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Abhandlungen

Financial Acceleration of Booms and Busts

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I. Introduction

Since the 1970s, many countries have gone through equity busts. Stock price corrections are often associated with sharp falls in economic activity and financial instability. Nonetheless, the importance of equity and other financial variables has long been ignored in the mainstream macro-economic literature. Under the Modigliani-Miller propositions, financial factors are irrelevant for firms' investment behaviour. Recently, the so-called "credit channel" or "financial accelerator" theory has drawn attention to financial frictions. This new literature, which is based on micro foundations, attaches a key role to credit and asset prices in the transmission mechanism (e. g. *Bernanke* et al. (1999)).

A key question is whether the role of financial factors in propagating and amplifying economic shocks can also be observed in practice. Given the surge in financial markets in the past decades, this issue has become increasingly relevant. In particular, studies based on micro-data have established that financial constraints indeed play a role in explaining the behaviour of individual firms and consumers (see *Hubbard* (1998), for a survey). So far, evidence based on macro-economic data has been less conclusive, largely on account of identification problems. Although less rigorous, macro-based studies are important to get insight into the quantitative importance of financial accelerator effects at the aggregate level. In this paper, we provide new evidence on the financial accelerator based on macro-data. We focus on periods around equity busts, which represent strong downward revisions in economic prospects and losses in financial wealth.

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Section II presents a brief outline of the underlying theory, on the basis of which hypotheses are formulated. After discussing the methodology for testing these hypotheses in Section III, Section IV discusses the empirical results. Section V concludes. We find empirical support for financial accelerator effects around asset price busts in the second half of our sample, with the typical bust followed by a reduction in nominal policy interest rates.

II. Financial Determinants of Economic Cycles

Kindleberger (1978) and *Minsky* (1982) present early examples of macro-economic theories in which financial frictions play a prominent role. They stress the instability of the interaction between credit, equity prices and economic activity. Others have focused on financial wealth accumulation, in particular the relationship between asset prices and consumption. A survey by *Poterba* (2000) shows that this link is modest – with a $1 increase in financial assets leading to 3 cents of additional income – as one would expect on the basis of Friedman's permanent income hypothesis. In addition, financial factors can influence investment through Tobin's q. If the market value of a firm's capital is higher than its replacement value ($q > 1$), expansion of the capital stock is profitable. However, the empirical link between Tobin's q and investment is weak (e. g. *Hayashi* (1982)).

In the more recent literature, financial frictions have been studied in a financial accelerator framework (*Bernanke* et al. (1999), and the references therein). The emphasis is on credit market imperfections, which are caused by problems of information, incentives and enforcement. These imperfections can be mitigated by aligning the borrower's incentives to those of the lender, which will be the case if the borrower risks substantial financial losses. Hence, credit will be extended at a lower cost to borrowers with strong financial positions. The wedge between the cost of external funds and the risk-less interest rate is inversely related to the borrower's net worth. *Bernanke* et al. (1999) refer to this wedge as the external finance premium. Since net worth is procyclical, the external finance premium declines in booms and rises in recessions. This creates an amplification mechanism, which is called the financial accelerator. Typically, a financial cycle starts with a build-up phase during which real and financial imbalances accumulate (*Bordo*/*Jeanne* (2002), and *Borio*/*Lowe* (2002)). This phase is characterized by an increase in spending, overopti-

mistic growth expectations, and a low risk assessment by both borrowers and lenders (*Asea/Blomberg* (1998)). This process can be self-reinforcing, as rising asset prices improve borrower net worth, stimulating credit expansion and investment, which further drives up asset prices, etcetera. At some point, however, economic agents will realize that developments are unsustainable and the process will be reversed. Hence, economic growth perceptions are revised, leading to a downward correction in stock prices. Experiences since the mid-1990s seem to be in line with this description of the financial cycle, given the favourable economic prospects that were widely attributed to new developments in Information and Communication Technology (ICT). In the event, however, market sentiment turned against this notion of a "New Economy" and stock prices collapsed, followed by an economic downturn in most countries.

The effects of the financial accelerator may be particularly severe in a low inflation environment, where the lower bound on nominal interest rates is an impediment to monetary policy. Demand can decline sharply after a downward revision of long-term growth perspectives, since the initial effects are exacerbated by financial factors, particularly through higher external finance premiums. As a result, the central bank has a strong incentive to lower the nominal policy interest rate, in order to limit the impact of a bust. This may result in policy interest rates hitting the lower zero bound, which seems close to the situation in Japan in the 1990s.

The most convincing empirical evidence for the existence of a financial accelerator is provided by micro-based studies. Disaggregated data show that particular groups of firms and households face more financial constraints than others, which can be linked to differences in their financial positions and information asymmetries (see e. g. *Gilchrist/Zakrajsek* (1998); *Hubbard* (1998)). So far, the macro-economic evidence for financial accelerator effects is limited. *Gertler/Lown* (1999) and *Mody/Taylor* (2003) present some macro evidence for the United States, using the bond spread as a proxy for the external finance premium. In an earlier paper, *Bernanke* (1983) presents evidence that financial factors explain the severity of the Great Depression. Another strand of literature based on aggregate data, initiated by *Bernanke/Blinder* (1992), investigates the importance of credit market imperfections in the transmission of monetary policy. In this paper, we take the existence of a financial accelerator from micro-based studies as given and consider some implications of the financial accelerator at the aggregate level. Our paper provides insight into the macroeconomic importance of the financial accelerator. In parti-

cular, we investigate the following three macroeconomic consequences of the financial accelerator prior to and after an equity bust:

1. Given the build-up phase that characterizes financial cycles, an equity bust is likely to be preceded by buoyant credit growth.
2. If equity busts are triggered by deteriorating financial conditions, this should be reflected by an external finance premium hike.
3. If equity busts reflect downward revisions of economic prospects and lift external finance premiums, they are expected to be followed by expansionary monetary policy.

III. Methodology and Data

We investigate the hypotheses formulated in the previous section using a probit model. In particular, we look at the explanatory power of several macro-economic variables prior to equity busts, which reflect downward revisions in the long-term economic growth perspective. We consider a panel of 20 industrialized countries over the period 1970–2002, which includes a sufficient number of equity busts to investigate general patterns.[1] Particularities of individual cases are not the focus of this paper. All results are pooled estimations of all countries, using annual observations.

An equity price bust is an extended period of unusual equity price declines in comparison to normal trend growth. Although we use annual data in our estimations – partly due to data constraints – our identification of equity busts is based on quarterly stock prices in order obtain a more refined pattern.[2] We follow *Bordo/Jeanne* (2002) and define a bust as a period in which the real average asset price change over a 12-quarter window is smaller than a threshold. This threshold is the average growth rate of asset prices in all countries over the entire sample ($\overline{g}$), minus x times its standard deviation v:

$$\sum_{l=1}^{12} \frac{g_{i,t-l}}{12} \leq \overline{g} - xv. \tag{1}$$

[1] The countries concerned are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

[2] In our estimations, a year is considered part of a bust period if it includes one or more quarters that have been identified as a bust in our procedure.

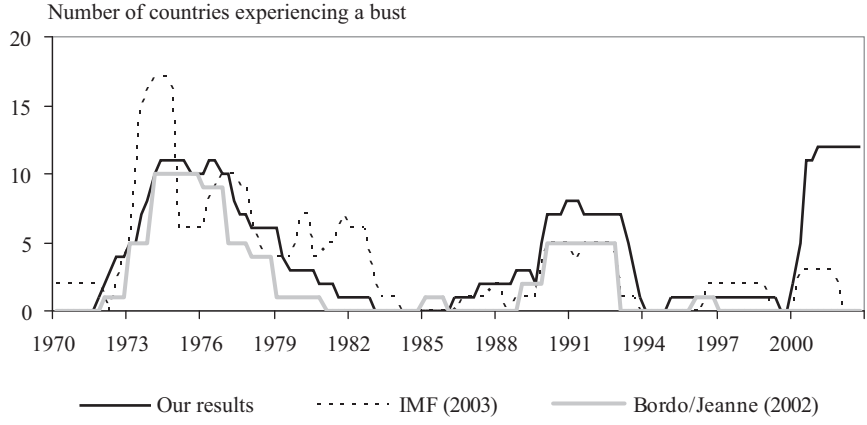

Figure 1: Equity Busts

There are two ad-hoc elements in this definition: the length of the window and the value of parameter x. Following Bordo and Jeanne we choose a twelve-quarter window, which is sufficient to filter out short-term volatility. The number of bust episodes is not sensitive to the exact choice of the timespan. The parameter x is calibrated such that the main bust episodes are selected, without including too many observations. For this purpose, x is set at 0.8. We have considered alternative values of x, see Section IV.2 below. The main boom-bust periods are plausible when compared to other sources. In particular, most boom-bust patterns for individual countries closely match the results of Bordo and Jeanne, despite some differences between their data set and ours. Furthermore, the *IMF* (2003) finds similar patterns using a very different methodology (Figure 1).[3] Following our procedure, 35 stock market busts have occured over the period we consider (see Appendix B). Busts are concentrated in three subperiods, reflecting the strong correlation of international stock markets.

We examine both real and financial indicators in relation to equity busts: industrial production, gross domestic product, private investment (capital formation), inflation, short-term and long-term interest rates, money, credit, asset prices (equity and residential property), and the ex-

[3] *Bordo/Jeanne* (2002) and *IMF* (2003) do not include the most recent equity busts. In addition, they consider slightly different groups of countries. Bordo and Jeanne do not include Austria, Belgium, Korea, New Zealand, Portugal and Switzerland; the IMF does not include Korea and Portugal.

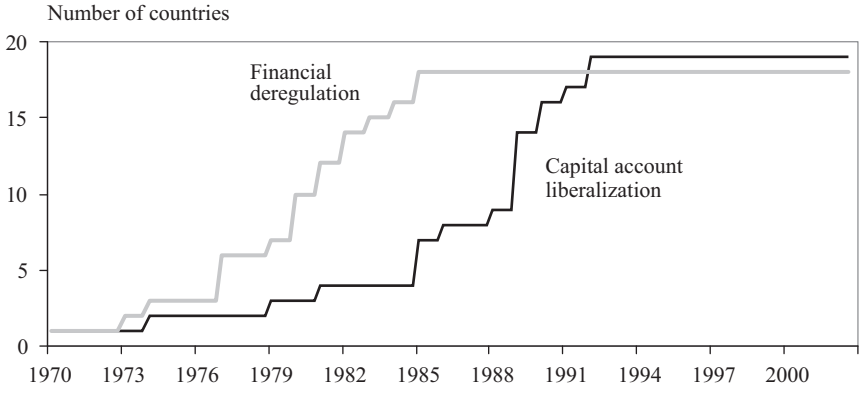

Figure 2: Deregulation and Liberalization

ternal finance premium.[4] For the latter, we use the interest rate spread of private debt over government debt, a standard measure of the private sector's risk premium. While the private debt interest rate series are not as accurate and consistent across countries as one would like (see Appendix A), our results show that the spread does have important characteristics of the external finance premium.

Appendix C presents cross-correlations of all variables we included in our analysis, at an annual frequency. Most of these have plausible signs. Nominal interest rates are positively correlated with each other and with inflation, and negatively related to real activity (industrial production, GDP, investment), money and credit growth, and asset prices. Positive correlations also exist between real activity measures, and between money and credit. The interest rate spread is negatively related to real activity, again in line with what one would expect.

In our estimations, we consider two subperiods: 1970–1986 and 1987–2002. This splits our sample into two equal parts, which roughly corresponds to a distinction between pre and post financial liberalization (see Figure 2). These subsamples are more homogeneous periods than the entire sample, and also allow us to take into account changes over time.

[4] Most data are taken from the IMF's International Financial Statistics database, see Appendix A for an overview.

IV. Empirical Results

1. Explaining Equity Busts

Table 1 presents the results of probit estimations with only one explanatory variable. Each entry in the table represents a separate equation, in which the equity bust dummy is explained by a constant and one particular lag of a variable. Including lags up to 8 years, we can investigate to what extent equity busts are related to developments several years earlier.[5] This accords with the idea that imbalances build up over a long period prior to a correction. As the estimated coefficients of probit models are difficult to interpret directly, the table reports the marginal impact of the regressors. This so-called "slope derivative" is evaluated at the sample means of the data and can be interpreted as the increase in the probability of an equity bust due to a one-unit change in the explanatory variable. The results in Table 1 are useful to address the first two hypotheses that were formulated in Section II.

The *first hypothesis* states that a financial accelerator manifests itself by increasing credit growth in the years before an equity bust. This is only supported for the most recent subperiod.

According to our *second hypothesis,* a stock market bust should be triggered by an increase in the external finance premium. Again, this is supported only for the most recent subperiod, for which our proxy for the external finance premium – the interest rate spread – is significant for the one-year lag. For the first subperiod, none of the lags is significant.

An interesting observation for both subperiods is that several variables seem to be relevant long before a stock market correction takes place. The explanatory power of industrial production, gross domestic product and investment is strongest two to six years prior to the equity bust. The same holds for money and credit growth. This suggests that stock market exuberance may be the result of long cumulative processes initiated by loose monetary conditions. In this context, it is worthwhile to observe that higher inflation significantly raises the probability of an equity bust up to three years in advance. Inflation is a sign of overheating, which

[5] This approach follows *Estrella/Mishkin* (1998), who investigate leading indicator properties of several financial variables in order to predict recessions in the United States.

Table 1

Probit Analysis for Individual Regressors

Lag	1	2	3	4	5	6	7	8
Variable	*Estimated slope coeffients 1970–1986**							
Short-term interest	0.60	0.13	–0.67	–1.22[b]	–1.00[b]	–1.31[b]	–1.39[a]	–0.93[a]
Long-term interest	0.73	0.40	0.10	–0.26	–0.41	–0.75	–1.17[c]	–1.43[b]
Inflation	2.19[a]	1.77[a]	0.88[b]	–0.05	–0.87[c]	–1.64[a]	–1.73[a]	–1.92[a]
Industrial production	0.25	0.55	0.73[b]	1.02[a]	1.04[a]	1.32[a]	1.24[a]	1.22[a]
Gross domestic product	0.76	1.34[b]	1.11[c]	1.55[a]	1.37[b]	1.11[c]	0.94	0.47
Investment	0.48[c]	0.64[b]	1.34[a]	1.44[a]	1.35[a]	0.92[a]	0.71[b]	0.66[b]
M3 growth	–0.11	0.07	0.58[c]	1.15[a]	1.11[a]	1.17[a]	0.95[b]	0.85[b]
Credit growth	–0.47	–0.10	0.30	0.45	0.30	0.45	0.49	0.57
Interest rate spread	2.00	2.97	0.10	–0.31	–1.04	1.08	0.98	0.72
Stock prices	–0.44[a]	–0.40[a]	–0.22[b]	0.09	0.32[a]	0.31[a]	0.34[a]	0.26[b]
House prices	0.64[b]	1.08[a]	1.09[a]	0.85[a]	0.08	–0.06	–1.12	–0.03
	*Estimated slope coeffients 1987–2002**							
Short-term interest	1.20[b]	0.48	–0.29	–0.65	–0.59	–0.71	–0.80	–0.44
Long-term interest	1.35[b]	0.40	–0.33	–0.79	–0.58	–0.43	–0.42	0.06
Inflation	3.86[a]	2.46[a]	1.22	0.59	0.33	0.08	0.22	0.53
Industrial production	–0.27	0.97[c]	1.41[a]	1.25[b]	1.25[b]	1.69[a]	1.29[a]	0.75
Gross domestic product	0.71	2.60[a]	3.28[a]	2.76[a]	2.00[b]	1.83[b]	1.35	0.07
Investment	0.85[a]	1.64[a]	1.27[a]	0.81[b]	0.70[b]	0.73[b]	0.09	–0.54[c]
M3 growth	0.95[b]	1.21[b]	1.73[a]	1.50[a]	1.03[b]	0.53	0.02	–0.14
Credit growth	0.88[b]	1.09[a]	0.99[b]	0.75[c]	0.29	0.30	–0.19	–0.60
Interest rate spread	4.29[b]	–0.06	–1.94	–3.94	–4.30[b]	–3.43	–3.97[b]	–7.20[a]
Stock prices	–0.33[a]	0.01	0.37[a]	0.39[a]	0.31[a]	0.16	0.22b	0.10
House prices	0.82[a]	1.34[a]	1.28[a]	0.68[b]	0.13	–0.15	–0.46	–0.69[b]

* Explanation: the subscripts a, b and c denote, respectively, statistical significance at the 1%, 5% and 10% level. Slope derivatives, which report the marginal impact at the sample means, are multiplied by 100 to convert them into percentage points. The number of observations varies between 135 and 338 in the first subperiod, and between 264 and 320 in the second.

may induce the downward revision of economic prospects. More specifically, inflation may drive up interest rates. It is interesting to see that the coefficients for interest rates and the interest rate spread – albeit not always significant – have a negative sign for long lags and a positive sign for short lags. Altogether, these results suggest that easy financial conditions in combination with high production and investment growth contribute significantly to the boom-bust cycle in equity prices.

Finally, asset prices have significant explanatory power. For stock prices themselves, this is an obvious result as it directly reflects the boom-bust cycle. For house prices, the explanatory power is likely to be related to the investment boom prior to the stock price correction, also given the correlation between house prices and investment, money and credit growth.

Our next step is to analyse the external finance premium in a probit model with several regressors (Table 2). We consider a baseline equation including three key macroeconomic variables – inflation, industrial production and the long-term interest rate – which is extended by several representations of the interest rate spread. All regressors are included with one lag. Table 2 also includes the "pseudo R^2" as a goodness of fit measure.[6] Like in Table 1, the spread and the interest rate are more significant for the recent subsample.

The approach in Table 2 is also useful to investigate the *third hypothesis* in Section II, i.e. whether equity busts are followed by a more expansionary monetary policy. To explore this, we split our observations into two parts: those that are followed by a monetary expansion – i.e. decreasing short-term interest rate – in the subsequent year, and those followed by a monetary contraction. The results for the two subsamples are very different. In the first period, the spread is only significant for observations followed by a monetary contraction, while in the most recent pe-

[6] The pseudo R^2 can be directly derived from the regression, which is estimated by maximum likelihood, and is defined as

$$1 - \left(\frac{\log L_u}{\log L_c}\right)^{-(2/n)\log L_c},$$

where L_u is the estimated likelihood of the equations presented in Table 2 (i.e. 'unconstrained'). L_c is the likelihood under the constraint that all coefficients except the intercept are zero, i.e. the dependent variable is explained by only a constant. n is the number of observations. The pseudo R^2 will always be between zero (no fit) and one (perfect fit). See *Estrella/Mishkin* (1998) for a further discussion.

Table 2

Extended Probit Analysis

Variable	*Estimated slope coefficients 1970–1986**				
Constant	–28.4[a]	–32.0[a]	–33.0[a]	–30.3[a]	–31.7[a]
Inflation $(t-1)$	1.76a	2.26[a]	2.31[a]	2.15[a]	2.27[a]
Industrial production $(t-1)$	0.46[c]	0.68[b]	0.96[a]	0.44	0.68[b]
Long-term interest rate $(t-1)$	–0.62	–0.51	–0.44	–0.64	–0.56
Interest rate spread $(t-1)$		2.01			1.40
Monetary expansion spread $(t-1)$**			0.99		
Monetary contraction spread $(t-1)$**				4.65[c]	
Spread $(t-1)$ * financial deepening					–0.26
# *observations*	306	245	134	111	240
Pseudo R^2	0.08902	0.18035	0.21608	0.17331	0.18058

Variable	*Estimated slope coefficients 1987–2002**				
Constant	–31.33[a]	–24.7[a]	–18.9[c]	–34.4[b]	–25.3[a]
Inflation $(t-1)$	9.79[a]	4.56[b]	2.48	6.74[c]	4.66[b]
Industrial production $(t-1)$	–0.24	0.18	1.07	–1.08	0.07
Long-term interest rate $(t-1)$	–3.94[b]	–3.05[c]	–2.90	–2.63	–2.74[c]
Interest rate spread $(t-1)$		4.68[b]			5.07[c]
Monetary expansion spread $(t-1)$**			6.28[c]		
Monetary contraction spread $(t-1)$**				1.88	
Spread $(t-1)$ * financial deepening					2.31[a]
# *observations*	319	268	148	120	262
Pseudo R^2	0.07915	0.03918	0.06113	0.05286	0.07669

* See Table 1.

** Only includes observations that are followed, respectively, by a monetary expansion or a monetary contraction (measured by the short-term interest rate).

riod, the spread is only significant when accompanied by a monetary expansion. Hence, only the latter is in line with the hypothesis that a downward revision of long-term prospects which is exacerbated by financial factors causes downward pressure on the nominal policy interest rate. Presumably, the role of financial variables has increased on account of financial deepening.

To investigate this, we add $\log\left(\frac{credit}{GDP}\right)$ as a proxy for financial development, multiplied by the external finance premium. Again, this interaction term is only statistically significant in the second subperiod, implying a positive relationship between financial development and the short-run impact of the external finance premium.

2. Robustness

We performed several robustness checks:

– In the results shown in the tables we use a threshold value $x = 0.8$ to determine equity bust episodes. Although this gives plausible equity bust episodes which broadly correspond with other studies, it is important to check the robustness of our results to a change in x. Using $x = 1.0$ already leads to a substantial reduction in crisis observations (by about half), but the main results and conclusions remain intact. When larger thresholds are used, too many crisis observations are thrown away to be able to perform analyses.

– We repeated the analysis with the equity busts episodes derived by *Bordo/Jeanne* (2002) and *IMF* (2003). As shown in Figure 1, both patterns of aggregated equity busts are similar to our indicator, although some countries and most of the recent bust episodes are missing in these studies. With some exceptions, the results of these two alternative indicators are similar, and do not lead to different conclusions. In many cases the results are even more pronounced. At the same time, our proxy for the external finance premium – the credit spread – performs worse than in the estimations with our own indicator. Presumably, this is because the recent equity busts – which largely determine the results of the second subsample – are missing for the two alternative indicators.

– As an alternative proxy for the external finance premium, we considered the level of stock price volatility perceived by market partici-

pants. More specifically, we used the conditional variance of stock prices, generated by a GARCH process. This measure of uncertainty is a key determinant of the risk premium required by investors to hold shares instead of deposits, and therefore indicative of the external finance premium. At the same time, a serious drawback of this measure is that it is directly derived from the same variable (equity prices) that is used to generate the equity bust dummy. In most equations, however, including stock price volatility instead of the interest rate spread leads to the same conclusions.

– We re-estimated the extended analysis (Table 2) with alternative baseline equations, including gross domestic product and the short-term interest rate instead of industrial production and the long-term interest rate, and including the oil price. In addition, we experimented with different lag structures. Neither of these alternatives had much impact on our results.

– We analysed smaller subsamples, in particular the periods 1970–1980 and 1990–2002. In general, this leads to stronger differences between periods. Recursive estimations also confirm our finding that financial variables have become more important over time.

V. Concluding Remarks

Our results are in line with a financial accelerator mechanism in the post-1986 period. Probably, the growing importance of the financial accelerator over time is due to the rapid development of financial markets. Comparing stock market performance in the 1970s and in recent years, Davis (2003) draws a similar conclusion. More specifically, he concludes that the 1970 busts were characterized by a sharp deterioration of fundamentals, while the recent equity busts reflect the correction of overvaluation (i.e. a correction of an incorrect perception of fundamentals).

The outcomes for the external finance premium and interest rates around equity busts support the existence of downward pressure on policy interest rates after a downscaling of long-term growth prospects in an environment with strong financial accelerator effects. Expansionary monetary policy in reaction to busts has been the typical reaction in the recent period, but not in the 1970s and early 1980s.

In 2007, the world economy had witnessed several years of strong economic growth, at unprecedented levels since the early 1970s. In those

years, optimism had boosted credit growth in many countries. Shocks to the US subprime mortgage market have triggered the downward revision of economic prospects, and risks around the central projections have come to the fore. This has undermined collateral values and driven up premiums and market interest rates from levels that are very low by historical standards. High market interest rates exacerbate the initial downward economic shocks. This has put pressure on monetary authorities to reduce policy interest rates, in many cases from low levels at the outset.

Appendix A: Data

Most data are taken from the IMF's International Financial Statistics (IFS), extended by various other (mostly national) sources. Table A gives an overview of data availability for each country in our sample.

- *Real activity and prices*. We include real Gross Domestic Product, Industrial Production and Investment (Gross Capital Formation) as measures for real activity. Inflation is based on the consumer price index.
- *Money and credit markets*. The short-term interest rate is a (mostly three-month or overnight) market interest rate, and the long-term interest rate is in most cases the ten-year government bond yield. The interest rate spread proxy for the external finance premium is the difference between the interest rates of long-term private debt and government bonds. For most countries, private-sector interest rates are based on corporate bonds, taken from Globalfindata. Obviously, several characteristics, such as the average maturity, are likely to differ between corporate bonds and government bonds and across countries. Therefore, this measure for the risk premium may also capture a yield curve effect. However, because the direction of this effect varies across countries, its aggregate impact on our results is probably limited. Furthermore, the yield curve itself (measured by difference between long-term and short-term interest rates) has no significant explanatory power in most of our estimations. The alternative proxy for the external finance premium, the conditional volatility of stock prices, is calculated with a GARCH(1,1) model. M3 and credit data from the IFS are extended by data from many other sources.
- *Asset markets and financial crises*. Most stock prices are taken from the IFS, while house prices are based on various national sources and mostly taken from the BIS Datase. An episode is considered a banking crisis if it qualifies as such according to either *Bordo* et al. (2001) or *Mehrez/Kaufmann* (1999).

Table A

Data Availability

	GDP	*IP*	*I*	π	r_S	r_L	r_{spread}	*M3*	*CR*	*S*	*H*
Australia	65-02	65-02	65-02	65-02	68-02	65-02	83-02	65-02	65-02	65-02	70-02
Austria	65-02	65-02	88-02	65-02	65-02	70-02	65-02	65-02	65-02	65-02	87-99
Belgium	80-02	65-02	80-02	65-02	65-02	65-02	65-02	69-98	65-02	65-02	70-02
Canada	65-02	65-02	65-02	65-02	65-02	65-02	65-02	65-02	65-02	65-02	70-02
Denmark	70-00	65-02	88-02	65-02	71-02	65-02	71-02	65-02	65-02	65-02	70-02
Finland	75-02	65-02	75-02	65-02	78-02	78-02	-	75-99	65-02	65-02	70-02
France	70-02	65-02	78-02	65-02	65-02	65-02	65-02	65-98	65-02	65-02	70-02
Germany	65-02	65-02	91-02	65-02	65-02	65-02	65-02	65-02	65-02	65-02	71-99
Italy	65-02	65-02	70-02	65-02	71-02	65-02	71-02	80-02	70-98	65-02	70-01
Japan	65-02	65-02	80-02	65-02	65-02	65-02	65-02	65-02	65-02	65-02	70-02
Korea	70-02	70-02	70-02	70-02	76-02	73-02	76-02	65-02	65-02	78-01	-
Netherlands	65-02	65-02	77-02	65-02	65-02	65-02	70-98	65-98	65-02	65-02	70-02
New Zealand	70-01	77-02	70-02	65-02	73-02	65-02	-	71-02	65-02	65-00	70-02
Norway	65-02	65-02	78-02	65-02	71-02	65-02	83-02	65-02	65-02	65-00	70-02
Portugal	77-02	77-02	86-02	65-02	82-02	65-02	-	80-02	65-02	88-02	88-02
Spain	65-02	65-02	80-02	65-02	74-02	78-02	74-02	65-02	65-98	70-00	75-02
Sweden	70-02	65-02	70-02	65-02	65-02	65-02	65-02	65-02	70-00	65-02	70-01
Switzerland	65-02	65-02	70-02	65-02	65-02	65-02	65-02	72-02	65-02	65-02	70-02
United Kingdom	65-02	65-02	65-02	65-02	65-02	65-02	65-02	82-02	65-02	65-02	68-02
United States	65-02	65-02	65-02	65-02	65-02	65-02	70-02	65-02	65-02	65-02	70-02

GDP = Real gross domestic product
IP = Industrial production
I = Investment
π = Inflation
r_S = Short-term interest rate
r_L = Long-term interest rate
r_{spread} = Interest rate spread
M3 = M3 growth
CR = Credit growth
S = Stock prices
H = House prices

Appendix B: Asset Busts

The busts in presented in Table B are calculated using the methodology explained in Section III.

Table B

Overview of Asset Bust Episodes

	Equity busts		Equity busts
Australia	1972Q2–1977Q1	Netherlands	2000Q1–2002Q4
Austria	1990Q4–1992Q3	New Zealand	1973Q3–1977Q4
Belgium	1974Q1–1977Q3		1987Q2–1991Q2
Canada	2001Q1–2002Q4	Norway	1974Q1–1979Q1
Denmark	1977Q4–1980Q3	Portugal	1986Q2–1989Q2
Finland	1973Q4–1979Q2		1989Q4–1993Q3
	1988Q4–1993Q1		2000Q2–2002Q4
	2000Q2–2002Q4	Spain	1973Q3–1981Q2
France	1974Q2–1977Q2	Sweden	1990Q1–1993Q1
	2000Q3–2002Q4		2000Q2–2002Q4
Germany	2000Q1–2002Q4	Switzerland	1972Q1–1976Q3
Italy	1973Q1–1979Q1		2000Q3–2002Q4
	1990Q1–1993Q2	United Kingdom	1971Q4–1977Q1
	2000Q3–2002Q4		2000Q3–2002Q4
Japan	1989Q4–1993Q3	United States	1972Q3–1975Q2
	2000Q3–2002Q4		2000Q3–2002Q4
Korea	1976Q2–1982Q4		
	1989Q4–1993Q2		
	1995Q1–1999Q2		

Appendix C: Cross-Correlations

Table C

Correlations

	r_S	r_L	π	*IP*	*GDP*	*I*	*M3*	*CR*	r_{spread}	*S*	*H*
r_S	1.00										
r_L	0.82	1.00									
π	0.78	0.55	1.00								
IP	–0.22	–0.19	–0.34	1.00							
GDP	–0.24	–0.12	–0.38	0.89	1.00						
I	–0.24	–0.23	–0.31	0.80	0.80	1.00					
M3	–0.34	–0.30	–0.51	0.33	0.45	0.51	1.00				
CR	–0.36	–0.30	–0.58	0.60	0.69	0.72	0.88	1.00			
r_{spread}	–0.07	0.01	–0.09	–0.68	–0.61	–0.57	0.18	–0.68	1.00		
S	–0.26	–0.13	–0.52	0.21	0.32	0.12	0.22	0.21	–0.12	1.00	
H	–0.44	–0.52	–0.51	0.45	0.54	0.58	0.74	0.45	–0.12	0.16	1.00

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Summary

Financial Acceleration of Booms and Busts

For a panel of 20 industrialized countries from 1970 through 2002, we analyze the role of financial variables in economic cycles. We focus on equity busts, which are considered a proxy for downward revisions of economic prospects. Particularly in the second half of our sample, we find that financial factors have explanatory power. This suggests that the financial accelerator has become more important over time. In this environment, the typical bust is followed by a substantial reduction in the nominal policy interest rate. (JEL E44, E32)

Zusammenfassung

„Booms" und „Busts" als Beschleunigungsfaktoren auf dem Finanzmarkt

Wir untersuchen für eine Gruppe von 20 Industrieländern die Rolle von Finanzmarktvariablen im Verlauf der Konjunkturzyklen im Zeitraum von 1970 bis 2002. Wir konzentrieren uns auf den Absturz von Aktienkursen, der stellvertretend als Konjunkturabschwung angesehen wird. Wir stellen insbesondere im zweiten Teil unserer Untersuchung fest, dass Finanzmarktfaktoren eine erklärende Kraft zugesprochen werden muss. Dies legt nahe, dass der Beschleunigungsfaktor Finanzmarkt im Zeitverlauf an Bedeutung gewonnen hat. In diesem Umfeld folgt auf den typischen Absturz ein substanzieller nomineller politischer Zinsverlust.