The financial sector and the real economy

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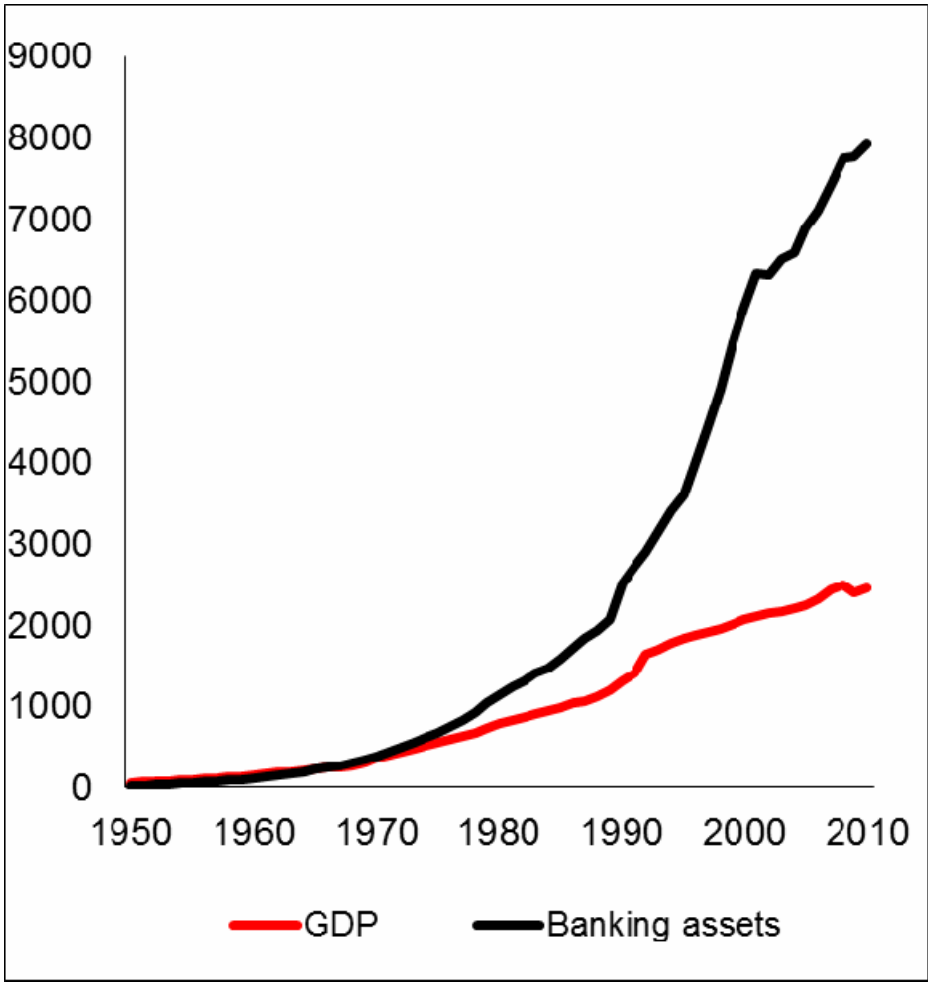
Abstract
The uncertainty precipitated by the lingering fallout from the financial, economic, and debt crises increases daily. Meanwhile, leading mainstream economists are being criticized for their divided positions on the correct diagnosis of and viable solutions for these crises. Classical economic growth theories were unable to predict these dilemmas, as they did not adequately take into account factors such as the macroeconomic impact of outsized financial sector developments. Classical economic models are still considered by many economists to be the correct tools for dealing with the consequences of the 2008-2011 credit crisis ("crisis"). Meanwhile, others view crisis as stemming from the global imbalances precipitated by the application of these classic macro models. This contradiction seems irreconcilable. A new approach is therefore necessary. In this review, we present an alternative growth model. Specifically, one which helps to analyze the interdependence between the financial and the real economy and which also yields analytical statements about the causes of crises.

Introduction

Sufficient capital is the basic prerequisite for enabling economic processes. Innovation is impossible without the availability of adequate capital. Mainstream economic growth models assume that categorical positive relationship exists between the two. However, as the recent financial and economic crises revealed, there is a fundamental interaction between the financial sector and the gross domestic product (GDP) of an economy. The relationship between the two is, however far away from being linear. This is demonstrated in chart 1 for Germany.

In the case of Germany, financial assets - measured by total bank assets - grew significantly faster than the gross domestic product (see chart 1). Interestingly, a tendency for stagnating and (in 2009) even falling growth rates for GDP can be ascertained. Allow us a brief historic synopsis. At the end of the 80s there was a surge in GDP due to the integration of the East German economy. At the same time, nominal assets increased due to the conversion of Ost-Marks into Deutsch-Marks. Afterwards, GDP grew only linearly, while financial assets experienced massive exponential growth. As of the 90s, growth rates in the real economy fell by such a degree that capital could no longer earn the high returns of the past. As a result, capital increasingly gravitated to the higher return potential of the financial markets (equities, private equities, hedge funds etc.). This caused the so-called "savings glut," a situation wherein too much capital is chasing too few investment opportunities. It is in this context that the term "financialization" is often used by economists. Financialization describes the process by which increasingly more corporate earnings and personal income result from financial transactions and not from real economic growth, i.e., increased production and related growth in employment.

Chart 1: Development of nominal gross domestic product and banking assets in € billion



Source: German Bundesbank, total assets of all German banks, time series OU0308, GDP data: www.destatis.de

Noteworthy in chart 1 is the onset of exponential growth in financial wealth after the collapse of the tech bubble in early 2000. The financial and economic crises have also left their marks. Between 2008 and 2009, both GDP and financial asset valuations fell. Valuations fell from a peak of 8093 billion EUR in October 2008 to 7472 billion EUR at the end of October 2010. Due to unprecedented interventions by central banks and policy makers, a sharper decline has thus far been prevented. Central banks continue to attempt to kick start economic growth by expanding the money supply. Economic growth, as expounded by classical macro models (especially the IMF model of 2005[1]) should have risen proportionally with monetary expansion. Unfortunately, empirical observations show that just the opposite happens when the debt to GDP ratio has already grown too large (as is currently

[1] http://www.imf.org/external/pubs/ft/weo/2005/02/pdf/chapter2.pdf, pp 118, 121, and in addition page 105: „The investment equation is less successful than the saving equation in tracking recent developments. This result is similar to other recent studies, which have found that traditional econometric models of investment have difficulty explaining recent trends. The equation over predicts investment in both the industrial and emerging market regions, in some cases by large margins. For instance, while the equation predicts that investment should have increased in industrial countries—largely as a result of the decline in the cost of capital—investment in several key industrial countries, including Japan and the Large Euro countries fell. Similarly, the equation fails to explain the drop in investment in emerging markets, particularly in the east Asian countries. The equation suggests that the investment accelerator—whereby investment rates and output growth move in the same direction—has not worked as strongly as expected in recent years in these countries, most likely because corporates have focused on reducing debt and strengthening balance sheets, rather than on investing in capital."

the case in Greece, the US, and other countries). How can this conflict between theory and reality be resolved?

A new macro-model

Models display cause and effect principles. In this review, we endeavor to determine the relationship between GDP *Y* and financial assets *K*. We will revisit the increasingly contested relationship between these two functions. In so doing, we shall deploy the very mathematical modeling procedures which are well known in the natural sciences. For mathematical reasons we need at least two linearly independent equations to define the relationship. Our basic equation system has the following structure:

$$\frac{dY}{dt} = b_0(t) + p_B(t)Y(t) + p_Y(t)K(t) \quad \text{and} \quad \frac{dK}{dt} = a_0(t) + p_S(t)Y(t) + p_K(t)K(t)$$

with initial conditions $Y(0) = Y0$ and $K(0) = K0$. In the case of Germany, $Y0 = Y$ (1950) and $K0 = K$ (1950).

This coupled system of differential equations describes the effect, i.e., the growth rates of *Y* and *K* as autonomously generated data points. Said data points stem a) from independent causes (a_0, b_0) and b) from the function (*Y*, *K*), which is itself causal. In this sense, the parameter functions have to be determined. These are in principle - as are the sought unknown functions *Y* and *K* - functions of time.

The parameters a_0 and b_0 describe independent causes for the growth of GDP or capital. For example, a_0 could represent the inflow or outflow of foreign capital (such as financial support from the IMF) and b_0 could be an exogenous GDP inflow (e.g., grain donations from abroad).

p_n is what we call the net business investment rate of the banking industry and the function $-p_n$, therefore, represents the net rate of investment in the real economy. p_S denotes the savings rate, p_B the population growth, p_Y the investment in the real economy, and p_K the actual return on financial assets. There is, however, a causal link between the parameters and the functions p_Y and p_K. The interest/capital gains for financial assets ultimately have to be generated by the real economy (GDP). Therefore, our equation: $p_K = - p_Y := p_n (t)$.

We distinguish between interest payments for financial assets and those for loans. Furthermore, we differentiate between capital that circulates in the financial system and the portion of capital which finds its way into loans for the real economy (either for consumption or investment purposes). The latter is called "net business rate" p_n where $p_n = p_v - p_r$ (written in units of an interest rate).

To determine the specific representation of the "net business investment rate" p_n we need information about investments in the real economy as well as information about "proprietary business investment," which the financial system processes within itself.[2] The share of loans going into the real economy's total business ("p_{rel}") stood at 75% in 1950 ac-

2. We interpret the financial systems as a subsystem of our social system. See Niklas Luhmann "Social Systems" (1996).

cording to the Bundesbank (time series OU0115). Today, 60 years later, the figure has fallen to about 40%. Since we are interested in comparing "real economy loans" with overall asset growth (which represents the entire economy), we express pr as a portion of interest payments or p_v. The share of interest remaining after reinvestment in the real economy is given by:

$$p_n(t) = p_v(t) - p_r(t)$$
$$= p_v(t)(1 - p_{rel}(t)) - p_v(t)\,p_{rel}(t)$$
$$= p_v(t)(1 - 2\,p_{rel}(t))$$

We can interpret p_n(t) as follows: because (accumulated) capital is growing faster than GDP, its relative capacity for making loans into the real economy declines. Assuming an exponential half-life (in this case T_h = 80 years), p_{rel} can be phenomenologically stated as:

$$p_{rel} = \frac{1}{e}\exp(-\frac{t - T_h}{T_h})$$

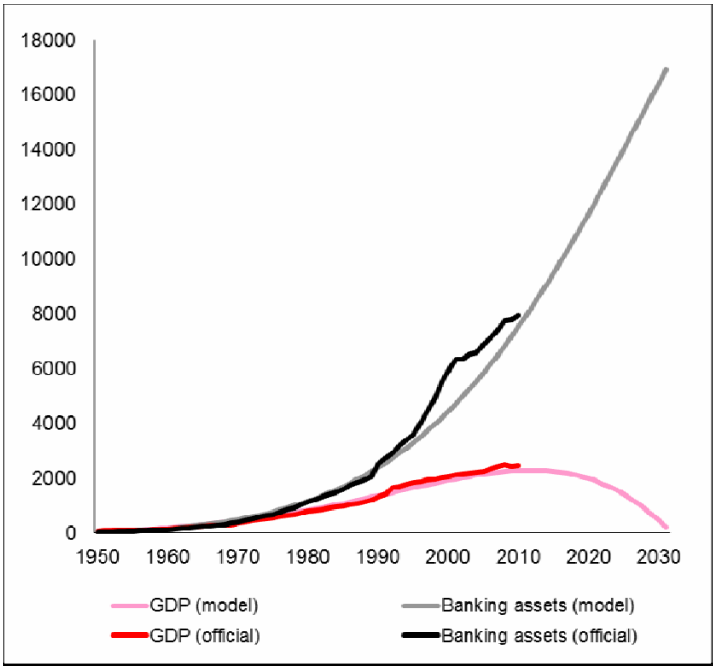
This yields p_{rel} (0) = 1 = 100% and p_{rel} (80) = 1 / e = 0.37 = 37% and p_{rel} (∞) = 0. Inserting this into p_n (t) results in:

$$p_n(t) = p_{v0}(1 - \frac{2}{e}\exp(-\frac{t - T_h}{T_h}))$$

as an approximate function based on empirical experience for the real data.

We have calibrated the parameters in the model with the empirical Bundesbank data from 1950 to 2010 and have made an extrapolation with the synthetic function (for detailed explanation see the technical paper[3]). The results can be seen in chart 2:

Chart 2: simplified macro model for Germany calibrated with the data 1950-2010 and model forecast through 2030



Source: Empirical data: Bundesbank and the Federal Statistical Office, model values: own calculations.

[3] Available for download at www.ifara.eu

Our simplified macro model shows the significant effects of the core and net business savings rate on the interaction between financial assets and the real economy and has the following basic structure:

$$\frac{dY}{dt} = -p_n(t)K(t) \quad \text{and} \quad \frac{dK}{dt} = p_S(t)Y(t) + p_n(t)K(t)$$

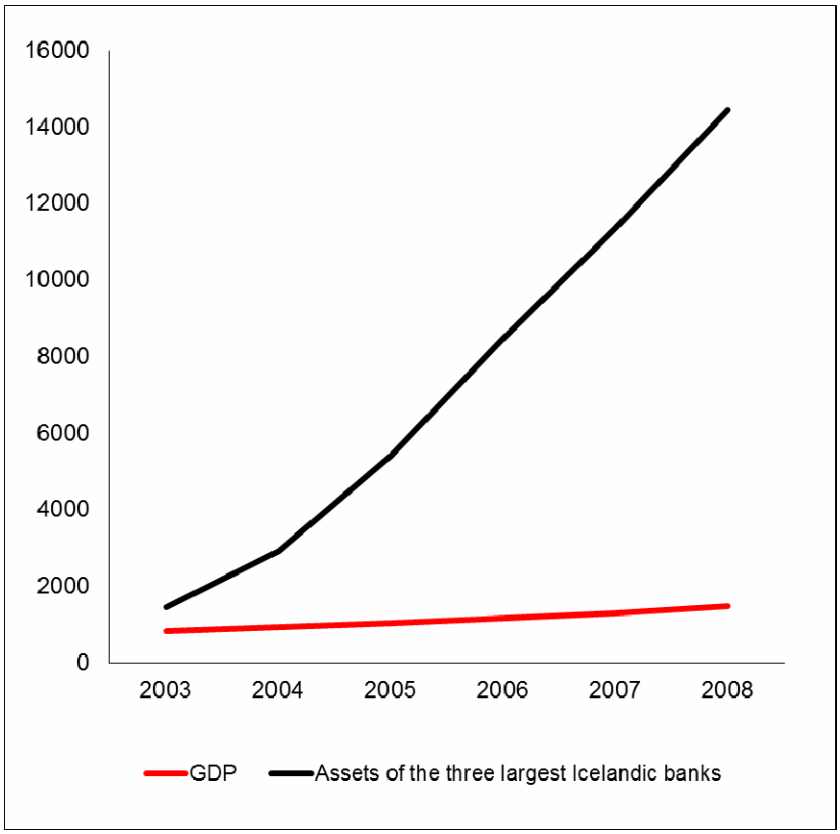
Flattening GDP growth in the final developmental phase is due to the fact that the required rate of return on investment can no longer be attained via sufficient growth in the real economy. Therefore, ever increasing amounts of debt need to be assumed to underpin GDP. This effect is ultimately self-reinforcing because the reduced (and finally negative) economic growth is accompanied by exponential growth in financial assets along with the related reduction in capital available for reinvestment in the productive capacity of the real economy. As a result, GDP shrinks. The model shows that sustained growth in financial assets as a percentage of the economy increases the very "financialization" necessary to meet the demands of financial asset growth.

The case of Iceland

Iceland, a country with approximately 300,000 inhabitants, makes for an excellent case study for "when such a process gets out of control". The pace of financialization in Iceland can be described as one of the fastest in the history of mankind. In only a few years, the assets of the three largest Icelandic banks increased to nearly ten times the country's GDP, as can be seen in chart 3. Icelandic banks funded their expansion with short-term loans in the interbank market and, in the later stages, through foreign depositors. In order to fight speculation and inflation, the Icelandic central bank increased interest rates to over 15%. But these very high interest rates attracted even more foreign savings, which in turn increased the Icelandic money supply and thus further fueled economic stress. When international banks ultimately refused to roll over loans in the interbank market, the whole system collapsed like a house of cards. The result of this crisis was soaring unemployment and inflation. The claims of foreign savers had to be written off to an unprecedented extent.

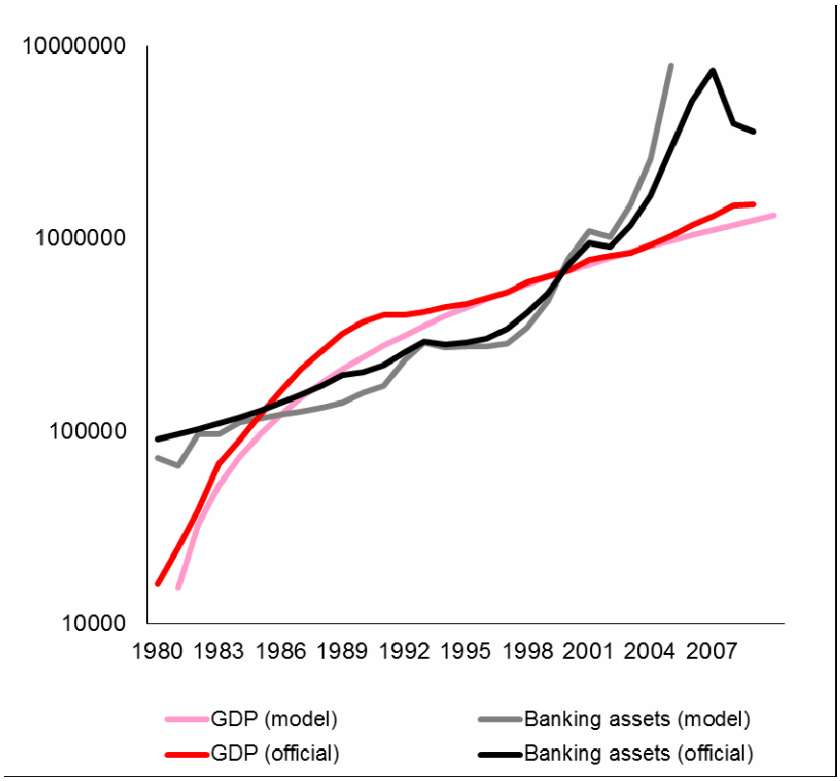
Noteworthy: even a simplistic version of our macro model reveals impressive predictive results when we "reproduce" the developments in Iceland, as can readily be seen in chart 4. For a more insightful depiction, a logarithmic representation was chosen.

Chart 3: Financialization in Iceland: Nominal GDP versus total assets of the three largest banks (2003-2008) in billion Icelandic kronas



Source: Iceland Central Bank

Chart 4: Simplified macro model for Iceland



Source: Empirical data (1980-2009): Icelandic Central Bank, Iceland's statistics office, model values (1980 - 2005); Own calculations.

The discrepancies between official data and model results stem from the fact that the underlying data of the Icelandic statistics compared to those of Germany are incomplete and had to be partially interpolated. In particular, during the final stages of development, the parameters a_0 and b_0 had non-zero values due to numerous rescue packages. However, these parameters could not be considered in the model due to the lack of official data for this same time period. Under these circumstances, material rescue packages in such states of economic development are necessary to prevent - or at least postpone - systemic collapse.
The case of Iceland drastically illustrates what can or could happen as a result of exponential financial asset growth. Most economists conclude that a similar development in Germany can be categorically ruled out because the local economy is far more robust and the industrial base much healthier. Although this statement is correct in principle, we should not forget that financialization has taken hold of Germany as well. Take for example corporate profits, which have increased steadily since 2003, in large part due to stagnating real wages in Germany. These profits, however, were not primarily reinvested into the real economy but were instead invested in financial assets (predominantly in higher yielding bonds of deficit countries in the Euro area). Between 2004 and 2009, the annual cumulative inflows of foreign net financial wealth climbed to 982 billion Euros. However, due to the recent write-downs this value has decreased by 455 billion Euros.[4]

Summary and outlook

A close mutual relationship exists between the financial sector and real economy. Capital can trigger economic growth. On the other hand, financial wealth cannot sustain itself indefinitely without an adequate "real economy" foundation. Since the financial sector is not represented in the mainstream macro models developed over the last 40 years, those models do not anticipate the shocks that spread through the entire financial system and affect the real economy. The goal of our macro model is to reveal the interactions between financial assets and the real economy in order to better understand the causes of systemic crises. For a better understanding of the economic balance sheet and the cause-effect chains of economic change, we can derive a number of interesting applications. Case in point: the model allows political and economic decision makers to measure the impact of their interactions within the whole system. In this way, systemic crisis can be forecasted and implications for investment strategies be examined. This topic will be discussed in a paper in progress.

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[4] See Schulmeister „Deutschland verbrennt sein Vermögen im Ausland", Handelsblatt 26.11.2010