MONETARY NATIONALISM AND INTERNATIONAL ECONOMIC INSTABILITY

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ABSTRACT: This paper describes the international transmission of boom-and-bust cycles to small periphery economies as the outcome of excessive liquidity supply in large center economies, based on the credit cycle theories of Hayek, Mises, and Minsky. We show how too-expansionary monetary policies can cause overinvestment cycles and distortions in the economic structure on both the national and the international level. Feedback effects of crises in periphery countries on center countries trigger new rounds of monetary expansion in center countries, which bring about new credit booms and international distortions. Crisis and contagion in globalized goods and financial markets indicate the limits of purely national monetary policies in countries, which provide the asymmetric world monetary system with an international currency. This makes the case for a monetary policy in large countries that takes responsibility for its long-term effects on goods and financial markets in both the center and the periphery countries of the world monetary system.

KEYWORDS: credit cycles, monetary policy, crisis, contagion, Hayek, Mises, Minsky

JEL CLASSIFICATION: E42, E58, F33, F44

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"the desirable behavior of the total quantity of money [...] can never legitimately be applied to the situation of a single country which is part of an international economic system, and that any attempt to do so is likely in the long run and for the world as a whole to be an additional source of instability." (Friedrich von Hayek, 1937a, p. 93)

"The wavelike movement effecting the economic system, the recurrence of periods of boom which are followed by periods of depression is the unavoidable outcome of the attempts, repeated again and again, to lower the gross market rate of interest by means of credit expansion." (Ludwig von Mises, 1998 [1949], p. 572)

1. INTRODUCTION

The subprime market crisis of 2007 and the following global crisis have led to decisive interest rate cuts towards zero and unprecedented quantitative easing in the advanced economies. Central banks, particularly at the core of the world monetary system such as the US Federal Reserve (Fed) and the European Central Bank (ECB), have provided ample liquidity to the financial system to counteract the threat of a painful global credit crunch. Interest cuts and devaluations were expected to speed up the economic recovery by generating investment, export momentum and growth.

Yet given liberalized international capital markets, these purely domestically oriented policies hold severe risks of fuelling bubbles abroad, thereby causing international economic instability. The liquidity glut in the large advanced countries has led to destabilizing capital flows to emerging market economies, which have triggered distorting policy measures such as excessive reserve accumulation, non-market based sterilization of surplus liquidity, state directed capital allocation and the introduction of capital controls.

The crisis reactions have triggered a discussion about the appropriate global monetary regime. Steil (2007) argues that monetary sovereignty is the Achilles' heel of globalization. UNCTAD (2010) and McKinnon (2010) propose policies to put a constraint on purely domestically oriented monetary policies of large economies. Emerging markets such as China and Russia call for a new international system that is less dependent on the monetary policy decisions of the US Federal Reserve System (Xiaochuan, 2009).

In the 1930s, Hayek (1937a) warned that in an environment of floating exchange rates—as present since the breakdown of the Bretton Woods System—insular monetary policies will cause destabilizing capital outflows to other countries. *"Suspicion that exchange rates were likely to change in the near future"* were argued to foster one-way bets on appreciation (Hayek, 1937a, pp. 63–64). When central banks lower interest rates to exceptionally low levels to stem against painful appreciation and destabilizing capital inflows, they allow for excessive credit creation. This puts the stage for Mises-Hayek style credit cycles, structural distortions and competitive depreciations.

Previous research empirically shows that a fall of interest rates to unnaturally low levels can cause distortions or Mises-Hayek style credit cycles in an economy (Keeler, 2001; Young, 2005; and Mulligan, 2006). Since the 2007 subprime crisis, there is a growing body of literature that applies the Mises-Hayek credit cycle theory to explain causes of the financial crisis (Garrison, 2009; Leijon-hufvud, 2009; O'Driscoll, 2009; Salerno, 2012; and Young, 2012).

Only a little research addresses international linkages as described by Hayek (1937a). Schnabl and Hoffmann (2008) argue that since the 1980s, undue monetary expansion in large advanced economies has caused a wave of wandering bubbles in new and emerging markets. Hoffmann and Schnabl (2011) point out that the recurring and growing bubbles were caused by asymmetric macroeconomic policy patterns, i.e., a structural decline of monetary policy rates towards zero and a substantial increase of public debt levels.

Borio and Disyatat (2011) provide empirical evidence that interest rates in large advanced economies have reached exceptionally low levels. They argue that this is the key behind the international credit booms after the turn of the millennium. Hoffmann (2010) shows that low euro area interest rates contributed to Austrian-type credit cycles in central and eastern Europe in the 2000s. Cachanosky (2013) explains the link between low interest rates in large advanced economies and the development of structural distortions in small open emerging economies.

Inspired by Hayek (1937a)'s claim that *"monetary nationalism"* renders the international economic system fragile, we aim to further analyze the limits and risks of domestically oriented

monetary policies based on a Mises-Hayek overinvestment[1] / credit cycle framework.

The paper provides two innovations. First, we extend the standard closed-economy setting of the Mises-Hayek credit boom theory (as reviewed in section 2) to a two-country partial equilibrium framework to outline the effects of monetary expansion in large industrial economies on emerging markets (section 3). We focus on an explanation of the international transmission of credit booms via capital flows from large advanced to small open economies under different exchange rate regimes. To account for risk-taking of banks, which has become an important aspect of boom-and-bust cycles, we integrate aspects of Minsky's (1992) "theory of financial instability."

Second, we apply our extended Mises-Hayek framework to show that crisis in emerging markets can have destabilizing feedback effects on large industrialized countries (section 4). This will highlight the limits of purely domestically oriented monetary policies for large countries and the benefit to large countries from a timely exit from near-to zero interest rate policies and quantitative easing. The paper concludes with policy implications in the spirit of Hayek (1937a) (section 5).

2. THE CREDIT CYCLE IN A CLOSED ECONOMY

We review the credit cycle (overinvestment) theory of Mises (1912, 1928, 1998 [1949]) and Hayek (1976 [1929], 1967 [1935]) in a simplified framework to describe the economic distortions caused by too-expansionary monetary policy as a basis for extension in section 3. To account for risk-taking aspects we focus on Hayek's (1929 [1976]) early works on credit cycles and integrate parts of Minsky's (1992) "theory of financial instability."

2.1. MODEL SETUP

We distinguish three types of interest rates to explain credit cycles: First, the *natural interest rate* i_n is defined as the interest rate which

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[1] Hayek (1976 [1929]) referred to unsustainable investment as "Überinvestition" or "overinvestment." To emphasize the distortions in the production structure, often unsustainable investment is also labeled "mal-investment" (see for instance Garrison, 2006).

balances supply (saving) and demand (investment) on domestic capital markets ($I_1 = S_1$ in Figure 1). Second, the *central bank interest rate* i_{cb} is the policy rate set by the central bank. It represents the interest rate, which commercial banks are charged by the central bank for refinancing operations. Third, the *capital market interest rate* i_c is defined as the interest rate set by the private banking (financial) sector for credit provided to private enterprises. We understand all three types of interest rates as real interest rates. Because prices are sticky in the short run changes in nominal interest rates are assumed to be equivalent to changes in real interest rates. Respectively, we refer to real investment, real saving and real credit.

We assume the saving-investment decisions in an economy to equilibrate, when the *capital market interest rate* is equal to the *natural rate of interest*, which balances planned saving and investment (Rizzo and O'Driscoll, 1997, p. 203; Garrison, 2006, pp. 36–40). In our framework, the capital market rate is not solely determined by the market. Instead, it is assumed that the central bank steers capital market rates via central bank rates as long as monetary policy and capital markets work smoothly. For simplification, we assume that under normal conditions the central bank and the capital market rate are identical.
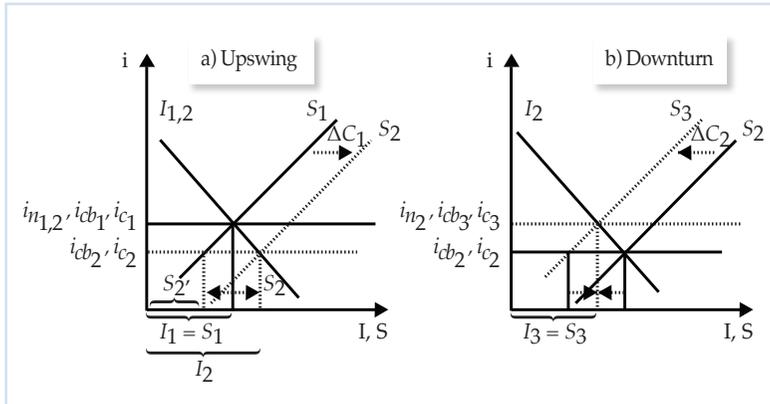
2.2. THE CREDIT CYCLE

In the Mises-Hayek theory a credit cycle begins with a fall of the capital market rate below the natural rate. Following Mises (1928, pp. 53–58) and Hayek (1976 [1929], p. 79) this may be caused by a central bank that aims at stimulating the economy by lowering central bank policy rates.[2]

The fall in policy rates allows for easy refinancing conditions so that capital market rates fall as well. In Figure 1a, the central bank lowers the policy rate from i_{cb_1} to i_{cb_2}. As the natural rate of interest stays unchanged, the policy and natural rates diverge ($i_{n_1} = i_{n_2} = i_{cb_1} > i_{cb_2}$). If commercial banks follow the central bank via credit

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[2] Hayek (1976 [1929], p. 106) offers alternative reasons for a fall of the capital market rate below the natural rate. He stresses the crucial role of the elasticity of the credit system for the emergence of credit cycles and argues that central bank policies are a possible trigger but not a necessary condition for credit cycles (p. 83).

expansion the capital market rate of interest diverges from the natural rate ($i_{n_2} > i_{c_2}$).

Figure 1. Closed Economy Disequilibria

According to Hayek (1976 [1929], pp. 98–100), banks have an incentive to follow the central bank's interest rate cut because of competition for market share. The credit expansion is modeled by a right shift of the savings (capital supply) curve to S_2, which then represents planned savings S_1 plus the additional credit supply ΔC_1. $S_{2'}$ represents the lower planned savings S_1 at i_{c_2}.[3] The falling interest rate triggers additional investment. Projects with a lower marginal efficiency can be financed that are not backed by respective saving ($I_2 > S_{2'}$).

Following the Mises-Hayek credit cycle theory, excessive lending distorts the production structure of the economy during the upswing.[4] If planned saving had increased to S_2 together with investment, (future) preferences of households would be in line with the investment plans as more saving signals rising consumption in the future. As interest rates are lower despite higher investment,

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[3] We use an apostrophe to mark *ex ante* planned saving.

[4] Garrison (2004; 2006, pp. 67–83) models the effects of monetary policy on the structure of production. He uses production possibility frontiers and the Hayekian triangle to illustrate the distortionary effects of monetary expansion.

the credit expansion falsely signals that planned saving $S_{2'}$ (preferences of households to forgo present consumption) has increased to S_2. With consumption being expected to decline in the present and to increase in the future, high future returns on investment in capital goods (which aim at producing future consumer goods) are expected (Mises, 1912, pp. 430–432; Hayek, 1976 [1929], p. 101; Hayek, 1967 [1935], p. 89; Mises, 1998 [1949], pp. 550–560).

This constitutes an unsustainable disequilibrium between planned saving and investment $S_{2'} < I_2$ at $i_{c_2} < i_{n_2}$ (Figure 1a). An overinvestment boom in the capital goods sector is induced. Unemployed capacities and labor are drawn into the production of investment goods. Rising employment, wages and income stimulate consumption. Given low interest rates, the demand for consumer goods—particularly durable goods—rises as well. Rising demand provides an incentive to further increase capacities (Garrison, 2004).

Due to rising demand, expected returns in investment goods industries remain high (Hayek, 1937b) and stock prices rise. Households may want to participate in rising enterprise profits (or are unwilling to consume at higher prices) and decide to invest in stock markets. Additional capital is provided for investment (endogenous shift in savings). This dampens the inflationary pressure in the consumer goods sectors for a while. As the equity of firms increases, banks are inclined to lend even more at low interest rates. The profitability and sustainability of investment becomes even more dependent on low capital market rates and increasing asset prices.

In this context, Minsky (2008 [1986], p. 233) argues that low interest rates stimulate risk-taking of banks. Given low interest rates, hedge financing is transformed into Ponzi financing and *"Ponzi financing may be transformed to speculative financing"* (Minsky, 2008 [1986], pp. 231–232).[5] While *"hedge finance units are vulnerable to difficulties in fulfilling outstanding financial commitments only if*

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[5] Minsky (2008 [1986]) defines hedge finance as the traditional form of financing with investors being able to repay loans and interest rates in the future based on the returns of investment. Speculative finance schemes only cover the cash flows. In the case of *Ponzi finance*, to stay in business investors have to borrow to meet their near-term debt obligations. It is only sustainable as long as asset prices increase.

receipts fall short of expectations," Ponzi and speculative finance mainly hinges on low interest rates because debt has to be rolled over to extend financing after a while (Minsky, 2008 [1986], pp. 233–234). Thus, artificially low interest rates not only induce overinvestment in capital goods sectors but also induce leverage, which is unsustainable once interest rates increase.

Investment and consumption co-move upwards. At some point, labor becomes scarce and capacity limits are reached. Temporary over-employment of resources may emerge to satisfy further increasing demand.[6] But due to overinvestment, resources are bound in the capital goods sector, leaving the consumption goods sector eventually unable to continue satisfying increasing demand at constant consumer goods prices. Overinvestment in capital-intensive sectors is followed by incomes rising faster than the supply of consumer goods.

The boom turns bust, when over-employment of capital and labor cannot be sustained to keep up the production level and consumer price inflation accelerates. The central bank increases the interest rate to fight inflation (Hayek, 1976 [1929], p. 100; Minsky, 1992, p. 8)[7] and/or commercial banks tighten credit supply (Hayek, 1976 [1929], pp. 100–101). In Figure 1b, credit is tightened by ΔC_2, and central bank rates and capital market rates rise to i_{cb_3} and i_{c_3}. This shifts the savings (capital supply) curve back to the right to S_3. The distortions in the economic structure become visible and investment projects with an internal interest rate below $i_{cb_3} = i_{c_3}$ have to be dismantled.

A cumulative process downwards shifts the investment curve to the left. If the central bank keeps credit tight, the natural rate is below the capital market rate. *"Debt deflation"* and *"deep depression"* follows (Minsky, 2008 [1986], p. 245).

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[6] In the short run, longer working hours or the over-use of machinery (capital consumption as opposed to maintenance) in the overinvested industries may relieve the resource constraint. The resulting rapid depreciation of capital goods may look justified in the light of rising expected profits (Garrison, 2004; 2006).

[7] This implies that under a fiat money standard, the central bank feels obliged to keep consumer price inflation under control. If, however, the central bank does not tighten credit supply, the boom comes to an end as well because the increasing price level brings about the tightening of real credit.

3. MONETARY NATIONALISM AND INTERNATIONAL ECONOMIC INSTABILITY

The seminal credit cycle theory of Mises (1912) and Hayek (1976 [1929]; 1967 [1935]) was elaborated as closed economy framework.[8] Domestic monetary expansion leads to a domestic credit cycle. To model how monetary expansion in one economy can cause a credit cycle in another economy we augment the credit cycle theory to a two-country setting. The augmented model helps to show how, in an asymmetric world monetary system, monetary policy in a large "center" country can cause boom-and-bust cycles in small "periphery" countries. (For a similar approach see McKinnon, 2010).

In this extended framework, we assume that both the center and periphery countries are fully open to trade and capital flows. We further assume that center and periphery countries have their own currencies which are linked via exchange rates. Although—reflecting the current world monetary system—exchange rates are often *de jure* flexible, we acknowledge a persistent *"fear of floating"* in periphery countries (Calvo and Reinhart, 2002). This implies either fixed exchange rate strategies or discretionary foreign exchange interventions in periphery countries to stabilize exchange rates. In the face of monetary expansion in the center economy and appreciation pressure on the currencies of the periphery countries, exchange rate stabilization leads to an accumulation of foreign (dollar) reserves in the balance sheets of periphery central banks because of negative growth effects of appreciation. Thus, the monetary policy stance of the center country is exported to the small open economy independent of its exchange rate regime.

3.2. INTERNATIONAL CAPITAL FLOWS AND EQUILIBRIUM

Figure 2 models international borrowing as additional source of liquidity in an open economy. We assume that there are two economies, which are populated with individuals that differ in

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[8] Mises assumed a gold standard in early works and recognized the theory as open economy model. But the further elaboration of the credit cycle theory focused on a closed economy setting (Garrison, 2006).

planned saving and consumption. Planned saving in one economy is higher than in the other. This implies a lower interest rate level as long as capital markets are closed.

One economy is the center economy, in which monetary policy decisions are exogenous (e.g., based on domestic inflation and growth). The other economy is a group of periphery countries where the exchange rate plays an important role for monetary policy making. The model does not pre-impose a restriction on which is the center and which is the periphery. But we assume that the economy with lower planned savings is the periphery. Further, we assume a similar size of the center economy and the aggregated group of periphery countries.[9]

Given open capital markets, savings are allocated to the most profitable international investment opportunities. Higher expected returns on investment (interest rates) in the periphery attract savings from the center economy where expected returns and capital market interest rates are lower, as saving is relatively abundant. The center economy exports capital to become the creditor economy. The periphery imports capital as the debtor country (group). A convergence process as modeled below has, for instance, been experienced between western and eastern Europe after the fall of the Berlin Wall with the integration of central and eastern Europe into the European (and world) economy.

Figure 2 illustrates the convergence process. The initially closed economy capital market rate of the creditor (center) economy $i^c_{c_0}$ (at which $S^c_0 = I^c_0$) and the initial debtor (periphery) capital market rate $i^d_{c_0}$ (at which $S^d_0 = I^d_0$) converge towards a common world capital market rate $i^w_{c_1} = i^c_{c_1} = i^d_{c_1}$. The amount of capital exports of the creditor (center) economy is CX^c_1, which is equal to the amount of capital imports CM^d_1 of the debtor economies (periphery).
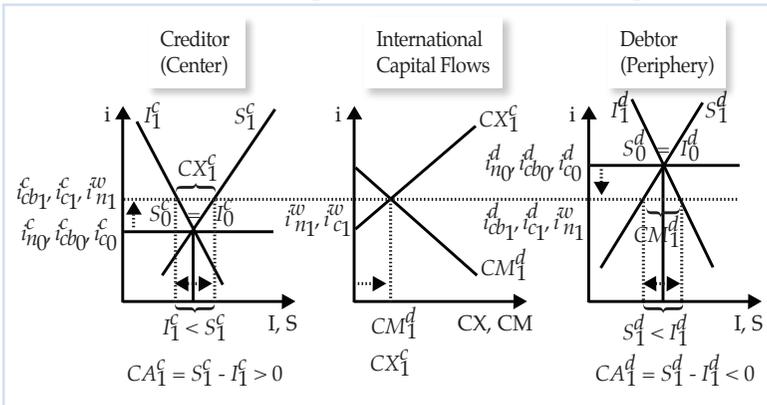
With capital market rates increasing in the creditor (center) economy ($i^c_{c_0} < i^c_{c_1} = i^w_{c_1}$) following international financial liberalization, saving is stimulated ($S^c_0 < S^c_1$), while domestic investment is replaced by foreign investment ($I^c_0 > I^c_1$). In the debtor economies (periphery),

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[9] In practice, the capital exports of one large creditor country are matched by the capital imports of a group of smaller debtor countries, as, for instance, in the case of Germany and many smaller European countries.

the lower capital market rate ($i^d_{c_0} > i^d_{c_1} = i^w_{c_1}$) originating in capital inflows discourages saving ($S^d_0 > S^d_1$) and promotes investment ($I^d_0 < I^d_1$). A domestic saving-investment gap arises in both economies with opposite signs. Internationally aggregated saving and investment are balanced at the world capital market interest rate, which is equal to the world natural interest rate ($i^w_{c_1} = i^w_{n_1}$).

Given liberalized goods and capital markets, to fulfill the balance of payments identity, the debtor economies (periphery) import goods from the creditor (center) economy. The gaps between supply and demand on capital markets are closed via trade. Capital exports CX^c_1, capital imports CM^d_1 and respective current account positions (CA^c_1 and CA^d_1) in Figure 2 reflect an efficient international allocation of resources, which matches national preferences for inter-temporal saving and consumption (Hoffmann, 2010; McKinnon and Pill, 1997).

Figure 2. International Capital and Goods Market Equilibrium

3.2 INTERNATIONAL CREDIT BOOM

Whereas international capital mobility can stimulate investment and growth in economies with a shortage of capital and higher expected returns of investment, it can contribute to too-easy liquidity conditions and boom-and-bust cycles. This is particularly the case when interest rate cuts in center countries bring about excessive

capital inflows into small open economies with underdeveloped capital markets. This was, for instance, observed in southeast Asia prior to the Asian crisis, in central and eastern Europe as well as parts of the euro area during the boom period after the turn of the millennium up to the 2007–08 crisis, and is currently observed on a global level (Hoffmann, 2010; Löffler et al, 2010).

In the model of Mises (1912) and Hayek (1976 [1929]; 1967 [1935]), a credit boom emerges on a national level if the central bank lowers policy rates below the natural rate and the banking sector finances additional investment by holding capital market rates below the natural rate (as modeled in Figure 1a). In an asymmetric world monetary system, the international availability of capital originates in large and highly developed financial markets of center economies that provide the international monetary system with international currencies. We assume that the central banks of such center economies take into account only domestic goals such as inflation and growth[10]—what Hayek (1937a) called *"monetary nationalism."*

Easy liquidity conditions initiate capital flows to periphery economies (with higher interest rate levels), where monetary policy decisions strongly hinge on external factors such as exchange rate stabilization (Calvo and Reinhart, 2002). If interest rates in the center economy are held low to boost domestic growth, investors can finance (risky) investment in periphery economies that would not have been profitable under tighter liquidity conditions.[11] Carry trades and momentum betting for interest rate arbitrage and exchange rate revaluation gains lead to excessive reserve accumulation and monetary expansion in emerging markets.[12]

In Figure 3, we illustrate the emergence of a credit boom in the periphery triggered by liquidity expansion in the center economy,

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[10] As formalized for instance in the Taylor rule (Taylor, 1993).

[11] There are alternative reasons for a drop of capital market rates and speculative capital inflows into emerging market economies. For instance, implicit credit guarantees by the government increase the risk appetite of banks (McKinnon and Pill, 1997).

[12] McKinnon and Schnabl (2004) show why in emerging markets free floating is not a feasible policy choice because of underdeveloped goods and capital markets (in east Asia).

which we assume to be the international creditor economy. The starting point is Figure 2. Capital market and central bank interest rates in the two economies have converged towards the world natural interest rate $i^w_{n_1}$. International aggregated saving is equal to aggregate investment. Capital exports amount for CX^c_1 and capital imports for CM^d_1. The current account balance is $CA^c_1 = S^c_1 - I^c_1 > 0$ in the creditor (center) economy and $CA^d_1 = S^d_1 - I^d_1 < 0$ in the debtor (periphery) economies.
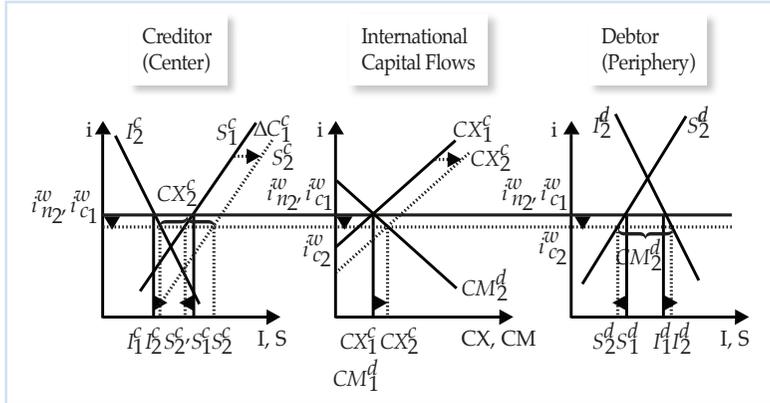
If the central bank in the center (creditor) economy lowers the policy rate below the world natural rate of interest to $i^c_{cb_2}$ to promote domestic investment and growth, the financial sector will create additional credit ΔC^c_1. The credit expansion mimics an increase in planned saving which is modeled by a right shift of the savings curve from S^c_1 to S^c_2 (by ΔC_1). The world capital market interest rate falls from $i^w_{c_1}$ to $i^w_{c_2}$ (Figure 3).

Given lower interest rates, new investment projects are started. Investment activity increases from I^c_1 to I^c_2 in the center (creditor) economy and from I^d_1 to I^d_2 in the periphery (debtor) economies. Due to lower capital market rates, planned saving falls to $S^c_{2'}$ in the creditor (center) economy and from S^d_1 to S^d_2 in the debtor (periphery) economies. The term S^c_2 represents credit supply in the creditor economy, $S^c_{2'}$ plus the additional credit expansion ΔC^c_1 ($S^c_2 = S^c_{2'} + \Delta C^c_1$) at $i^w_{c_2}$. Rising capital exports are reflected in a growing current account surplus from CA^c_1 to CA^c_2 (= $S^c_{2'} + \Delta C^c_1 - I^c_2 = S^c_2 - I^c_2 \gg 0$) in the center (creditor) economy. In the periphery (debtor) economies the current account deficit CA^d_1 widens to $CA^d_2 = S^d_2 - I^d_2 \ll 0$, as capital imports increase to CM^d_2 (= CX^c_2).

Because global planned saving has not increased with the credit expansion but fallen to $S^c_{2'} + S^d_{2'}$, the world capital market interest rate is below the world natural interest rate $i^w_{c_2} < i^w_{n_2} = i^w_{n_1}$. A global disequilibrium between saving and investment emerges, which amounts for the difference between $I^c_2 + I^d_2$ and $S^c_{2'} + S^d_2$. As the global interest rate level has declined to $i^w_{c_2}$, the credit expansion triggers overinvestment with lower expected marginal returns. Based on Hayek (1935) with the fall in interest rates below natural rates the production structure of the economies would lengthen and capital intensity increase. This may be accompanied by booms in the

stock markets or the housing sectors.[13] The average default risk of investment increases as—given resource constraints—the capital market rate has to return to the natural rate in the long run.

Figure 3. Credit Expansion and Overinvestment

It is possible that there is no credit boom in the center economy despite the interest rate cut. This can be the case in the aftermath of a financial crisis, when investors and banks do not expect an economic recovery despite easy liquidity conditions. This can be argued to have been the case in Japan after the burst of the Japanese bubble economy.[14] A low interest rate elasticity of domestic investment would correspond to a close to vertical investment curve I_2^c in Figure 3. Then, given sluggish expectations in the center, after the center economy's central bank has lowered policy rates, the additional credit is exported entirely. This amplifies the credit and overinvestment boom of the periphery as experienced in east Asia before the Asian crisis.

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[13] Cachanosky (2013) models the effects of a fall in interest rates below the natural rate based on the Hayekian triangle.

[14] Alternatively a restrictive fiscal policy in the center country may prevent a credit boom thereby amplifying the credit boom in the periphery as in the case of Europe after the turn of the millennium (Schnabl and Wollmershäuser, 2013).

3.3 Crisis and Contagion

When overinvestment in capital-intensive sectors of the periphery economies comes along with rising asset prices, increasing incomes and high consumption raise the demand for consumer goods. Overconsumption emerges with consumption being larger than consistent with the inter-temporal equilibrium. As resources are bound in the capital goods sector the consumption goods sector becomes unable to satisfy rising demand at constant prices. Inflation accelerates.[15] Given exchange rate stabilization due to *"fear of floating,"* the real appreciation of the currency brings about growing current account deficits as observed in the southeast Asian economies before the Asian crisis, the central and eastern European economies before the 2008 crisis and the current crisis countries of the euro area.

The turn-around becomes inevitable when, on an international level, interest rates rise. The tightening of international credit can originate in either monetary policy or the private banking sector. Central banks in the center can restrict credit to counteract inflation once domestic activity picks up. Alternatively the banking sector reassesses credit risks once signs of instability in the periphery emerge.

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[15] In the short term the inflationary pressure can be dampened by additional imports, which contributes to a rising current account deficit.

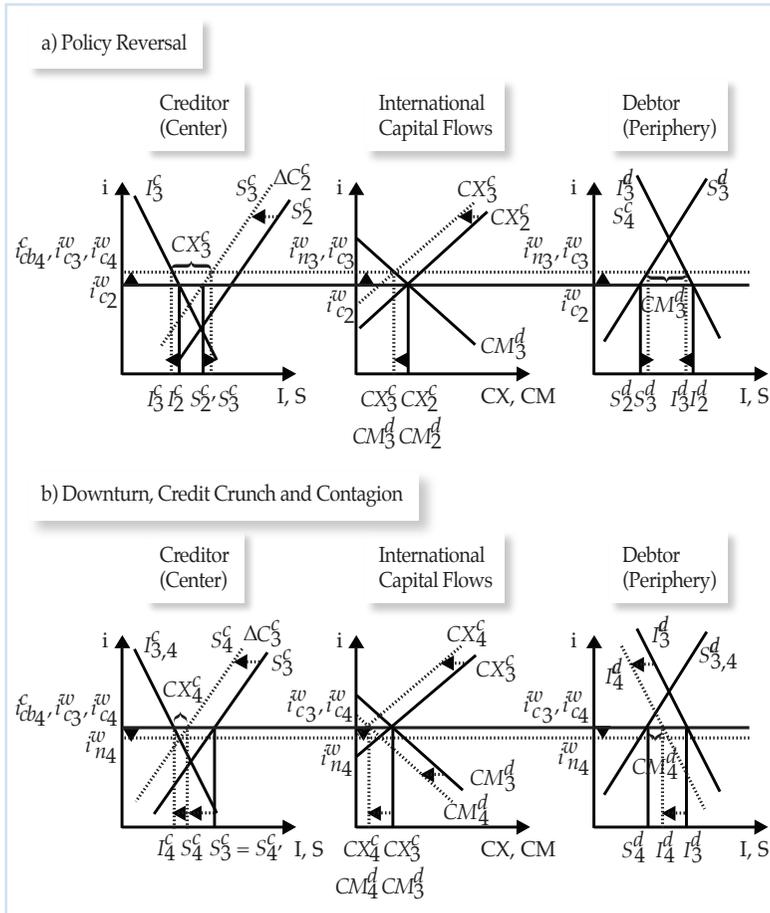## Figure 4. Policy Reversal, Credit Crunch and Crisis Contagion

Figure 4a illustrates the policy reversal in the center (creditor) economy and the impact on the periphery economy. When the central bank tightens money supply, the banking sector has to reduce the credit exposure, for instance by ΔC_2^c. The central bank policy rate increases to i_{cb3}^c, which is—for instance—equivalent to the world natural interest rate ($i_{cb3}^c = i_{n3}^w$).[16] The saving curve shifts

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[16] We implicitly assume that due to the asymmetry of world monetary system, the world interest rate is determined by the center central bank.

back to its initial position ($S_3^c = S_1^c$). Less capital is exported by the center (creditor) economy ($CX_3^c < CX_2^c$). Capital imports of the periphery (debtor) economies fall from CM_2^d to CM_3^d. World capital market interest rates rise along with the center policy rate $i_{cb_3}^c = i_{c_3}^w$:

This lifts the threshold for the profitability of investment projects. Structural distortions are cleared as investment with internal interest rates below the natural interest rate $i_{n_3}^w$ has to be dismantled. Investment in the center (creditor) economy falls to I_3^c and investment in the periphery (debtors) to I_3^d. Planned saving increases from $S_{2'}^c$ to S_3^c in the center (creditor) economy and from S_2^d to S_3^d in the periphery (debtors). Global planned saving and investment are balanced again as the world capital market rate is equal to the world natural interest rate.[17]

When investment projects are dismantled, others become unprofitable as general demand declines (negative multiplicator effect). Expected returns of investment fall. As illustrated in Figure 4b, the investment curve of the periphery shifts from I_3^d to I_4^d. With falling capital demand the world natural rate falls to $i_{n_4}^w$. According to Hayek (1967 [1935], p. 103), during a crisis, panic in financial markets may arise. Credit markets can dry up if the central bank does not increase monetary accommodation.[18] The downturn in the periphery causes credit defaults. The center economy's banking sector faces losses on the asset side of the balance sheets and has to deleverage. Credit to the private sector is further restricted.

In Figure 4b, the center economy's banking sector restricts credit to the private sector by ΔC_3^c.[19] The savings curve shifts to S_4^c and capital market interest rates remain at $i_{c_4}^w$ despite a fall in

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[17] Note that in this case planned saving is equivalent to overall saving. Thus, we do not add the apostrophe.

[18] "It is also a fact which has been established by long experience, that in times of crisis central banks should give increased accommodation and extend thereby their circulation in order to prevent panics, and that they can do it to a great extent without effects which are injurious" (Hayek, 1967 [1935], pp. 108–109).

[19] To keep the graph simple, the shift in the investment curve in the periphery is equal to the shift in the capital supply curve in the center. This keeps the capital market rate unchanged at . In reality, the combination of feedback effects from credit defaults and rising risk aversion (i.e. panic) are likely to shift the capital supply curve more to the left than the investment curve, shifting the capital market rates further upwards.

investment demand. In the center economy, investment is at I_4^c while planned saving remains at $S_{4'}^c$. The capital market rate is held above the natural rate of interest $i_{c4}^w > i_{n4}^w$. The international effects of the credit crunch are symmetrically opposed to those of the credit expansion in Figure 3. Capital exports fall to CX_4^c and the periphery's capital imports decline to CM_4^d as the capital returns to the safe haven.

Thus, the unwillingness of banks to lend keeps investment activity in both the center and the periphery too low. Given too high world capital market rates, a global capital supply overhang emerges ($S_{4'}^c + S_4^d > I_4^c + I_4^d$). With lower investment, overcapacities are dismantled, wages fall, unemployment rises and incomes decline. Consumption contracts in both economies. The current account balances narrow to match the smaller capital account balances. Given lower incomes and lower consumption, prices deflate (capital goods devalue) and investment activity remains sluggish.

4. INTERNATIONAL FEEDBACK EFFECTS AND POLICY IMPLICATIONS

The effects of national monetary policies in large countries in the center of the asymmetric world monetary system on the smaller periphery countries depend on the relative economic size and the financial linkages. In our model the economic size of center and periphery are assumed to be equal. If the center is large, the periphery is small, and international capital mobility high, even a moderate credit expansion in the center can trigger a severe boom-bust cycle in the periphery. This is particularly the case if capital outflows from large centers are clustered in a few periphery countries. At the same time, feedback effects of crisis in a small periphery on a large center are negligible. Then, a solely domestically oriented monetary policy is the dominant strategy from the point of view of the center.

This changes when the magnitude of international capital flows increases, the periphery economy or a group or periphery economies become larger, and therefore feedback effects of crisis in the periphery on the center are significant. Financial instability in emerging markets then triggers financial instability and outright policy responses in center countries.

4.1 EMPIRICAL EVIDENCE FOR INTERNATIONAL FEEDBACK EFFECTS

Feedback effects from crisis in the periphery on center countries could be recently observed in southeast Asia and Europe.[20] Following the burst of the Japanese bubble economy starting in December 1989, Japan suffered from a severe deflation in stock and real estate prices. To contain the negative growth effects of asset price deflation, during the first half of the 1990s Japanese policy makers cut interest rates to prevent a credit crunch. But domestic investment remained sluggish—which corresponds to a close to vertical investment curve in the creditor economy—and the first large wave of carry trades directed Japanese capital exports to southeast Asia.

In southeast Asia, starting from the early 1990s, capital inflows from Japan provided a fertile ground for (US dollar) foreign reserve accumulation,[21] monetary expansion and credit growth (McKinnon and Pill, 1997). This triggered—in line with our overinvestment framework—speculative investment in the southeast Asian export sectors, stock markets and real estate markets. In Japan, the export industry experienced rising revenues from declining production costs in and rising exports to the region. The balance sheets of Japanese banks improved due to higher revenues from lending to the smaller southeast Asian economies.

At some point of the overinvestment cycle the boom turned bust. This marked the starting point of the Asian crisis, which returned to Japan via goods and capital markets as Japanese banks and enterprises were hit (Schnabl and Hoffmann, 2008). We see three transmission channels. First, Japan's export industry, which constitutes the most important pillar of Japanese growth, suffered from declining exports. Second, Japanese FDI in the smaller Southeast Asian economies was rendered unprofitable. Third, Japanese banks faced a further increasing stock of non-performing

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[20] Also, significant feedback effects between monetary expansion in the US and credit cycles in the dollar periphery, in particular in east Asia, can be observed. The monetary interaction between the US and east Asia is more complex due to sterilization operations in the periphery countries (Schnabl and Freitag, 2012).

[21] East Asian reserve accumulation is predominately in US dollars. In contrast to the US and the euro area Japan accumulates international assets in dollars instead of in domestic currency (McKinnon and Schnabl, 2012).

loans, now from defaulting credit in Southeast Asia. Thus, (as modeled in Figure 4b) the Asian crisis triggered the 1998 Japanese financial crisis via contagion effects in goods and financial markets. The Japanese central bank responded with new interest rate cuts to stabilize the Japanese economy, which brought the short-term interest rate towards zero.

In Europe, the monetary policy of the European Central Bank contributed to boom-bust cycles in the inner and outer periphery of the euro area after the turn of the millennium (Schnabl and Wollmershäuser, 2013). After the burst of the new economy bubble, German private and public wage austerity (to regain competitiveness after the unification boom) combined with ECB interest rate cuts stimulated capital outflows from Germany to central, eastern, southern and western Europe. At the EMU periphery credit booms as modeled in Figure 3 emerged.

The crises in central and eastern Europe and at the southern and western periphery of the euro area was triggered by the interest rate increases of the European Central Bank during the years 2006 and 2007 as well as by a reassessment of credit risk following the US subprime crisis. As modeled in Figure 4a, the benchmark for investment in the periphery regions was lifted. Changing sentiment regarding the sustainability of the booms in the European periphery regions led to a financial market driven credit tightening as modeled in Figure 4b.
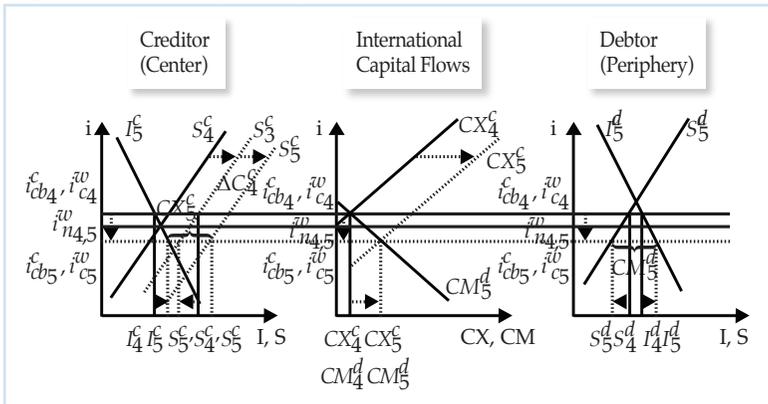
The crisis in the European periphery countries triggered monetary and credit expansion to forestall negative feedback effects on the center of the euro area as observed in east Asia via four channels. First, substantial interest rate cuts during the crisis and postponed ECB interest rate increases during the recovery after the slump. Second, credit provided to central and eastern European countries based on IMF credit facilities, the Vienna Initiative and public capital injections to euro area commercial banks with large credit exposure in the region. Third, ECB government bonds purchases of euro area crisis countries and other forms of quantitative easing. Fourth, credit provided via European crisis management facilities such as the European Financial Stability Facility (EFSF) and the European Stability Mechanism (ESM) etc. All factors can be assumed to have prevented similar feedback effects for the European center (in particular Germany) as observed in Japan

during the Asian and Japanese financial crisis, but may be followed by unintended consequences.

4.2 MONETARY POLICY, CRISIS MANAGEMENT AND UNINTENDED CONSEQUENCES

The interest rate cuts of center central banks in response to crisis in periphery countries are modeled in Figure 5. To prevent a meltdown in financial markets, which is caused by the credit exposure of the center country's banking sector to the periphery, center central banks pull down policy rates. Very low cost money aims to turn around sentiments of banks to provide new low cost credit to the private sector. In the short-run, a credit crunch and defaults of financial institutions are prevented in the center economy. However, as argued by Mises (1929) the well-intended intervention may have unintended consequences as it may constitute new and even larger boom-and-bust cycles, which will trigger even larger policy interventions in the future.

Figure 5. Monetary Policy Response to Crisis

In Figure 5, the policy makers in the center cut central bank rates from $i^c_{cb_4}$ to $i^c_{cb_5}$ allowing for additional credit expansion. This improves the banking sectors refinancing conditions and undoes the previous credit contraction. This is shown by a shift of the

saving curve from S_4^c back to S_3^c which would correspond to a move towards the world natural rate of interest $i_{n_4}^w$. In case of excessive monetary expansion new additional credit ΔC_4^c is created and world capital market rates converge towards the policy rate to $i_{c_5}^w = i_{cb_5}^c$. The global interest rate level has now fallen below the natural rate $i_{c_5}^w < i_{n_{4,5}}^w$ again. New overinvestment is triggered by excessive credit expansion. In Figure 5 capital exports shift outwards from CX_4^c to CX_5^c fuelling new overinvestment in the periphery ($I_5^d > I_4^d$).

In Figure 5, the central bank continues to support growth via easy liquidity conditions and does not undo the previous interest rate cuts by raising the central bank rate towards the natural rate $i_{n_5}^w$. As the central bank rate and the capital market rate have declined to an unprecedented low level, structural distortions from the previous credit cycle are preserved and the marginal efficiency of investment further decreases.

A new international overinvestment cycle starts from a level of even lower interest rates than the one before (Figure 3). The upcoming crisis will be more severe and will trigger even lower interest rates to prevent a credit crunch and stabilize growth as the marginal efficiency of investment has declined. An asymmetric intervention pattern of boom, crisis and interest rate cuts emerges if central banks raise interest rates less in the upswing than they cut them during the crisis (Hoffmann and Schnabl, 2011).

The asymmetric monetary policy pattern in the centers of the world monetary system, i.e. the structural decline in nominal and real interest rates in the large center countries, is likely to be transmitted to the rest of the world, independent from the exchange rate regime. Low interest rates in the center are imported directly by periphery countries if they pursue fixed exchange rate regimes. But also a flexible exchange does not allow periphery countries to isolate themselves from liquidity expansion in the center, as appreciation pressure on the domestic currencies would put a serious drag on growth.

With flexible exchange rates, outright interest rate cuts to shield against speculative capital inflows and appreciation pressure make the interest level converge towards the center's countries interest rates. If a gradual appreciation of the periphery countries currency is allowed for, the interest rate level in the periphery

country can fall even below the interest rate level of the center countries, once appreciation expectations become sustained. The resulting boom-bust cycles and structural distortions would be even larger. Such *"competitive interest rate cuts"* can be seen as the equivalent to competitive depreciations as in the aftermath of the Great Depression[22] (McKinnon, 2010). The outcome is a historical low global interest rate environment, i.e., a global liquidity glut.

Based on the extended Mises-Hayek overinvestment cycle theory, the risk of the current low interest rate environment is fourfold. First, although it is difficult to predict in which corner of the world speculative profit opportunities will emerge, the probability of boom-bust cycles has substantially increased. Second, although at a global level consumer price inflation still seems to remain under control, inflationary pressure has emerged in raw material, food and asset markets. Third, although speculative capital inflows into emerging markets can be (temporarily) tamed by capital controls and non-market based sterilization operations, distortions in domestic and international financial and goods markets are the consequence. Fourth, as nominal interest and real interest rates have fallen to very low levels, the marginal efficiency of investment has declined on a global level.

Increased financial market volatility, high raw material and food prices, distorted economic structures, global imbalances, and a low marginal efficiency of investment put a drag on long-term growth, which contributes to political instability. A reform of monetary policy rules is required to return to a stable long-term growth path and to prevent rising global political instability.

4.3 Implications for Monetary Policy Rules

In line with our findings, Diamond and Rajan (2009) argue that *"a central bank that promises to cut interest rates conditional on stress, or that is biased towards low interest rates […], will induce banks to*

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[22] In 1931, Britain was the first to exit from the gold standard, which helped to achieve a timely recovery from the great crisis. Losing export shares, the US followed in 1933 and forced the dollar to depreciate. This led to strong appreciation pressure and a drop in production in continental Europe until it went off the gold parity in 1936 (Eichengreen and Mitchener, 2003; McKinnon, 2010).

promise higher payouts or take more illiquid projects. This in turn can make the illiquidity crisis more severe and require a greater degree of intervention, a view reminiscent to the Austrian theory of cycles." To cope with the unintended but severe side effects of asymmetric monetary policy patterns, monetary policy-making needs to be subject to stricter rules.

Based on the Mises-Hayek framework, to forestall global financial and economic instability central banks in the large center countries have to keep interest rates close to the natural interest rate. Although the exact target value of the natural rate of interest is difficult to determine, given the current low interest rate level in the large countries such as Japan, US and euro area interest rates have to increase to equilibrate saving and investment preferences on a global level.

In a world with central banks that control the rate of interest, we suggest that monetary policy should concentrate on one goal only—long-term price stability. This implies that the short-term adjustment process in crisis is to be left to the market. Prices have to decline and productivity has to increase following an overinvestment boom. This would have a *"cleansing effect"* as speculative investment and enterprises with low profitability would have to leave the market, while unemployment rises until economic activity picks up and the economy returns to equilibrium (Schumpeter, 1912, pp. 360–369).

We propose that monetary policy makers apply policy rules in a broader, more forward-looking way. In a financially globalized world, the domestic inflationary effects of monetary expansion are postponed, as liquidity expansion takes the detour via international financial and goods markets until it feeds into higher domestic inflation. Adalid and Detken (2007) find that global credit growth is a better predictor for upcoming financial turmoil than national credit aggregates and domestic inflation. As monetary and credit growth can fuel foreign asset prices without affecting domestic consumer price inflation in the short-run, a rapid credit growth combined with sharp increases in asset prices raises the likelihood of future financial instability. Therefore, credit growth should be treated in a respective way in monetary policy decision making.

Because integrating international financial markets into domestic monetary policy reaction functions would lead to conflicting goals,

as one instrument is confronted with two or more targets, monitoring monetary and asset aggregates to forecast future inflation is necessary to restore international financial and economic stability. This presumes, however, that central banks in large center countries are willing to take the responsibility for global financial and economic stability, which brings us back to Hayek's (1937a) policy considerations.

5. HAYEK'S INTERNATIONAL SOLUTION

We have shown that national monetary policy bears the danger of international (economic) instability if it aims at stimulating domestic growth without regard to international repercussions. Particularly if the central bank is a big player that provides the international monetary system with an international currency, a control mechanism against undue monetary expansion has to be found.

Hayek (1937a) was pessimistic about a self-restriction of policy makers as they tend to follow short-term goals. He pointed out that a system of international free banking or an international monetary authority could solve these problems. In particular, he wrote *"a really rational monetary policy could only be carried out by an international monetary authority, or at any rate by the closest cooperation of the national authorities and with the common aim of making the circulation of each country behave as nearly as possible as if it were part of an intelligently regulated international system"* (Hayek, 1937a, p. 93).

Such a monetary system might be based on a symmetric fixed exchange rate system which could imitate the mechanism of the classical gold standard. Undue monetary expansions and beggar-thy-neighbor depreciations could be ruled out. Hayek (1937a) was, however, skeptical of such commitments. He referred to his idea as a *"utopian dream"* because the necessary policy shift was very unlikely in the 1930s. Therefore, a rule or *"principle (such as the gold standard) which at least secures some conformity of monetary changes in the national area to what would happen under a truly international monetary system is preferable to numerous independent and independently regulated national currencies"* (Hayek, 1937a, p. 93).

As in the 1930s, today the global conflicts about the international repercussions of national monetary policy making and the policy

responses at the periphery—as represented by the debate on exchange rate policies between, e.g., China and the US—signal that introducing a new international monetary system based on, e.g., fixed exchange rates (McKinnon, 2010) is unlikely to happen soon. Not even rule changes as proposed in section 4.3 are currently seriously envisaged.

Instead, we can observe a further nationalization of monetary policies. This nationalization is led by ultra-low monetary policies in the center economies. The resulting distortions are extended via (discretionary) exchange rate stabilization, non-market based sterilization, capital controls, state-directed capital allocation and the revival of industrial policy to the periphery countries. In short, we observe intervention spirals as described by Mises (1929): Well-intended policies in the center countries have unintended negative consequences on other economies that cause further interventions and new distortions in both centers and peripheries that necessitate new interventions, and so on.

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