Rate Downturns with Equity Price Busts	48	6.19	-5.44	-1.10	4.83**	-0.64**	-8.55***
Exchange Rate Downturns with Severe Equity Price Busts	28	6.82	-6.53	-1.04	3.49**	-5.11***	-8.30***
D. Exchange Rate Downturns without Financial Crises	257	5.77	-4.96	-1.02	7.10	2.37	6.33
Exchange Rate Downturns with Financial Crises	22	6.27	-11.86***	-1.90***	3.75*	-2.71**	6.65
Exchange Rate Downturns with Severe Financial Crises	11	5.27	-15.12**	-2.15***	1.92***	-4.52***	6.42

Table 9B. Exchange Rate Upturns Associated with Financial Booms

	Exchange Rate				Other Financial Variables		
	Number of Events	Duration	Amplitude	Slope	Credit	House Price	Equity Price
A. Exchange Rate Upturns without Credit Booms	265	11.62	3.49	1.01	5.20	1.73	3.10
Exchange Rate Upturns with Credit Booms	12	41.00*	2.31	0.57*	6.08	1.13	5.57
Exchange Rate Upturns with Strong Credit Booms	7	23.71	2.47	0.58	8.64	4.27	14.85
B. Exchange Rate Upturns without House Price Booms	195	11.44	3.76	1.13	5.25	1.36	5.53
Exchange Rate Upturns with House Price Booms	16	12.46	3.79	0.86	5.38	6.22**	9.49
Exchange Rate Upturns with Strong House Price Booms	9	8.89	3.79	1.11	5.94	8.11***	9.62
C. Exchange Rate Upturns without Equity Price Booms	237	12.34	3.16	1.02	5.20	1.63	-0.87
Exchange Rate Upturns with Equity Price Booms	31	18.30	3.77	0.89	6.38	4.39	32.91***
Exchange Rate Upturns with Strong Equity Price Booms	19	19.81	3.98	0.84	5.94	5.68	43.21***

Notes : All statistics except "Duration" correspond to sample medians. For "Duration" means are shown. Duration for exchange rate downturns is the number of quarters between peak and trough. Duration for exchange rate upturns is the time it takes to attain the level of exchange rate at the previous peak after the trough. The amplitude for the exchange rate downturns is calculated based on the decline in each respective variable during the peak to trough decline in exchange rate. The amplitudes for exchange rate upturns is calculated based on the one year change in each respective variable after the trough in exchange rate. The slope of the downturn is the amplitude from peak to trough divided by the duration. The slope of the exchange rate upturns is the amplitude from the trough to the quarter at which exchange rate has reached the level at its last peak, divided by the duration. Disruptions (Busts and Collapses) are the worst 25% of downturns calculated by the amplitude. Severe disruptions are the worst 12.5% of downturns, or the worst 50% of disruptions, as calculated by amplitude. Financial crises are those crises as defined by Reinhart and Rogoff (2009). The severe financial crises are the worst 50% of financial crises as measured by output decline during the exchange rate decline. Booms are the top 25% of upturns as calculated by the amplitude. Strong booms are the top 12.5% of upturns, or top 50% of booms, as calculated by the amplitude. Only exchange rate downturns and upturns with data for each respective associated variable are included. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between exchange rate downturns with a financial disruption and without, and between exchange rate downturns with a severe financial disruption and without a financial disruption.

Table 10. Synchronized Financial Downturns

	Financial Downturn				Other Financial Variables			
	Number of Events	Duration	Amplitude	Slope	Credit	House Price	Equity Price	Exchange Rate
A. Credit Downturns without Synchronization	77	5.25	-3.42	-0.91	-3.42	-1.06	-4.89	0.53
Credit Downturns with Synchonization	37	6.03	-6.63**	-1.25	-6.63**	-5.38*	-1.44	2.09
Credit Downturns with High Synchronization	21	5.71	-7.71**	-1.42	-7.71**	-6.45**	-10.63	2.57**
B. House Price Downturns without Synchronization	29	9.69	-3.97	-0.77	5.53	-3.97	-0.23	0.94
House Price Downturns with Synchonization	85	8.06	-6.89	-1.08*	2.38***	-6.89	-0.29	-0.38
House Price Downturns with High Synchronization	77	8.44	-7.11*	-1.13**	2.49***	-7.11*	-2.38	-0.38
C. Equity Price Downturns without Synchronization	119	6.82	-17.98	-3.37	5.95	1.27	-17.98	0.56
Equity Price Downturns with Synchonization	126	6.48	-29.00***	-4.86***	5.14	1.84	-29.00***	2.30**
Equity Price Downturns with High Synchronization	64	7.23	-37.28***	-5.28***	5.93	2.55	-37.28***	3.54***
D. Exchange Rate Downturns without Synchronization	42	5.21	-4.88	-1.14	4.50	0.37	3.51	-4.88
Exchange Rate Downturns with Synchonization	237	5.92	-5.34	-1.04	7.13**	2.18	7.24**	-5.34
Exchange Rate Downturns with High Synchronization	221	6.02	-5.41	-1.04	7.16**	2.14	6.42**	-5.41

Notes : All statistics except "Duration" correspond to sample medians. For "Duration" means are shown. Duration for downturns is the number of quarters between peak and trough. The amplitude for the downturns is calculated based on the decline in each respective variable during the peak to trough decline in the financial variable. The slope of the downturn is the amplitude from peak to trough divided by the duration. Credit downturns are considered synchronized if they occur during a period where more than 40% of countries are experiencing credit downturns, and highly synchronized if they occur during a period where more than 50% of countries are experiencing credit downturns. House price downturns are considered synchronized if they occur during a period where more than 40% of countries are experiencing house price downturns, and highly synchronized if they occur during a period where more than 50% of countries are experiencing house price downturns. Equity price downturns are considered synchronized if they occur during a period where more than 80% of countries are experiencing equity price downturns, and highly synchronized if they occur during a period where more than 90% of countries are experiencing equity price downturns. Exchange rate downturns are considered synchronized if they occur during a period where more than 40% of countries are experiencing exchange rate downturns, and highly synchronized if they occur during a period where more than 50% of countries are experiencing exchange rate downturns. Cycles are considered to be highly synchronized if they are ongoing during a period of high synchronization as defined by the aforementioned thresholds, started at most 8 quarters before the period of high synchronization, and ended at most 8 quarters after the period of high synchronization. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance refers to the difference between synchronizated and non-synchronized downturns, and between highly synchronized and non-synchronized downturns.

Table 11. Determinants of the Duration of Financial Downturns: Bivariate Regressions

	Weibull Duration Models [1/]							
	Credit		House Price		Equity Price		Exchange Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Downturn with Credit Crunch 2/				0.273		0.118		0.139
				[0.350]		[0.352]		[0.248]
Downturn with House Price Bust 2/		-0.961***				0.970***		0.131
		[0.275]				[0.188]		[0.157]
Downturn with Equity Price Bust 2/		0.111		-0.355				-0.15
		[0.246]		[0.263]				[0.181]
Downturn with Exchange Rate Bust [2/]		0.251		0.015		0.112		
		[0.282]		[0.241]		[0.162]		
World Growth (Average 1 year After the Peak)		0.105***		0.033		0.022***		
		[0.032]		[0.033]		[0.005]		
Inflation (Average 3 Years Before the Peak)		-0.192***		0.03		-0.144***		0.009
		[0.060]		[0.073]		[0.055]		[0.037]
Trade Openness (at Peak)		0.002		0.023***		0.016***		0.007
		[0.011]		[0.007]		[0.004]		[0.005]
Financial Openness (at Peak)		0.025		0.101**		0.069*		0.029
		[0.125]		[0.040]		[0.038]		[0.035]
Financial Crisis [5/]		-2.050***		-0.037		0.659*		0.529**
		[0.423]		[0.318]		[0.361]		[0.259]
Duration of Previous Expansion		-0.006		-0.033**		0.006		0.002
		[0.010]		[0.016]		[0.017]		[0.010]
Globalization Dummy (Post 1985)		-0.331		0.117		0.657***		0.075
		[0.251]		[0.215]		[0.140]		[0.122]
P (Weibull distribution parameter) [3/]	1.707	[1.706 - 1.799]	1.469	[1.469 - 1.519]	1.627	[1.626 - 1.687]	1.782	[1.782 - 2.029]
	[0.087]	[0.086 - 0.094]	[0.078]	[0.077 - 0.085]	[0.060]	[0.058 - 0.066]	[0.067]	[0.067 - 0.080]
Adjusted R-Squared [4/]								
Number of Observations [4/]	114	[99 - 114]	117	[116 - 117]	245	[194 - 245]	281	[224 - 281]

Notes : All regressions include country fixed effects. Coefficents shown along with robust standard errors in brackets below respective coeffient estimate. The dependent variable is the duration of a downturn. A downturn associated with a financial disruption (credit crunch, equity price bust, house price bust, exchange rate collapse) dummy variable takes on a value of 1 when a disruption is ongoing when the downturn begins or ended at most one quarter before the downturn began. World growth is the PPP weighted annualized quarterly growth of the respective financial variable from OECD countries. Trade openness is defined as (exports+imports) as percent of GDP. Financial Openness is defined as (Total Assets+Total Liabilities)/GDP. *** implies coefficent is significant at 1% level, ** implies coefficent is significant at 5% level, * implies coefficent is significant at 10% level.

[1/] Regression model with one covariate at a time.

[2/] Downturn of the variable in the heading row.

[3/] Weibull distribution parameter, range values obtained from the bivariate regressions.

[4/] Range values obtained from the bivariate regressions.

[5/] As defined by Laeven and Valencia

Table 12. Determinants of the Amplitude of Financial Downturns: Bivariate Regressions

	Amplitude [1/]			
	Credit	House Price	Equity Price	Exchange Rate
	(1)	(2)	(3)	(4)
Downturn with Credit Crunch 2/		-0.809	-0.482	-0.591
		[3.761]	[3.978]	[1.223]
Downturn with House Price Bust 2/	3.305**		-11.185***	2.054
	[1.442]		[2.815]	[1.433]
Downturn with Equity Price Bust 2/	0.899	6.499*		1.163
	[1.285]	[3.611]		[1.160]
Downturn with Exchange Rate Bust [2/]	-0.05	0.209	0.59	
	[1.610]	[2.474]	[3.899]	
World Growth (Average 1 year After the Peak)	-0.542***	-0.308	-0.679***	
	[0.173]	[0.300]	[0.076]	
Inflation (Average 3 Years Before the Peak)	1.317**	0.839	2.824***	-0.333
	[0.584]	[0.873]	[0.975]	[0.307]
Trade Openness (at Peak)	-0.03	-0.210*	-0.145*	-0.014
	[0.047]	[0.112]	[0.074]	[0.026]
Financial Openness (at Peak)	-0.486	-0.872**	-1.626**	-0.348*
	[0.574]	[0.400]	[0.632]	[0.185]
Financial Crisis [5/]	10.085**	2.418	-2.019	2.86
	[4.714]	[2.285]	[3.428]	[1.945]
Amplitude of Previous Expansion	-0.014**	-0.103**	-0.021	-0.154***
	[0.005]	[0.043]	[0.019]	[0.044]
Globalization Dummy (Post 1985)	0.154	-0.516	-4.432**	0.896
	[1.980]	[2.036]	[2.010]	[0.754]
Adjusted R-Squared [4/]	[-0.009 - 0.157]	[-0.009 - 0.055]	[-0.004 - 0.202]	[-0.003 - 0.008]
Number of Observations [4/]	[99 - 114]	[116 - 117]	[194 - 245]	[224 - 281]

Notes: All regressions include country fixed effects. Coefficents shown along with robust standard errors in brackets below respective coeffient estimate. The dependent variable is the amplitude of a downturn. A downturn associated with a financial disruption (credit crunch, equity price bust, house price bust, exchange rate collapse) dummy variable takes on a value of 1 when a disruption is ongoing when the downturn begins or ended at most on quarter before the downturn began. World growth is the PPP weighted annualized quarterly growth of the respective financial variable from OECD countries. Trade openness is defined as (exports+imports) as percent of GDP. Financial Openness is defined as (Total Assets+Total Liabilities)/GDP. *** implies coefficent is significant at 1% level, ** implies coefficent is significant at 5% level, * implies coefficent is significant at 10% level

[1/] Regression model with one covariate at a time.

[2/] Downturn of the variable in the heading row.

[3/] Weibull distribution parameter, range values obtained from the bivariate regressions.

[4/] Range values obtained from the bivariate regressions.

[5/] As defined by Laeven and Valencia

Table 13. Determinants of the Amplitude of Financial Upturns: Bivariate Regressions

	Amplitude [1/]			
	Credit	House Prices	Equity Prices	Exchange Rate
	(1)	(2)	(3)	(4)
World Growth (Average 1 Year After the Trough)	0.282	0.338	0.754***	
	[0.182]	[0.253]	[0.127]	
Inflation (Average 3 Years Before the Trough)	0.246	-0.039	-0.388	0.196
	[0.310]	[0.243]	[0.811]	[0.168]
Trade Openness (at Trough)	-0.142**	0.031	0.012	0.024*
	[0.054]	[0.061]	[0.082]	[0.012]
Financial Openness (at Trough)	-0.155	0.139	-0.227	-0.217*
	[0.473]	[0.352]	[0.469]	[0.111]
Upturn with Credit Boom [2/]		1.338	0.092	-2.241*
		[2.111]	[5.210]	[1.181]
Upturn with House Price Boom [2/]	0.812		-5.447	0.196
	[1.321]		[8.581]	[0.695]
Upturn with Equity Price Boom [2/]	2.874	2.28		0.025
	[2.836]	[2.036]		[0.527]
Upturn with Exchange Rate Boom [2/]	-1.876	2.049	-7.228**	
	[1.687]	[2.117]	[3.341]	
Financial Crisis (Preceeding the Trough) [3/]	-1.647	-3.935	4.421	1.437
	[1.656]	[6.403]	[5.830]	[1.123]
Amplitude of Previous Downturn	0.14	-0.016	0.078	0.092*
	[0.147]	[0.066]	[0.069]	[0.049]
Globalization Dummy (Post 1985)	-3.379***	-2.427	-0.374	0.777*
	[1.124]	[1.449]	[1.823]	[0.443]
Adjusted R-Squared	[-0.01 - 0.043]	[-0.009 - 0.025]	[-0.004 - 0.185]	[-0.003 - 0.017]
Number of Observations	[99 - 113]	[114 - 114]	[208 - 251]	[235 - 288]

Notes : All regressions include country fixed effects. Coefficents shown along with robust standard errors in brackets below respective coeffient estimate. The dependent variable is the amplitude of an upturn. An upturn is said to be associated with a boom if the the boom is ongoing as the upturn begins (and started at most four quarters before the upturn) or starts at most two quarters after the upturn begins. World growth is the PPP weighted annualized quarterly growth from OECD countries. Growth is the annualized quarterly growth rate. Trade openness is defined as (exports+imports) as percent of GDP. Financial Openness is defined as (Total Assets+Total Liabilities)/GDP. *** implies coefficent is significant at 1% level, ** implies coefficent is significant at 5% level, * implies coefficent is significant at 10% level.

[1/] Regression model with one covariate at a time.

[2/] Upturn of the variable in the heading row.

[3/] As defined by Laeven and Valencia

Table 14. Financial Downturns: Historical vs. Latest Episodes

	Duration			Amplitude			Slope		
	1960-2007	Latest Complete	Latest All	1960-2007	Latest Complete	Latest All	1960-2007	Latest Complete	Latest All
Credit [1/]	5.50	3.00	4.00**	-4.03	-1.72*	-4.32	-0.93	-0.64	-1.03
	[4.00]	*[2.00]*	*[4.00]*	*[-6.68]*	*[-1.93***]*	*[-5.07]*	*[-1.25]*	*[-0.64**]*	*[-1.30]*
House Prices [2/]	8.47	4.89***	6.44**	-5.99	-10.15	-8.93	-1.06	-2.13***	-1.84**
	[6.00]	*[5.00]*	*[6.00]*	*[-10.85]*	*[-10.02]*	*[-10.64]*	*[-1.22]*	*[-2.05**]*	*[-1.73**]*
Equity Prices [3/]	6.64	6.10	6.10	-23.70	-54.13***	-54.13***	-4.07	-9.11***	-9.11***
	[5.00]	*[6.00]*	*[6.00]*	*[-27.38]*	*[-54.65***]*	*[-54.65***]*	*[-4.70]*	*[-9.20***]*	*[-9.20***]*
Exchange Rate [4/]	5.81	3.00***	3.10***	-5.14	-2.03	-2.82	-1.06	-1.02	-1.24*
	[5.00]	*[2.00***]*	*[2.00***]*	*[-7.63]*	*[-8.00]*	*[-7.28]*	*[-1.37]*	*[-2.12]*	*[-2.13*]*

Notes : For "Duration", means shown with medians in brackets. For "Amplitude" and "Slope", medians shown with means in brackets. "Latest All" declines includes declines that are complete, as well as those that are not complete (does not have a trough based on the BBQ dating method which requires at least two quarters of positive growth). If it is incomplete, the trough is assumed to be at the last quarter of negative growth or, if there is no quarter of positive growth, the last observation. *** implies significance at the 1% level, ** implies significance at the 5% level, * implies significance at the 10% level. Significance is based on the difference from 1960-2007 means or medians.

[1/] Of the 19 latest Credit Downturns: 3 are complete, 8 have positive growth, 8 have neither turning point nor positive growth

[2/] Of the 18 latest House Price Downturns: 9 are complete, 6 have positive growth, 3 have neither turning point nor positive growth

[3/] Of the 21 latest Equity Price Downturns: All are complete

[4/] Of the 20 latest Exchange Rate downturns: 15 are complete, 4 have positive growth, 1 has neither turning point nor positive growth