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On the Role of International Spillovers from the European Central Bank's Unconventional Monetary Policy

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Abstract

One of the most significant new developments in the global post-crisis economy is the implementation of various unconventional monetary policies (UMP) by major central banks in the advanced countries with the ECB being not an exception. We summarize the evidence on international effects of the ECB's unconventional monetary policy, which has been studied much less than those of the Fed, with rather mixed empirical findings for the time being. The estimated spillover effects for the same set of countries differ across the studies in terms of magnitudes, signs as well as with respect to detected operative transmission channels and factors determining these spillovers. The observed heterogeneity in results is largely attributed to the specifications of the ECB unconventional monetary shocks and modeling frameworks chosen by the authors, which implicitly consider only part of the transmission channels and omit others. Thus, the paper argues that development of more sophisticated and unified econometric frameworks is crucial for conducting future research on this theme and providing regional central banks with coherent policy implications. The paper finally assesses the scope for monetary policy coordination as a reaction to non-pecuniary spillover effects to other regions of the world from the political economy perspective.

Zur Rolle internationaler Effekte der unkonventionellen Geldpolitik der Europäischen Zentralbank

Zusammenfassung

Eine der bedeutendsten neuen Entwicklungen in der Weltwirtschaft nach der Krise ist die Umsetzung verschiedener unkonventioneller Geldpolitiken durch die Zentralbanken der wichtigsten Industrieländer, unter denen die EZB keine Ausnahme darstellt. Die internationalen Auswirkungen der unkonventionellen Geldpolitik der EZB wurden bisher

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weit weniger erforscht als die der FED, mit bisher gemischten empirischen Befunden. Die geschätzten Übertragungseffekte („Spillovers") unterscheiden sich in den einzelnen Studien hinsichtlich ihrer Größe, ihrer Vorzeichen sowie der identifizierten operativen Übertragungskanäle und Faktoren, die diese Spillover-Effekte bestimmen. Die Heterogenität der Ergebnisse wird weitgehend auf die jeweils gewählten Spezifikationen unkonventioneller monetärer Schocks und Modellierungsrahmen zurückgeführt, die notwendigerweise immer nur einen Teil der Übertragungskanäle berücksichtigen können. Daher wird für die Durchführung künftiger Forschung zu diesem Thema und für die Ableitung kohärenter geldpolitischer Implikationen für die nationalen Zentralbanken die Entwicklung umfassender, komplexerer und einheitlicher ökonometrischer Rahmen von entscheidender Bedeutung sein. Abschließend bewerten wir den Spielraum für die Wahrscheinlichkeit einer Koordinierung der Geldpolitik als Reaktion auf nichtpekuniäre Übertragungseffekte auf andere Regionen der Welt aus der Perspektive der politischen Ökonomie.

Keywords: European Central Bank, monetary policy, policy coordination, spillovers, International Monetary Fund

JEL Classifications: E52, E58, F41, F42, G15

I. Introduction

One of the most significant new developments in the global post-crisis economy is the implementation of various unconventional monetary policies (UMP) by major central banks in the advanced countries with the European Central Bank (ECB) being not an exception. The ECB's non-standard monetary policy measures originally aimed at improving the transmission mechanism of the monetary policy in the Euro area (*Fratzscher* et al. 2016). In March 2008 the ECB introduced its Supplementary Long Term Refinancing Operations (SLTROs) with maturity between six months and one year and Long Term Refinancing Operations (LTROs) with maturity of three years in order to tackle liquidity shortages in the banking sector and keep the money market working. In May 2010 the ECB announced the Securities Markets Programme (SMP), which was terminated in September 2012 with the introduction of the Outright Monetary Transactions (OMT).

These measures aimed to restore the monetary policy transmission mechanism by supporting specific financial market segments, such as sovereign bond markets, and containing redenomination risk due to the fears of a Euro area break up. At a time when the policy rate had reached its zero lower bound (ZLB) the other unconventional instruments, e. g. forward guidance and the Public Sector Purchase Programme (PSPP), directly addressed the risks of a too prolonged period of low inflation and fragile economic recovery in the Euro area.

Given the leading global role of the US economy, there is an abundant literature on the domestic and international effects of US unconventional monetary

policies (UMPs)[1]. On the contrary, the international role of the ECB monetary policies is less studied and comes up with the different findings. This article summarizes the empirical evidence and identifies potential gaps in existing research.

The empirical literature on the international spillovers stemming from the Euro area usually concentrates on the Central, Eastern and South Eastern European non-euro countries (CESEE), which are either European Union members or EU (potential) candidate countries. Firstly, the Euro area is the most important trade partner for these countries, both on the export as well as the import side, which along with the sizable remittances constitutes a real channel of shock transmission. Secondly, these countries are integrated with the Euro area through strong financial linkages, since the latter provides large capital flows into the region and domestic banking systems are largely dominated by the euro area banking groups. Against this background, the ECB's monetary policy can be expected to have a significant impact on these countries even if they retain an autonomous monetary policy.

Moreover, due to the size of the Euro area economy and the ECB's balance sheet, the global transmissions of the ECB actions might go far beyond Europe. Furthermore, the euro remains unchallenged as the second most important currency in the international monetary system. Moving towards an EU capital markets union, as well as a completed banking union may contribute to the depth and liquidity of euro area financial markets and, as an indirect result, foster the international role of the euro, narrowing the gap to the US dollar (ECB 2017).

In what follows we present the brief overview of the positive and negative effects of the spillovers in general as well as the potential transmission channels of the international propagation of the unconventional monetary policy shocks. Next, we discuss the available empirical approaches that are used to assess the spillovers of the ECB monetary policy shocks. Then we address the empirical findings on the international role of the ECB monetary policies, which address the signs and the magnitude of the spillovers, the operative transmission channels as well as the factors which amplify the spillovers in receiving country. Finally, based on the available evidences, we conclude and discuss which policies might be effective for the small open economies to withstand the undesired output and inflation fluctuations.

II. Positive and Negative Effects of Monetary Policy Spillovers

Due to the trade linkages and global financial integration, the policies in one part of the world are able to create non-negligible spillover effects in the rest of the world, which could have both positive and negative effects. On the one

[1] See, for instance, *Belke* et al. (2017) for a critical review of these studies.

hand, cross-border optimization of capital allocation improves efficiency and thus has a positive impact on economic welfare. International diversification of financial assets can help to re-distribute risks and consequently reduce the overall risk attached to investments. Financial globalization can also help emerging markets to improve financial intermediation and attract capital from abroad. On the other hand, spillovers on financial markets might also dramatically raise the interdependence between economies and make it almost impossible for individual countries to decouple from adverse developments abroad. They also open up the possibility of speculative bubbles in case of underdeveloped financial markets and contagion effects in times of crisis. Finally, even the coordination of monetary policy instruments across the Member States of a monetary union is seen by some to be justified when this kind of spillover is significant. However, the significance of monetary policy spillovers may be a necessary but by far not sufficient condition of fiscal policy coordination. For instance, the spillovers may bear a pecuniary character and, hence, do not need to be internalized in a strict sense. Seen on the whole, thus, the rise in international financial flows and the capital markets' rapid responses has therefore fundamentally changed the conditions for national economic policy in open economies.

Especially in small open economies, global factors and/or spillovers from abroad sometimes have a greater influence on cross-border capital flows than domestic conditions (*Belke/Rees* 2014). During the recent financial crisis and the ensuing European sovereign debt crisis, the issue became particularly acute and resulted in the collapse of international trade and the increase in investors' risk aversion worldwide. The subsequent monetary policy developments in major advanced economies created low interest rate environments and favorable liquidity conditions for investors in conjunction with the incentives to channel capital into emerging market economies in search of higher expected risk-adjusted returns. This lowered risk premia, boosted asset prices, and eased financial conditions in a number of emerging markets, despite of their fundamental domestic conditions such as high economic growth, growing inflation and laxer fiscal conditions (*Belke/Verheyen* 2014). In some of the affected countries, the sudden surge in capital inflows caused real appreciation of national currencies and reduced therefore price competitiveness (*Aizenman* et al. 2016).

The Fed's "tapering talk" in spring 2013 led to sudden portfolio rebalancing away from many emerging market economies and an abrupt depreciation of their currencies. This resulted in the increased value of US dollar-denominated debt in local currencies, posing additional risks to financial stability (*Moore* et al. 2013). Hence, many questions arose about the advantages of international cooperation and the inadvisability of allowing countries to focus solely on their own domestic stability (*Rajan* 2014). Nowadays, spillover effects of diverging monetary policies among the United States and the Eurozone as well as the uncertainty with respect to the possible effects of the ECB exit strategies pose fur-

ther challenges on emerging economies. Moreover, the large unknown is whether the monetary policies in advanced countries in the future will continue to work with the broadened mandate and use extended set of instruments as the "new normal" (*Blinder* et al. 2017).

Finally, the observed developments in the global financial markets triggered discussions about the existence of a global financial cycle with international synchronicity of lending flows and real estate prices, which individual countries can have trouble to circumvent (*Rey* 2015). The existence of a global financial cycle further revitalize the discussion about policy choices in an open economy in the context of the so-called impossible trinity – the hypothesis that a country can achieve two, but not all three, goals of monetary independence, exchange rate stability, and financial integration (*Aizenman* et al. 2010). A key question in this regard is whether the 'trilemma' has reduced into a 'dilemma', e. g. an economy cannot have at the same time independent monetary policy and an open capital account, independent of the exchange rate regime. In this case, policy makers might turn to capital controls for policy autonomy. However, the empirical evidence on the efficiency of the macroprudential tools, a tighter financial regulation or restrictions on cross-border financial instruments, is mixed (*Klein/Shambough* 2015; *Forbes* et al. 2015; *Singh/Wang* 2017).

III. Main Transmission Channels and Amplification Mechanisms

Cross-border spillovers generally occur as a result of a shock in one country that is transmitted through a variety of channels to another economy. Thus, the qualitative and quantitative analysis of the spillover effects of the monetary policy shock in the Euro area relates to the discussion of the transmission channels as well as the amplification or stabilization mechanisms in the receiving spillovers country (European Commission 2014).

The channels of shocks' transmission have increased and became more complicated after unconventional monetary policy has emerged. The most prominent traditional domestic monetary policy transmission channels are through the market rates, expectations, asset prices and exchange rate. The official interest rate decisions affect directly money-market rates and indirectly lending and deposit rates of the banks. Moreover, policy actions and announcements affect expectations about future interest rates (and thus long-term interest rates[2]) and, more generally, future course of the economy. The altered financing conditions and market expectations in turn trigger adjustments in asset prices (e. g. stock, bond and housing prices). Policy-induced changes also affect the exchange rate,

[2] Long interest rates at least partially depend on market expectations about the future developments of short-term interest rates.

since the relative price of domestic and foreign money exchange rate naturally depends on both domestic and foreign monetary conditions. At least two other channels become potentially relevant for the transmission of the unconventional monetary policies – the wealth and the confidence channel (*Bluwstein/Canova* 2016). The stabilization purpose intertwined with the latter channel, aiming at the reduction of the uncertainty and risk perceptions in financial markets, was heavily emphasized during the period of the global financial crisis. Finally, all these aforementioned transmission mechanisms contribute to the changes in supply and demand of goods and labor markets, and thus, to domestic output and price fluctuations.

The international transmissions of domestic UMPs are not constrained to one particular channel as well and have been subject to several discussions. First, UMP measures may alter bilateral exchange rates, affecting net trade and import prices for the partner country and thus, altering foreign prices, production, and consumption. Second, the ECB's non-standard monetary measures might ease liquidity conditions for Euro area international banks and influence thus their decisions to extend cross-border lending abroad, affecting in turn global credit conditions. The international bank lending channel is of particular importance for the economies with, on the one hand, dominance of banks in financial intermediation, and, on the other hand, with large presence of foreign-owned banks in the local banking systems. Third, UMP measures are spread through the asset pricing channel by altering the relative prices and yields of domestic assets (*Chinn* 2013). This may involve the international dimension and activate the portfolio rebalancing channel (*Krishnamurthy/Vissing-Jorgensen* 2011) with the investors turning to non-UMP countries in their search for higher risk-adjusted returns, inducing lower bond yields and higher asset prices there. This rebalancing effect may also affect nominal exchange rates (*Bruno/Shin* 2015). The signaling channel operates via the changes of public expectations for future short-term policy rates and results in the changes in the prices and yields of assets as well. This channel is linked to the confidence channel whereby the announcements, if credible, or actual operations, of the central bank influence perceptions of uncertainty and risk (*Ciarlone/Colabella* 2016).

Taken together, the wide range of transmission channels results in international financial spillovers altering exchange rates, liquidity, risk and asset prices abroad. This further contributes to the macroeconomic spillovers via trade, import prices, investment and consumption decisions, and ultimately alters output and inflation in the receiving spillovers countries. Moreover, the monetary policy in one country might affect not only the levels of financial and macroeconomic variables in other economies but also create substantial volatility spillovers. Here worth to mention that volatility can still be detrimental even if the levels of the respective variables are beneficial for the domestic economy (e. g. levels of interest rates, exchange rates).

Different market structures and policy regimes might affect the sensitivity of countries to the spillover effects. A high degree of trade openness is believed to facilitate the propagation of shocks across integrated economies. Nominal and real rigidities also play an important role in determining the amplitude and persistence of spillover effects, affecting the adjustment to shocks (European Commission 2014). The sensitivity to financial spillovers depends on several factors, such as financial openness and development, the size and activity of multinational banks, the nature of financial market regulations, inflation stability, levels of government debt or budget deficit, current account deficit, legal development, the exchange rate regime (*Singh/Wang* 2017). *Chen* et al. (2015) mention that, whether a country benefits or is negatively affected by spillovers of a foreign monetary policy shock depends on whether its business cycle is in the same position as that of the foreign country. Finally, the interaction between open macro policy variables with macroeconomic and institutional conditions seems also to play a role in amplifying or mitigating spillovers (*Aizenman* et al. 2016). Despite the fact that both amplification and stabilization mechanisms are of great interest for policymakers, they have hardly been classified in an unified way due to their high dependence on country-specific factors.

IV. Empirical Modelling

1. Measuring the ECB's Unconventional Monetary Policy

In order to empirically assess domestic and international effects of the ECB policies given the ZLB and the implementation of the UMPs, researchers can no longer rely on the key monetary policy rate and thus, the alternative indicators for the stance of non-standard monetary policy have to be found. The most popular indicators used in the literature include the term spread between government bonds of different maturities (e. g. *Chen* et al. 2012; *Feldkircher* et al. 2017), central bank balance sheet assets (e. g. *Gambacorta* et al. 2014; *Boeckx* et al. 2017), synthetic shadow rates (e. g. *Lombardi/Zhu* 2014; *Krippner* 2015; *Wu/Xia* 2016), or the combination of the respective indicators (e. g. *Horváth/Voslarova* 2016).

The shadow rates are calculated based either on the term-structure models (*Wu/Xia* 2016; *Krippner* 2015) or on the factor models of a broader set of monetary policy indicators, including interest rates, monetary aggregates, selected ECB balance sheet items and the exchange rate (e. g. *Babecká Kucharčuková* et al., 2016). In contrast to the balance sheet assets, the shadow rates proxy not only the realized operations of the central banks but also include announcement effects of non-standard monetary policy measures whenever they affect bond yields.

2. Empirical Approaches

The short-run effects of policy announcements on financial variables (e. g. sovereign bond yields, stock market indices, CDS spreads, money market rates, exchange rates) are usually investigated in the form of regressions or so-called event studies (*Fratzscher* et al. 2016; *Georgiadis/Graeb* 2015; *Falagiarda* et al. 2015; *Ciarlone/Colabella* 2016). The event methodology relies on the theory of efficient markets, i. e. that all new and relevant information, which comes along with the occurrence of some certain event, would be immediately incorporated in financial prices given all market participants act rationally. The main points of criticism of the event studies are usually lying in possible inaccurate identification of the event's time, data contamination by other events and the estimation of the counterfactual – the variables' values in the absence of the event itself. Another approach is to scrutinize the dynamics of the co-movements in the financial markets based on the methodology proposed by *Diebold/Yilmaz* (2012). The latter allows constructing the measures of spillover intensities and analyzing their time-variations against the backdrop of monetary policy changes or announcements in advanced economies (*Belke* et al. 2017; *Belke/Dubova* 2017). Using high-frequency financial data for these studies allows mitigating the endogeneity (reverse causality) problem, which means that a policy action might have significant implications on daily financial markets, whereas the decision of engaging in policy actions does not depend on market changes occurred within one day, but is rather based on the broader picture of developments.

Focusing on medium- and long-run effects, various types of vector autoregressive (VAR) models are employed to assess spillovers on macroeconomic variables. In the VAR modelling all variables together are considered as endogenous, that is, all variables are presumed to be determined within the model and are used simultaneously to explain each other. Additional inclusion of variables determined outside the model's structure (exogeneous variables) is also possible. Different VAR settings might be used for the modelling of the spillover effects from large to small economies. The first possibility is to consider a two-country VAR model (*Babecká Kucharčuková* et al. 2016; *Moder* 2017). The identification of the spillovers usually relies on the block-exogeneity assumption (*Cushman/Zha* 1997; *Canova* 2005; *Mackowiak* 2007), i. e. the developments in a small open economy do not transmit to the large economy neither contemporaneously nor with lags (near-VAR setting). This assumption allows accounting properly for the direction of the spillovers and reducing the number of parameters to be estimated. The second set of VAR specifications includes more than two countries simultaneously while accounting for interconnections among economies and/or allowing higher-round effects to examine the propagation of shocks in a fuller manner (e. g. the factor-augmented VAR by *Potjagailo* 2017 and the global VAR by *Hájek/Horváth* 2016; *Feldkircher* et al. 2017).

Finally, in order to analyze both short- and long-run effects simultaneously in one unified framework, the study of *Bluwstein/Canova* (2016) combines slow-moving monthly macroeconomic variables, weekly monetary policy variables and fast-moving daily financial variables in a mixed-frequency VAR setting. The approach examines jointly macroeconomic and financial linkages in response to shocks. Comparing to the event studies, the mixed-frequency VAR takes into account macroeconomic effects, while also preserving information content of high-frequency data, which would otherwise will be lost by the aggregation data into low-frequency data.

When interpreting the empirical findings the potential drawbacks of used estimation techniques (models) need to be considered. Since international factors have become more important in policy reaction functions, simple regression analysis of the spillovers attributed to ECB monetary policy can overstate the effects. The observed developments might also have been influenced by factors other than the ECB UMP policies, such as U.S. Fed monetary policy, global real and financial shocks, bilateral interrelationships across countries, domestic economic developments, and policy responses. Thus, only rigorous econometric frameworks are able to disentangle the impact of ECB UMP from other factors. Moreover, the changing conditions in which the ECB's UMP operations took place make it difficult to estimate its international impact and may partially account for the wide standard errors and statistically insignificant spillovers found.

V. Empirical Findings

Based on the various empirical approaches summarized in the previous section, the extensive literature on the international effects of Federal Reserve's UMP finds significant financial spillovers to other countries. In general, the literature finds that QE caused US-dollar depreciation, raised capital inflows in EMs, and affected international long-term bond yields and equity prices (e. g. *Neely* 2010; *Fratzscher* et al. 2017; *Tillmann* 2014; *Chinn* 2013; *Bhattarai* et al. 2015; *Chen* et al. 2012). The evidence of the spillovers' strength to the real economy is less clear-cut and depends largely on the domestic fundamentals and financial market development (IMF 2013; *Bhattarai* et al. 2015). *Moessner* (2014) argues that international spillovers are similar for advanced and emerging countries, whereas *Chen* et al. (2012) and *Bhattarai* et al. (2015) found the impact on emerging countries to be stronger. The studies reveal several channels – exchange rate, portfolio rebalance, liquidity and signaling channels – to be at work simultaneously, where the strength of each channel varies among three QE rounds. Due to the different international role of US and Euro area, as well as different UMP's designs of the Fed and ECB, the results obtained for the US UMP's spillovers might be very different from ones stemming from the Euro zone. In the following, we will introduce the empirical findings on the interna-

tional effects of the ECB monetary policies, which for the time being are rather mixed. It is important to point out that many studies analyze the direction of effects rather than identifying an exact quantitative effect.

Most studies consider the international effects of ECB unconventional monetary policies on non-euro European countries, whereas the international effects of the ECB policies outside the Europe are investigated to a lesser extent[3]. Firstly, the studies highlight cross-country differences in spillover effects. Thus, despite the evidence of insignificant output and only slightly positive inflation effects for the Central European countries (Czech Republic, Hungary and Poland), *Bluwstein/Canova* (2016) find persistently positive output and negative inflation responses for the European advanced countries (Sweden, Norway, Denmark, and Switzerland). The heterogeneous responses and magnitudes of international spillovers are usually associated with some country-specific characteristics or bilateral relationships (e. g. trade and financial linkages) with the country, where the shocks originate. *Bluwstein/Canova* (2016) highlight the level of financial development and the extent of domestic ownership of banks in receiving spillovers country, whereas *Feldkircher* et al. (2017) argued that countries with a low GDP per capita ratio and a sound banking sector benefit more from the expansionary euro area shocks. Further, the studies do not agree on the role of exchange rate regime in spillovers propagation. *Bluwstein/Canova* (2016) and *Moder* (2017) conclude that the responses of foreign output and inflation are independent of the exchange rate regime, whereas according to *Babecká Kucharčuková* et al. (2016) the economic activity in the countries with fixed exchange rate reacts stronger to the ECB monetary policy shocks. Secondly, even for the same set of countries different studies sometimes come to the opposite conclusions. For instance, in contrast to the findings of *Bluwstein/Canova* (2016) for the Central European countries (insignificant output and slightly

[3] Addressing the international effects of the ECB policies outside the Europe, *Rogers* et al. (2014) observe that there are important cross-country spillovers from unconventional monetary policies in the US, the UK, the euro area and Japan in their each other's financial markets. They find such monetary policy spillovers to be asymmetric, as the effects of the monetary policy shocks in the US economy on asset prices in the other economies are larger than the spillovers from these countries' policies on the US. This view is corroborated by *Belke/Dubova* (2017) who analyze the cross-country co-movements in asset prices of these countries. The authors find, however, increased cross-asset spillovers from Euro area bonds and stocks markets during the Global financial crisis and the Euro debt crisis. Analyzing the bond yield spillovers from major advanced economies to Emerging Asia, *Belke* et al. (2017) find that sovereign bond yields in Emerging Asia at times responded significantly to changes of both US and Euro area bond yields, although the magnitudes turned out to be heterogeneous across countries and varied over time. The pattern of these variations can partially be attributed to the implementation of UMPs by the Fed and ECB. Finally, *Apostolou/Beirne* (2017) detect volatility spillovers from the actions of the ECB and the FED to the set of Emerging Markets economies.

positive inflation effects), *Horváth/Voslarova* (2016) and *Feldkircher* et al. (2017) find that following an expansionary unconventional monetary policy shock by the ECB the effect on output growth was significant and much stronger than the effect on inflation for these countries. The results of *Babecká Kucharčuková* et al. (2016) are close to *Bluwstein/Canova* (2016) and indicate very slow and limited effect of unconventional measures on the real economy, whereas inflation often remains unaffected. Interestingly, *Babecká Kucharčuková* et al. (2016) highlight the difference between the role of conventional and unconventional euro area monetary shock, where the former indeed affect notably inflation and output in Central European countries.

The observed heterogeneity in the results for the same set of countries can largely be attributed to the different identification of the ECB monetary shocks as well as modeling frameworks chosen by the authors, where the latter for instance might consider not similar transmission channels and/or model cross-country interconnections or relevant higher-round effects in a different manner. Thirdly, there are also diverse empirical findings with respect to the relative importance of each transmission channel. The results of *Feldkircher* et al. (2017) emphasize the importance of financial and trade channels along with a strong evidence of exchange rate channel. *Moder* (2017) finds the trade channel to be relevant in most cases as well. *Bluwstein/Canova* (2016) argue that the wealth, the risk, and the portfolio rebalancing channels matter for international propagation, while the credit channel does not. The portfolio channel is emphasized also in the study of *Ciarlone/Colabella* (2016) along with the exchange rate channel. *Fratzscher* et al. (2016) on the contrary finds only limited evidence of portfolio rebalancing across regions and assets on impact. *Falagiarda* et al. (2015) emphasize the heterogeneity of operating transmission channels with respect to the different programs announcements, so that the portfolio rebalancing and the signaling channels worked for the SMP announcements, the transmission of the OMT operated via the confidence channel and, finally, for the Public Sector Purchase Programme (PSPP) both the confidence and the signaling channels were at play. *Fratzscher* et al. (2016) and *Potjagailo* (2017) mentions the relevance of the confidence and risk channels. *Apostolou/Beirne* (2017) investigate explicitly volatility spillovers and found that international asset markets, particularly bond markets, were vulnerable to the volatility spillovers stemming from ECB balance sheet expansions. The differences in empirical findings with respect to the relative importance of transmission channels might stem, on the one hand, from cross-country heterogeneity, and on the other hand, from applying different modeling strategies.

Let us now finally turn towards the political economy aspect of monetary policy spillovers – at the example of the issue of monetary policy coordination in the case of exit from the UMPs.

VI. Policy Coordination of Exit Between Central Banks in the Light of Substantial Potential Spill-over Effects

International policy coordination on exit strategies from unconventional monetary policies is generally considered to be welfare improving under certain conditions.[4] The case for coordination becomes even stronger in view of the risks of premature or delayed exit. Given today's high degree of integration between economies and financial markets, spillover effects appear to be unavoidable. And the case for policy coordination becomes even more persuasive with an eye on the risks of premature and delayed exit (*Belke* 2014). There are positive and negative spillovers associated with the implementation of UMPs as well as to its counterpart, the exit from unconventional monetary policies (UMPs). Let us first turn to the negative ones resulting from existing UMPs.

UMPs and potentially also the exit from these policies are creating negative externalities in countries adopting conventional monetary policies. The latter are likely to adopt policy measures to counter these externalities and, thus, generating losses in both sets of countries and a suboptimal outcome (for details see *Belke* 2014). This is exactly the constellation in which international policy coordination regarding implemented UMPs and the exit from them potentially creates Pareto improvements in economic outcomes on a global level.

But so-called pecuniary external effects, such as trivial cross-border spillovers through exchange rate changes or changes of other (relative) prices, are neither necessary nor sufficient to make the case for international policy coordination. This is the case for exchange rate changes as a reaction to a unilateral exit from UMPs in, for instance, by the U.S. Fed which by definition have an impact also on the trade partner countries such as the Euro area (*Belke* 2014).

These considerations may stifle the old debate about exchange rate co-ordination or even "currency wars" again (*Cooper* 1984), and incentives for an early exit from UMP in order to prevent bubbles dwindle because of the accompanying appreciation of the home currency (*Belke* 2014). However, these induced exchange rate changes have to be interpreted as one step within the necessary portfolio adjustment to the new global equilibrium accompanying the unilateral exit. They can not be used as a justification for monetary policy coordination per se. Instead, "true" non-pecuniary externalities have to be indicated that have an effect on economic welfare (*Belke* 2002; *Laffont* 2008) in order to justify coordination.[5]

Defending the case for international policy coordination thus requires empirical evidence which supports the existence of an appropriate kind of externali-

[4] We do not explicitly differentiate between coordination and cooperation here.

[5] A pecuniary externality is an externality which takes effects through prices rather than by means of real resource impacts.

ties. Moreover, policymakers must be capable of identifying and measuring them (*Belke* 2014). Finally, problems emerging from incomplete or asymmetric information across countries have to be solved (IMF 2013; *Ostry/Ghosh* 2013; *Ostry/Ghosh/Korinek* 2012).

From a market perspective, it is overall desirable to activate international policy coordination which ensures that non-pecuniary cross-border policy spillovers are appropriately internalised. This assessment applies to spillovers of existing UMPs and to the exit from them. Let us now turn to the appropriate treatment of positive monetary policy spillover effects.

Academic analyses in this field sometimes come up with the result that unconventional monetary policies targeted at smoothening market functioning and financial intermediation tend to imply short-run positive externalities across the borders. This is especially so if these policies represent a reaction to immediate and acute shocks (*Belke* 2014). According to the IMF (2013), countries which have not deployed non-unconventional monetary policies themselves unambiguously benefited from the UMPs because they made the markets function again and stabilized their financial system. However, it clearly matters for a thorough assessment whether these positive externalities are abolished by exit (i. e. whether exit comes too early). One may argue that they are not abolished as soon as the UMPs have reached their goal.[6] Hence, the exit from such policies, as soon as their purpose has been fulfilled, does not necessarily cause negative externalities (IMF 2013).

Unconventional monetary policies targeted at stimulating aggregate demand at the zero lower bound have been helpful in stimulating global growth (*Belke* 2014). However, the other side of the coin is that they may have induced negative externalities as well. There is empirical evidence showing that they have caused financial distortions and contributed to the emergence of macroeconomic and financial stability risks (*Belke/Verheyen* 2014). The main transmission channel for this has been excessive capital flows to countries still having implemented non-unconventional monetary policies (*Belke* 2014). Again, especially in these cases policy coordination regarding the conduct of UMPs as well the exit from these policies is highly indicated (IMF 2013).

But nevertheless things have not settled yet on these important questions in academics. Instead, there are widely diverging perceptions among academics,

[6] But there is always the issue in this context of what the counterfactual has been and still is: how would the world have looked like if the UMPs would have been absent? Answers to this question bear a highly speculative character. In addition, the counterfactual is extremely difficult to quantify in empirical terms and thus inherently controversial. Nevertheless, in spite of this important open flank, the majority of policymakers try to convey the impression that employing UMPs has saved the world from deep depression. The latter effect is then implemented as the main ingredient of cost-benefit analyses of policy coordination. See *Belke* (2014).

policymakers as well as across countries. The size and the sign of the externalities of exiting, from various unconventional monetary policies and the international repercussions via capital controls etc. are still rather ambiguous. *Ostry/Ghosh/Korinek* (2012) show that the multilateral effects of capital controls tend to be constrained, except in case of "pervasive" controls (see also IMF 2011). Above all, there is huge uncertainty about the "break even" point, at which the beneficial impact of UMPs on worldwide growth is offset by financial stability risks triggered by the same UMPs (*Belke* 2014; IMF 2013).

It is at this stage not clear what different policy mix would make short-run support through UMPs sustainable in the medium to long run. Finally and possibly most importantly, the political will to change this policy mix will be lacking. As discussed in *Belke* (2014), the relative accomplishment of unconventional monetary policies in fostering growth in the short run has diminished the policymakers' incentives to use the input of monetary policy to push forward structural reforms. Instead, many countries benefitting from UMPs have been delaying or even interrupting the implementation of structural reforms (IMF 2013). Policy coordination within a two-handed approach among national or (in case of a smaller country) international monetary policy and national reform effort does not appear to work even on a national level. So it will probably a fortiori not work on the global (G20) level. What is more, it does not seem to be straightforward to envisage a global institutional arrangement which gives policymakers sufficient incentives to realize these bilateral gains (for the mechanics of this type of policy coordination dilemma see *Belke* 2002).

If coordination appears to be warranted and, hence, is implemented, it may come in different forms. Economies running unconventional monetary policies would be pushed into a change of their internal policy mix (*Belke* 2014). Whereas this turnaround is most likely not taking much pressure off the central banks to provide accommodative monetary policies, the implementation of the urgently needed structural, fiscal and banking sector reforms would certainly give policymakers ample room to unwind their unconventional monetary policies earlier rather than later. Coordination would foster the implementation of reforms also in those countries, which have not implemented unconventional monetary policies, to support rebalancing and to improve on necessary conditions for sustaining medium-run growth. Overall, the reforms conducted in both types of countries would turn out to be beneficial for global growth (IMF 2013a: *Belke* 2014).

But one should also not forget that coordination would also cover a larger degree of collaboration in issues related to the adoption of regulatory and macro-prudential policies "designed not to solve a problem at home but help others to deal with a problem they cause" (IMF 2013). *Buch/Goldberg* (2017) speak of "regulatory spillovers" in this context which should be avoided. What is more,

the International Monetary Fund (IMF 2013) argues that collaboration would be highly indicated when "preparing the terrain for exit". For instance, foreign exchange swap lines could be set up and other central banks may provide with sufficient early warning on exit probabilities (*Belke* et al. 2002; IMF 2013). But, again, coordination in the area of structural reforms unfortunately does not rank high on the agenda of international policy coordination.

Due to the coordination dilemma derived above, bringing about coordination on UMPs and the exit from them requires adequate incentives. Because governments are accountable to their electorate, they will need to be able to envisage clear medium-term net gains emerging from coordination. Hence, unconventional monetary policies should be conditioned on the implementation of other urgent reforms. However, I do not see both types of incentives sufficiently implemented in the current setting. As the IMF (2013) puts it: "There is notably little prospect that central banks might seek to impose conditions for their liquidity assistance on governments, except for possibly OMT".

But even with respect to the efficacy of OMTs in that respect some doubts remain: simply stating that the announcement of OMTs gives enough leeway for reforms is not enough because it is not at all clear that this leeway will be used de facto. This is at least the result of a bulk of literature on the political economy of reforms (*Belke/Herz/Vogel* 2006). However, central banks are able to impose conditions on commercial banks to advance at least reforms in the financial sector, i. e. bank balance sheet repair and reform (IMF 2013). This is exactly the area where there is the largest impact of monetary policies on reform effort across OECD countries visible (*Belke/Herz/Vogel* 2006).

One potential institutional framework which may be able to strengthen international coordination and also includes the emerging markets with their close trade and financial linkages to many Euro area member countries is offered by the International Monetary Fund (*Belke* 2014). The Fund may support the implementation of entry into and exit from unconventional monetary policies by contributing to a global perspective on exit policies through surveillance and policy buffers to get rid of possible negative side effects and a model-based and, hence, hopefully more "neutral" analysis. The IMF's new surveillance framework gives ample room for an integrated analysis of global spillovers from complex policies such as the exit from UMP. Finally, the innovative IMF reports on spillovers and on External Sector Assessments deliver an additional assessment of the effects of unconventional monetary policies and try to reconcile the bilateral with the multilateral perspective (IMF 2013). What is more, IMF lending facilities such as the Flexible Credit Line and technical assistance supporting domestic policy initiatives in the area of macro-prudential policies, may serve as a tool to moderate or even to prevent some of the risks from unconventional monetary policies as well (IMF 2013). Finally, the Fund analysis may "help oil

the wheels of economic cooperation and coordination" (IMF 2013) by contributing a global perspective to other forums for international policy coordination such as the G-20 Mutual Assessment Process.

VII. Conclusions

Overall, there is little doubt that international effects should be taken into account when analyzing monetary policy effects, However, the empirical findings on the quantitative importance of international spillovers from unconventional ECB monetary policy are rather mixed. The estimated spillover effects for the same set of countries differ across the studies in terms of magnitudes, signs as well as with respect to detected operative transmission channels and factors determining these spillovers. The observed heterogeneity in results might to a large extent be attributed to the specifications of the ECB monetary shocks and modeling frameworks chosen by the authors, which implicitly consider only part of transmission channels and omit others. A major issue is the exact identification of international monetary policy effects.

Thus, the development of more sophisticated and unified econometric frameworks might contribute to the future research on this theme. Given the mixed empirical findings, the policy implications differ across studies as well. According to the results of *Bluwstein/Canova* (2016) and *Moder* (2017), controlling exchange rate movements cannot prevent non-euro area countries from importing the unconventional monetary policy decisions of the ECB and, thus, policies that indirectly restrict financial flows and bank leverage could be more effective for small open economies in stabilizing output and inflation fluctuations. *Horváth/Voslarova* (2016) point at the need for the explicit incorporation of the effects of unconventional ECB monetary policy spillovers to the forecasting models used in the regional central banks. The development of coherent theoretical and empirical frameworks which jointly model the international transmission of monetary policy via trade and financial variables and via their interactions is thus of great importance.

Economic theory suggests that the justification of monetary policy coordination is linked to the existence of cross-border spillover effects. Monetary policy shocks in one country are likely to have pronounced effects which are not limited to the domestic economy. Monetary policy decisions can be expected to generate spillover to other countries (as modeled in the papers reviewed in this contribution). Therefore, real economic variables, as well as financial variables, may be influenced via several different transmission channels such as imports, relative prices, the interest rate channel and several others. Of course, the strength of such cross-border effects depends on the amount of economic ties, linkages, and the institutional framework.

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