

ARTICLES

GLOBAL LIQUIDITY: CONCEPTS, MEASUREMENTS AND IMPLICATIONS FROM A MONETARY POLICY PERSPECTIVE



Global liquidity is a multifaceted concept that can be defined and measured in many different ways. There is a broad consensus, however, that in the run-up to the financial crisis the level of global liquidity was an important determinant of asset price and consumer price dynamics in several economic regions. There is also evidence that, more generally, measures of global liquidity are one of the best performing leading indicators of asset price booms and busts. Liquidity is highly pro-cyclical and can quickly evaporate, setting in motion self-sustaining adverse dynamics, as has been observed during the financial crisis.

From a monetary policy perspective, the key issue is the need to understand and assess how domestic and global liquidity can ultimately influence domestic price stability. The ECB's monetary policy strategy, with its monetary pillar and its medium-term orientation, allows for the implications of global liquidity for inflation to be taken into account and for the adoption of a "leaning against the wind" approach towards financial imbalances, which are often fuelled by global liquidity.

I INTRODUCTION

Global liquidity is a multidimensional and complex phenomenon, which has repeatedly been proffered as one explanation for financial developments. It has, at times, been associated with a number of different developments: stock market rallies, low bond yields, rising commodity prices, real estate booms or strong increases in global monetary and credit aggregates. It has also been found to influence price and output fluctuations. The global financial crisis triggered shortages in global liquidity, at least in certain markets and regions, risking the setting in motion of self-sustaining adverse dynamics.

There are several distinct definitions of liquidity, and the most relevant for policy-making are the following: (i) "monetary liquidity", which is defined as the ease of converting monetary assets into goods and services, and (ii) "financial market liquidity", which is defined as the ease with which large volumes of financial securities can be bought or sold without affecting the market price. Moreover, in the context of financial stability, the concepts of "official liquidity" – comprising central bank money including foreign reserves – and "private liquidity" – largely created in the private sector – have been defined.¹

For the conduct of monetary policy, it is important to understand how global liquidity can affect price developments via its impact on international asset and commodity prices,

on risk and term premia in international asset markets and on money and credit aggregates.

Against this background, Section 2 of this article provides a detailed definition of global liquidity and discusses possible transmission channels from a conceptual point of view. Section 3 then describes the construction and evolution of various empirical measures of global liquidity. Section 4 discusses the implications for monetary policy and Section 5 concludes.

2 UNDERSTANDING GLOBAL LIQUIDITY

Global liquidity is a multifaceted concept, which cannot be encapsulated by one catch-all definition. This section explores the definition of global liquidity that is most useful from a perspective of monetary policy geared towards price stability over the medium term. Further, this section examines the various sources and implications of global liquidity conditions from a conceptual viewpoint. Finally, it discusses the possible transmission channels of global liquidity.

2.1 DEFINING GLOBAL LIQUIDITY

From a monetary policy perspective, the relevance of global liquidity derives from its

¹ See *Global liquidity – concept, measurement and policy implications*, CGFS Publications, No 45, Bank for International Settlements (BIS), November 2011, to which the ECB contributed.

ultimate effects on consumer price inflation over the medium term. Generally, one important aspect of liquidity is the ease with which an instrument can be exchanged for goods and services, giving prominence to the transactions' motive and suggesting that money can provide a useful benchmark for liquidity. Money, notably currency and overnight deposits, is the asset with the highest degree of liquidity, as it is the generally accepted medium of exchange for goods and services. The exchangeability criterion, therefore, suggests classifying liquidity into monetary liquidity – closely associated with the transactions' motive – and financial market liquidity – reflecting the ease of trading in assets compared with trading in money. These concepts can be extended to the global economy.

2.1.1 GLOBAL MONETARY LIQUIDITY

Monetary liquidity can be defined as the ease of converting monetary assets into goods and services, domestically and across borders. Global monetary liquidity comprises the holdings of liquid financial assets by domestic residents and the portfolio investment in such liquid assets by non-residents. The former is largely accounted for by domestic monetary liquidity, while the cross-border liquidity provided by international financial markets and internationally active banks constitutes the incremental element in global liquidity. However, cross-border capital flows would only constitute liquidity if they resulted from additional funds provided across borders, rather than simply from the reallocation of existing investments.

The concept of monetary liquidity attempts to capture the ability of economic agents to settle their transactions using money, an asset the agents cannot create themselves. Money is typically seen as the asset which, first, can be transformed into consumption without incurring transaction costs, and second, has an exchange value that is not subject to uncertainty in nominal terms, rendering it the most liquid asset in the economy. Strictly speaking, these characteristics apply only to currency. The question of which other assets can be defined as money depends on

the degree of substitutability between currency and these other assets. In practice, the definition of money in an economy generally includes those other assets which can be easily converted into currency: short-term bank deposits are an obvious example.

Generally, a higher level of money holdings allows for a higher volume of immediate transaction settlement. However, agents' liquidity, for instance, varies according to the synchronisation of their receipts and payments. For a given amount of money held, the more synchronised the agents' receipts and payments, the greater the agents' liquidity. Additional factors may affect agents' ability to obtain liquidity and thus their "potential" liquidity situation. For instance, the soundness of agents' balance sheets determines their credibility as sound counterparties and, therefore, their ability to trade less liquid assets for liquid assets.

Translating the main aspects of defining monetary liquidity (i.e. the ease of convertibility into consumption and capital certainty) into a multi-country setting is not straightforward, implying that even if liquidity were appropriately determined at the domestic level, a similar measure used for different countries may not correctly capture the global dimension of liquidity.

2.1.2 GLOBAL FINANCIAL MARKET LIQUIDITY

Financial market liquidity is generally defined as the ease of trading in assets compared to trading in money, thus reflecting the cost of converting a financial asset into money. Since trading implies a cost to those conducting the transaction, this notion of liquidity also embodies the ability of financial markets to absorb large transactions in securities without any significant effect on prices.²

In practice, there are few markets in which the assumption of ideal financial market liquidity conditions can be maintained on a continuous basis. Rather, in most cases, financial market

2 Amihud, Y., Mendelson, H. and Pedersen, L., "Liquidity and Asset Prices", *Foundations and Trends in Finance*, Vol. 1, No 4, 2005, pp. 269-364.

liquidity is imperfect, mainly reflecting the existence of information asymmetries (e.g. the cost of acquiring and processing relevant information, and the existence of private information) and transaction costs (e.g. brokerage fees).

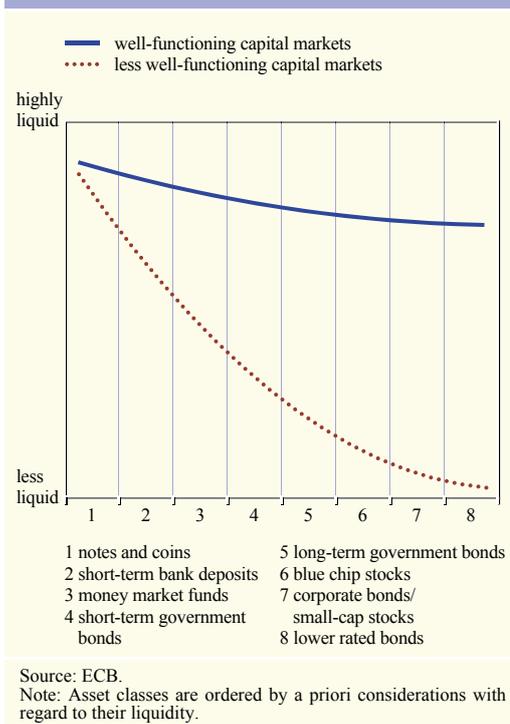
Greater financial market liquidity brings markets closer to the theoretical ideal of a frictionless environment in which two agents can conduct a mutually beneficial trade.

2.1.3 THE RELATIONSHIP BETWEEN MONETARY AND FINANCIAL MARKET LIQUIDITY

Monetary liquidity and financial market liquidity are related. First, as financial market liquidity increases for a particular instrument, the cost of transforming that instrument into money diminishes, so that at the limit of zero cost, the instrument could be defined as money. Generally, the choice of which assets to define as money is based on the degree of substitutability between banknotes and coins, and these other assets. This degree of substitutability reflects the capital certainty of the assets, which is in turn related to the volatility of their prices. Thus, the definition of money in an economy generally includes assets with high financial market liquidity, in addition to banknotes and coins. The higher the financial market liquidity of an asset, the more likely it is to be included in a specific measure of money. There is thus no absolute standard by which to classify liquidity, but rather a continuous scale, as illustrated in Chart 1.

Second, negative interaction between financial market and monetary liquidity can arise in a situation of both high volatility and weakening financial soundness. Financial market volatility heightens uncertainty in relation to the appropriate valuation of assets, thereby exacerbating information asymmetries and increasing the premia on risky assets, implying lower asset valuations that lead to higher margin requirements and less trading. During such periods of financial market uncertainty, financial market participants face increased funding requirements, as they have to cover their margin

Chart 1 Conceptual representation of a liquidity spectrum



calls and attempt to stabilise their liquidity situation. Some agents in the economy may experience a “liquidity squeeze”. Uncertainty regarding the degree to which agents are affected by such a liquidity squeeze can bring trading to a standstill and thus dry up financial market liquidity. At the same time, for those agents not trading on the financial markets and for the economy more widely, monetary liquidity may still be ample, for example as a result of monetary policy supporting the functioning of money markets via non-standard measures, with the ultimate goal of countering downward risks to price stability.

2.2 SOURCES OF GLOBAL LIQUIDITY

It is useful to distinguish between two major categories of sources/drivers of global liquidity: (i) macroeconomic factors including (among other things) the monetary policy stance and current account imbalances; and (ii) financial factors.

As regards macroeconomic factors, the chosen monetary policy stance is an important determinant of money and credit growth domestically, but also at the global level.³ Monetary policy actions affect the setting of market interest rates and prices in the economy through various channels, thereby affecting economic activity and inflation. Through its influence on market interest rates, monetary policy can also affect liquidity conditions in financial markets, for instance through the risk-taking behaviour of economic agents. Another important factor is the existence of global imbalances, which also have a significant effect on global liquidity conditions. Over the past two decades, the magnitude of current account imbalances, as a share of GDP in the main external surplus and deficit economies, has pointed to widening global imbalances, reaching a peak in the years 2006-08. The bulk of these global imbalances reflect a large current account deficit in the United States, and a high level of foreign exchange reserves resulting from substantial surpluses built up by China and oil-exporting countries. Many surplus economies have accumulated large foreign exchange reserves in order to control the appreciation effect of capital inflows on the exchange rate. The bulk of the assets consisted of low-risk instruments (such as US Treasury securities or dollar deposits). Given the tight linkages between advanced economies' bond markets, the low levels of interest rates in the United States have also created spillover effects in other major markets. Hence, the widening of global imbalances and the resulting feedback loop on asset prices worldwide has also had a marked impact on global liquidity conditions.

There are well-founded reasons for believing that certain common global financial factors affect individual countries' financial market liquidity trends. In particular, the following three factors have probably driven global financial market liquidity conditions. First, over recent decades national financial markets have become better integrated at the global level, which has, inter alia, reduced information

asymmetries. This has promoted larger cross-border financial flows and increased the diversity of investors, which, in turn, has had a positive impact on global market liquidity. The current financial crisis has partly reversed the integration of European financial markets,⁴ however, the financial integration of emerging market economies continues. Second, financial market deregulation has brought about many new financial instruments, leading to an increase in risk-sharing and hedging possibilities. It has also boosted competition, which has resulted in lower brokerage fees (i.e. lower transaction costs). Overall, the many new financial instruments have increased financial market liquidity.⁵ Third, financial integration and innovation have also influenced agents' attitudes towards risk, spurring elevated risk appetite during boom periods. More financial innovation and deeper financial integration have contributed to a surge in global liquidity, bringing with it the risk of costly asset price booms and busts with ultimate risks to price stability.

2.3 GLOBAL LIQUIDITY TRANSMISSION CHANNELS

From a monetary policy perspective, the key issue is the need to understand how global liquidity can ultimately influence domestic price stability. This issue is closely related to the mechanisms of monetary transmission at the international level.

In theory, an accommodative monetary policy stance may generate liquidity spillovers at the global level via two mechanisms. First, via a "push effect", in the event of monetary policy supporting the ample provision of monetary liquidity in one country through strong money and credit growth and thus inducing capital outflows to foreign asset markets, with the effect of raising demand for assets abroad and thereby exerting upward pressure on prices of financial

3 See the article entitled "The ECB's monetary policy stance during the financial crisis", *Monthly Bulletin*, ECB, January 2010.

4 *Financial integration in Europe*, ECB, Frankfurt am Main, April 2012.

5 Stark, J., "Globalisation and monetary policy: from virtue to vice?", speech, Dallas, United States, 29 November 2011.

and real assets. Second, via a “pull effect”, in the event of an accommodative monetary policy stance supporting ample domestic monetary liquidity reflected in strong money and credit growth. This could fuel robust economic growth accompanied by higher asset prices inducing foreign capital inflows.⁶

The exchange rate regime, capital controls, and the main financial and trading partners of a country determine the strength of the effects described above. A spectrum of alternative outcomes between the following two polar cases is possible. First, in the case of fixed exchange rates, capital inflows and outflows will be the main mechanism by which global liquidity transmits to the domestic economy. Second, in the case of free-floating exchange rates, global liquidity leads to adjustments via relative prices. Currently, a large number of countries still manage their currency exchange rates (only 30 countries – mainly advanced economies – were categorised as free-floating by the IMF in 2011).⁷ As a result, the ultimate transmission effects of global liquidity are composed of the effects associated with the two polar cases, i.e. of capital flows and relative price changes.

The effects of global liquidity on the domestic economy can be transmitted via persistent interest rate differentials and via capital flows. More importantly, recently, international commodity prices (and import prices more generally) played an important role in domestic price developments. From a euro area perspective, the impact of commodity prices on inflation can be direct, that is via unprocessed food and energy, or indirect, via higher import prices for materials. The likelihood of such an impact is, *ceteris paribus*, greater the more accommodative the monetary policy and the more liquidity there is in the euro area. The situation in emerging market economies also plays an important role in the transmission of the effects of global liquidity: commodity prices typically have a large, direct inflationary effect on both consumers and producers in commodity-importing emerging economies if

exchange rate adjustment is only partial. If this effect coincides with high liquidity and income growth in these countries, the price pressures are likely to spill over into euro area import prices. Moreover, even if the surge in commodity prices were originally due to a temporary shock (e.g. a drought or flooding in the case of food), a situation of ample liquidity and strong growth in emerging economies could render the effects of the shock more persistent.

The situation may give rise to self-sustaining spirals if advanced economies also experience abundant liquidity and direct some of this to emerging economies in view of the stronger growth and higher returns to be gained there. A global monetary spillover would raise the euro prices for imports from these countries even further. In the absence of an exchange rate appreciation, the adjustment would be transmitted via higher wages and inflation to the emerging countries, which would ultimately also lead to higher import prices for the euro area.

Whether terms-of-trade developments exert positive or negative pressure on aggregate inflation in the short run depends on their net effect on aggregate supply and demand. For a given level of aggregate demand, an adverse permanent terms-of-trade shock reduces potential output, so that the resulting positive output gap causes upward pressure on inflation. A negative aggregate demand effect materialises if a permanent commodity price shock impinges on the wealth of individuals via its impact on current and expected future income. For a given level of potential output growth, the negative wealth effect gives rise to excess aggregate supply, thereby leading to downward pressure on domestic inflation.

6 See Baks, K. and Kramer, C., “Global Liquidity and Asset Prices: Measurement, Implications, and Spill-overs”, *IMF Working Papers*, No 99/168, 1999, and Sousa, J. and Zaghini, A., “Monetary policy shocks in the euro area and global liquidity spillovers”, *International Journal of Finance and Economics*, Vol. 13, 2008, pp. 205-218.

7 See “De Facto Classification of Exchange Rate Arrangements and Monetary Policy Frameworks”, *Annual Report*, IMF, April 2011, Appendix Table II.9.

The discussion in this section shows that the transmission channels of global liquidity are complex and that they may be difficult to identify. Therefore, a broad range of indicators should be used to measure global liquidity.

3 MEASURING GLOBAL LIQUIDITY

This section provides selected examples of empirical measures of global liquidity conditions, most of which have also been identified as useful in the work of the BIS Committee on the Global Financial System.⁸ The indicators discussed below are imperfect measures and are influenced by a variety of factors. For policy-makers, it is, therefore, important to look at a broad set of indicators when gauging global liquidity conditions.

In line with the conceptual distinction made between monetary and financial market liquidity, a similar distinction is made below between the indicators of global liquidity.

3.1 GLOBAL MONETARY LIQUIDITY INDICATORS

Many empirical indicators can be used as global monetary liquidity indicators. This section limits the indicators to a core set: those derived from money and credit aggregates, banking statistics and interest rates. To gauge global monetary liquidity conditions, the measures are aggregated for advanced economies and emerging markets.

Measures of global monetary and credit growth aggregated from national data are typically used to construct a proxy for global monetary liquidity. Such proxies vary according to choices made regarding (i) the breadth of the selected monetary or credit aggregate; (ii) the geographical coverage; and/or (iii) the exchange rates used to convert the quantities in national currencies into one single currency.

A measure of global liquidity can be constructed based on narrow monetary aggregates (typically banknotes and coins plus highly liquid bank deposits, such as overnight deposits) or based on

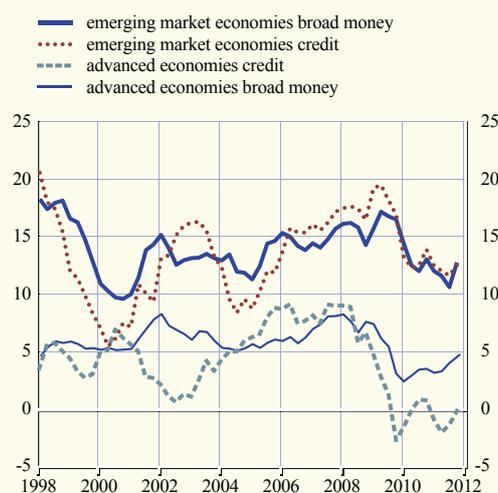
broad monetary aggregates (that also include less liquid bank deposits and marketable instruments issued by monetary financial institutions). A narrow monetary aggregate has the advantage of components being typically more homogenous across economies, rendering the resulting measure easier to interpret. However, broad monetary aggregates typically provide a less volatile picture of monetary growth in individual economies, as they internalise substitution among the different liquid assets. At the same time, the broader the monetary aggregate, the greater its capacity to measure monetary as well as financial market liquidity.

A comparison of a measure of money growth for advanced economies (Canada, Japan, the United Kingdom, the United States and the euro area) with a similar measure for ten major emerging market economies (see Chart 2)

⁸ See the report mentioned in footnote 1.

Chart 2 Nominal money and credit growth in advanced economies and emerging market economies

(annual percentage changes)



Sources: ECB, Eurostat, BIS, IMF and ECB calculations.
 Note: Advanced economies broad money and credit is the simple sum of broad money and credit aggregates in Canada, Japan, the United Kingdom and the United States converted into euro using purchasing power parity exchange rates as well as in the euro area. Emerging market economies broad money and credit is the simple sum of broad money and credit aggregates in Brazil, Chile, China, India, Malaysia, Mexico, Russia, South Africa, South Korea, Saudi Arabia converted into euro using purchasing power parity exchange rates.

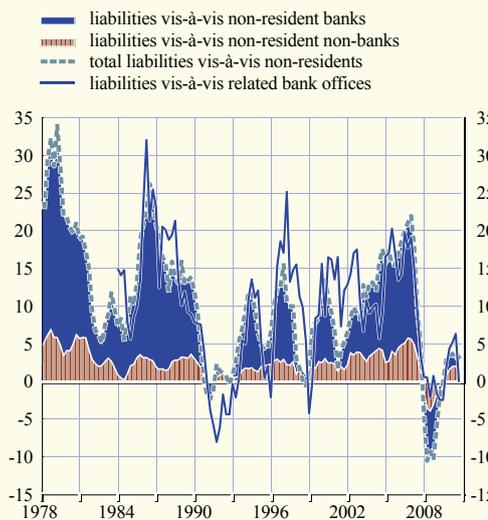
suggests that the patterns are broadly similar, at least prior to the onset of the financial crisis. In the period leading up to the financial crisis, i.e. from 2003 to 2007, both groups of countries saw high and increasing money and credit growth, potentially signalling strong increases in monetary and financial market liquidity. These developments reflected financial innovation and deeper financial integration, which contributed to improving the financial intermediation process, ultimately facilitating the provision of money and credit to the economies. The difference between the aggregated broad money growth rates of the two groups was reasonably stable in the eight years until 2009. It mostly reflected different real output growth and inflation rates.

Monetary growth in the advanced economies group has slowed considerably during the financial crisis, following a period of strong growth. The counterparts of money may provide some information on the sources and strength of liquidity creation. Therefore, Chart 2 also shows credit aggregates constructed in a manner similar to the monetary aggregates. These credit growth measures have tended to move closely in line with broad money growth in advanced and emerging market economies, with the notable exception of the period 2001-04. This period was characterised by heightened financial market and geopolitical uncertainty, leading to an unusually widespread preference for holding liquid instruments that are included in monetary aggregates. Thus money growth during this period led to an exaggerated perception of risks to price stability.⁹

By design, monetary aggregates generally focus on the holdings of monetary assets by the resident money-holding sectors in each country.¹⁰ For the analysis of global asset price developments, global measures based on cross-border short-term capital flows may provide useful information,¹¹ as these flows are likely to reflect the speculative short-term arbitrage transactions. Developments in banks' cross-border asset stocks reported by the Bank for International Settlements (BIS)¹² can provide insight into the strengthening of international

Chart 3 Bank liabilities vis-à-vis non-residents

(annual percentage changes; contributions in percentage points)



Sources: ECB, BIS locational banking statistics and ECB calculations.
Note: Series in US dollar are converted in EUR with purchasing power parity exchange rates.

financial flows. An analysis that examines linkages between global imbalances and capital flows and/or short-term speculative capital flows needs to include global interbank/credit relationships and foreign currency holdings of central banks in a global liquidity aggregate. Chart 3 illustrates that bank liabilities to non-resident non-banks and to non-resident banks follow a broadly similar cycle, with the former exhibiting, however, much larger fluctuations. The measure of bank liabilities to non-resident affiliates provides an indication of the type of capital flows that may be passed on from a jurisdiction (where deposits are collected) to

9 See the article entitled "Money demand and uncertainty", *Monthly Bulletin*, ECB, October 2005.

10 According to the IMF's Monetary and Financial Statistics Manual, money holders are "usually defined to include all resident sectors except depository corporations and the central government".

11 For each national monetary aggregate, cross-border short-term flows are treated as holdings of non-residents.

12 For recent reports see the "Statistical release: preliminary locational and consolidated international banking statistics at end-March 2012", *BIS*, July 2012 and "International banking and financial market developments", *BIS Quarterly Review*, BIS, September 2012, pp. 1-20.

another jurisdiction (where they are then invested by the bank's affiliate). The analysis of the leveraging behaviour of global banking networks is important from a monetary policy perspective, because it provides a better understanding of the transmission of global liquidity conditions to certain regions of the world.¹³

In addition to quantity measures, measures based on financial market prices may also be informative about global liquidity conditions. Short-term real interest rates provide an example, as they constitute a key determinant of liquidity conditions in an economy. An aggregated measure of real interest rates across major markets provides information on the influence of global financial market conditions on global liquidity conditions.¹⁴

Chart 4 shows GDP-weighted, ex ante real short-term interest rates for advanced economies and emerging market economies. The chart gives rise to two observations. First, real rates in advanced and emerging market economies have declined overall over the past decade. Since early 2010, ex ante real interest rates in advanced economies have been negative, resulting from low policy rates and substantial liquidity provision from major central banks. Second, ex ante real interest rates in emerging markets have remained at levels above those in advanced economies, but the gap has narrowed over most of the last decade, before widening slightly over the past two years. The higher real rates in emerging markets probably reflect higher economic growth prospects coupled with somewhat higher risk premia on government bonds issued by emerging market economies.

Theoretically, a normative and thus more appropriate measure of the global monetary policy stance, which ultimately drives global liquidity conditions, is provided by the real interest rate gap, i.e. the difference between the real interest rate and the natural real interest rate – the latter being defined as the real short-term interest rate which is consistent with output at its potential level and a stable rate

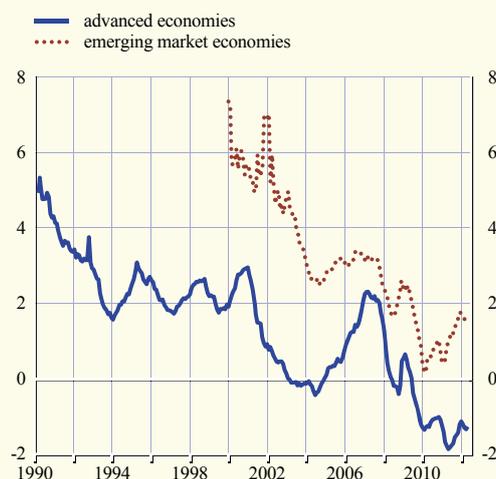
of inflation. However, there is no established measure of a global natural real interest rate, and existing estimates normally carry substantial uncertainty, rendering the construction of a normative measure difficult.

13 See for instance Bruno, V. and Shin, H.Y., "Capital Flows and the Risk-Taking Channel of Monetary Policy", paper presented at the joint workshop of the European Central Bank and the Bank for International Settlements entitled "Global Liquidity Conditions and its International Repercussions" of 6 and 7 February 2012, and the series of papers by Cetorelli, N. and Goldberg, L.: "Liquidity management of U.S. Global Banks: Internal Capital Markets in the Great Recession", *Journal of International Economics* (forthcoming), 2012; "Banking Globalization and Monetary Transmission", *Journal of Finance* (forthcoming), 2012; and "Global Banks and International Shock Transmission: Evidence from the Crisis", *International Monetary Fund Economic Review*, Vol. 59, No 1, 2011, pp. 41-46.

14 The aggregation can be carried out in various ways (equally weighted, GDP-weighted, weighted according to volumes traded on the market, etc.).

Chart 4 Ex ante real short-term interest rates

(percentages per annum; monthly observations)



Sources: Haver Analytics, Consensus Economics and ECB calculations.

Note: The ex-ante real rates are computed as the difference between money-market interest rates and the twelve-month-ahead average of Consensus Forecasts inflation expectations.

Advanced economies: Canada, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, United States.

Emerging market economies: Albania, Argentina, Azerbaijan, Bangladesh, Belarus, Bolivia, Costa Rica, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czech Republic, Dominican Republic, Ecuador, Hong Kong, Hungary, India, Indonesia, Kazakhstan, Korea, Latvia, Lithuania, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, Serbia, Singapore, Sri Lanka, Taiwan, Thailand, Turkey, Ukraine, Venezuela, Vietnam.

3.2 GLOBAL FINANCIAL MARKET LIQUIDITY INDICATORS

This section puts forward two specific examples of how financial market indicators can provide complementary insight into global liquidity conditions.

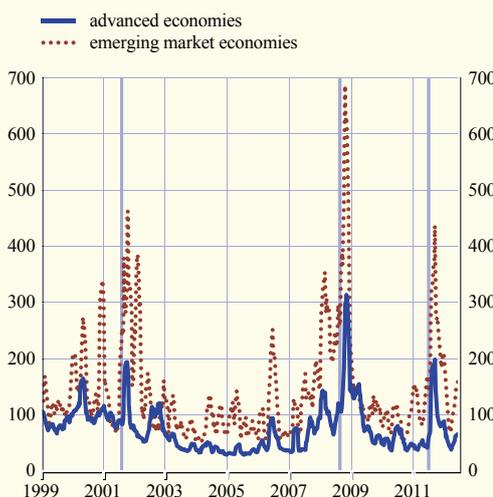
As stated in Section 2, one important aspect of global liquidity is the ease with which an instrument can be exchanged for goods and services. This concept can be applied to financial market instruments by computing the “illiquidity ratio” (ILR) for various assets. In its basic version, the ILR captures the extent to which the price of a certain security changes for each volume unit of trades, and can therefore be characterised as an elasticity measure. As its name suggests, the ILR attempts to quantify the lack of liquidity in the market, so that a high ILR estimate indicates low liquidity since it reflects a high price impact conditional on the trading volume. This concept is generalised here to serve as a measure of global liquidity by aggregating a large number of individual equity firm data on prices and volumes into indicators for advanced and emerging market economies.

The indicators in Chart 5 seem to support the general perception that financial market liquidity conditions in the two groups of countries largely improved between 2003 and the onset of the financial crisis in mid-2007. This pattern can probably be attributed to financial innovation and deeper real and financial integration, but the misperception of risk by market participants probably also played a role. Moreover, the illiquidity indicator peaked, understandably, during periods of severe financial stress: (i) in the aftermath of 11 September 2001; (ii) following the Lehman collapse in the autumn of 2008 and; (iii) during the intensification of the sovereign debt crisis in some euro area countries in the summer of 2011.

Further information about liquidity conditions can be inferred from developments in global bond markets. These markets have taken centre stage in international policy debates over the

Chart 5 Financial market illiquidity indicator for advanced economies and emerging markets

(index: 25 January 1999 = 100; weekly observations)



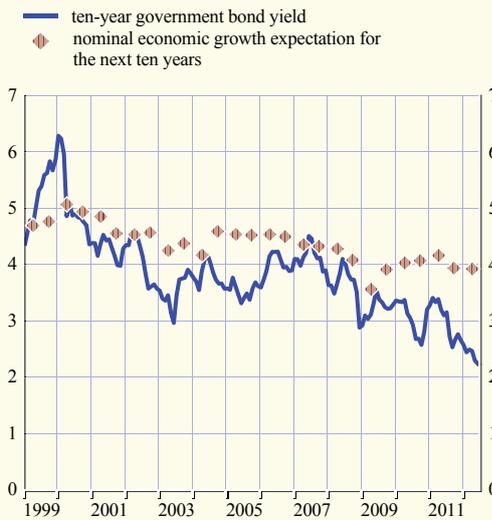
Sources: Datastream and ECB calculations.

Notes: The vertical lines correspond to the terrorist attacks on 11 September 2001, the Lehman collapse in September 2008, and the intensification of the EMU sovereign debt crisis in August 2011. Advanced economies: Australia, Canada, France, Germany, Italy, Japan, Spain, United Kingdom, United States. Emerging market economies: China, India, Indonesia, South Africa, South Korea. Latest observations: July 2012.

past decade and there is broad agreement that abundant global liquidity in the years leading up to the financial crisis contributed to the surge in private sector leverage and risk-taking in many economies. Chart 6 compares long-term government bond yields in advanced economies with nominal economic growth expectations, which, under certain mild conditions, should be closely correlated. The chart shows GDP-weighted ten-year government bond yields for Japan, the United Kingdom, the United States, and the euro area, and comparable nominal long-term GDP growth expectations proxied by summing consumer price inflation expectations and real GDP growth expectations provided by Consensus Economics. In the years from 2002 to 2006, advanced economies' bond yields diverged from nominal growth expectations, falling to lower levels, signalling that global liquidity increased. This decoupling has intensified during the financial crisis, largely reflecting the strong actions taken by monetary authorities to improve liquidity conditions and

Chart 6 Ten-year bond yields and long-term nominal economic growth expectations for advanced economies

(annual percentage changes; percentages per annum)



Sources: ECB, IMF, Consensus Economics and ECB calculations. Note: GDP-weighted data based on data from Japan, the United Kingdom, the United States, and the euro area. Long-term nominal economic growth expectations for each economic region are computed as the sum of real GDP growth expectations and consumer price inflation expectations.

to counteract the economic downturn and the associated risks to price stability. Although, at the present time, the bond markets indicator depicts ample liquidity conditions at the global level, the signal from this indicator is probably blurred.

4 IMPLICATIONS FOR MONETARY POLICY

The link between global liquidity conditions and both consumer price inflation and asset price inflation (see the box for a survey of available empirical evidence), and, more generally, the destabilising potential of global liquidity, raises several issues for monetary policy.

First, money, credit and, more broadly, domestic liquidity conditions have long been part of monetary policy considerations, although they have faded into oblivion in most monetary policy frameworks over the past couple of decades owing to the prevalence

of inflation targeting strategies. However, monetary developments convey important information that is relevant to the assessment of risks to price stability over the medium to longer term, as the money stock and the price level are closely related in the long run. Furthermore, the empirical evidence points to monetary trends leading inflationary trends, thus supporting the case for monetary analysis in a forward-looking monetary policy framework. However, there is, as yet, no consensus among central banks on how best to include money, credit and, more broadly, (global) liquidity in monetary policy strategies.

Second, the ECB's monetary policy strategy is an exception, as it enables liquidity conditions to be taken into account, mainly via its medium-term orientation. The monetary analysis under the monetary pillar allows the ECB to filter out the information in monetary data that is relevant for the longer term and more persistent trends in inflation. However, the detailed analysis of monetary dynamics also generates a wealth of information on monetary developments and on the transmission of monetary shocks and price formation. Analysing higher-frequency data on monetary developments also facilitates the assessment and comprehension of shorter-term macroeconomic and financial phenomena, which can give rise to risks to price stability in the longer run, if left unchecked. Monetary developments may also provide useful information on the state of the business cycle, liquidity conditions, financing conditions, monetary policy transmission and the condition and behaviour of banks. Moreover, the analysis of monetary dynamics helps to put asset price dynamics into perspective and to provide an indication as to the possible build-up of financial imbalances. The external dimension of monetary analysis – on which further analytical work is underway at the ECB – can complement the domestic analysis via the monitoring of global liquidity and the study of both its impact on commodity, equity and bond

prices (i.e. international asset prices) and its influence on domestic inflation. In addition, monitoring the effects of capital flows and international asset prices can lead to a better measure of the underlying domestic monetary trends and the associated signals concerning price developments.¹⁵

Third, the ECB's monetary pillar implicitly facilitates a forward-looking "leaning against the wind" approach to financial cycles and the associated risks to medium-term price stability. Leaning against the wind can be defined as a strategy whereby a central bank, confronted with an inflating financial bubble, adopts a somewhat tighter policy stance than would be the case under circumstances with a similar macroeconomic outlook but with more normal financial market conditions.¹⁶ Importantly, leaning against the wind does not mean that monetary policy targets asset prices or implicitly adopts a financial stability mandate. Rather, it means that monetary policy duly takes into account the adverse implications of increasing systemic risk for medium-term price stability. A "leaning against the wind" approach is, therefore, fully consistent with the ECB's mandate to maintain price stability in the euro area on a lasting basis.¹⁷

Fourth, in the long term, under normal economic conditions and a flexible exchange rate regime, active domestic monetary policy is the vehicle best suited to addressing the effects of global liquidity on domestic inflation. Even if global developments affect domestic price developments in the short term, this does not impinge on the central bank's ability to control domestic inflation through its domestically-oriented monetary policy, as monetary policy probably continues to exert the most influence on domestic price developments. Policy-makers should, therefore, be responsible for safeguarding the stability of consumer prices at the domestic level.¹⁸

Fifth, given the high degree of financial integration at the global level, there is a need for shared principles in terms of stability orientation in all macroeconomic policy domains. These

have to encompass the principles of fiscal and economic sustainability, monetary and financial stability. In this respect, central banks are working together, notably on global liquidity in the scope of the Committee on the Global Financial System.¹⁹ They also collaborate more broadly, for example within the scope of the G20 meetings and the Basel III consultations, to strengthen the overall resilience of banks. Central banks also have the opportunity to cooperate in a broader setting, for instance through the exchange of views on the economic outlook in international fora, such as the meetings of central bank governors at the BIS or the Working Party No 3 work stream at the OECD. Clearly, these initiatives do not equate to monetary policy coordination in the traditional sense, but the idea behind them is to share the goal of stability and the "rules of the game".

At the same time, in truly exceptional circumstances, monetary authorities have also coordinated interest rate decisions: in September 2001, the Federal Reserve System and the ECB coordinated their response to the financial consequences of the terrorist attacks in New York. In addition, on 8 October 2008, in a concerted and historic move, the ECB and other major central banks reduced policy interest rates by 50 basis points. However, in the case of the

15 For more details, see the article entitled "The external dimension of monetary analysis", *Monthly Bulletin*, ECB, August 2008.

16 With regard to the "leaning against the wind" approach, see the article entitled "Asset price bubbles and monetary policy revisited", *Monthly Bulletin*, ECB, November 2010, and Papademos, L.D. and Stark, J. (eds.), *Enhancing Monetary Analysis*, ECB, 2010, Chapter 6.

17 Scepticism toward the "leaning against the wind" approach is primarily based on the view that it involves high output costs (see, for example, Assenmacher-Wesche, K. and Gerlach, S., "Monetary policy and financial imbalances: facts and fiction", *Economic Policy*, Vol. 25, No 63, 2010, pp. 437-482, and Bean, C., Paustian, M., Penalver, A. and Taylor, T., "Monetary policy after the fall", a paper presented at the Federal Reserve Bank of Kansas City Annual Conference, Jackson Hole, Wyoming, August 2010.) Yet the high output costs associated with the current global crisis, together with the evidence mentioned earlier, which suggests that too loose a monetary policy might have played an important role in the run-up to the crisis, have probably strengthened the case for leaning against the wind.

18 See Woodford, M., "Globalization and Monetary Control", in Galí, J. and Gertler, M. (eds.), *International Dimensions of Monetary Policy*, Chapter 1, University of Chicago Press, 2010.

19 See the report mentioned in footnote 1.

ECB, even in exceptional circumstances, monetary policy has always remained clearly focused on its primary objective of maintaining price stability in the euro area. Overall, no general conclusions regarding monetary policy can be drawn from such exceptional events. The economic literature on monetary policy coordination is vast but not conclusive. A number of empirical investigations suggest that, in general, gains from monetary policy coordination seem to be small.²⁰ The results of theoretical studies tend to point to a similar conclusion,²¹ although some authors can generate significant gains in specifically parameterised models.²² In practice, a number of aspects are likely to hamper the implementation of formal monetary policy coordination.²³ First, some kind of commitment would be required to reflect the agreed policy plans. The implementation of these plans would also require a common understanding of the nature and propagation of economic disturbances in real time. Second, the different mandates of central banks would make it difficult to reach

common policy conclusions. Third, it would be difficult to hold policy-makers accountable at the national level if their policy actions were based on considerations that go beyond their assigned mandate. Fourth, individual policy-makers may neglect to implement coordinated policy actions in their countries owing to the possible lack of enforcement mechanisms.

- 20 Coenen, G., Lombardo, G., Smets, F. and Straub, R., "International transmission and monetary policy cooperation", in Gali, J. and Gertler, M. (eds.), *International Dimensions of Monetary Policy*, Chapter 3, University of Chicago Press, 2008.
- 21 Corsetti, G. and Pesenti, P., "Welfare and Macroeconomic Interdependence," *Journal of Quarterly Economics*, Vol. 116, 2001, pp. 421-446 and Obstfeld, M. and Rogoff, K., "Global Implications of Self-Oriented National Monetary Rules", *Journal of Quarterly Economics*, Vol. 17, 2002, pp. 503-535.
- 22 Sutherland, A., "International Monetary Policy Coordination and Financial Market Integration", *CEPR Discussion Papers*, No 4251, 2004, and Pappa, E. and Liu, Z., "Gains from International Monetary Policy Coordination: Does it Pay to be Different?", *Journal of Economic Dynamics and Control*, Vol. 32, No 7, 2008, pp. 2085-2117.
- 23 Issing, O., "On Macroeconomic Policy Co-ordination in EMU", *Journal of Common Market Studies*, Vol. 40, No 2, 2002, pp. 345-358.

Box

THE EFFECTS OF GLOBAL LIQUIDITY ON CONSUMER AND ASSET PRICE INFLATION

Disentangling empirical evidence of the effects of global liquidity on asset and consumer price inflation is not a straightforward exercise. Recent academic literature has put most of the emphasis on the effects of global monetary liquidity, which is therefore the focus of this box.

Effects on consumer price inflation

Berger and Harjes find that in the euro area excess liquidity, measured as the difference between M2 and estimated long-run demand for M2, shows strong co-movement with excess liquidity in the United States and Japan. They show that US excess liquidity exerts a positive impact on euro area inflation for up to 12 quarters.¹ Sousa and Zaghini use a similar approach and find a positive effect of global liquidity on euro area inflation. While the authors find that the precise contribution of global liquidity shocks to euro area inflation depends on the model specification and the metric used to measure global liquidity, it is always sizeable, and can account for up to around a third of the variability of the price level in the longer run.² Ruffer and Stracca estimate a vector autoregression (VAR), including a measure of global liquidity, proxied by a global broad

- 1 Berger, H. and Harjes, T., "Does Global Liquidity Matter for Monetary Policy in the Euro Area?", *IMF Working Papers*, No 09/17, 2009.
- 2 Sousa, J.M. and Zaghini, A., "Monetary Policy Shocks in the Euro Area and Global Liquidity Spillovers", *International Journal of Finance and Economics*, Vol. 13, 2008, pp. 205-218.

monetary aggregate constructed as the GDP-weighted sum of the domestic broad monetary aggregates of Canada, Japan, the United Kingdom, the United States, and the euro area.³ They find that global liquidity has a significant positive impact on the price level in the euro area economy.

These findings for the euro area are in line with related studies for the United Kingdom. Mumtaz and Surico, for instance, provide evidence that monetary easing in the rest of the world leads to an increase in CPI inflation and real house price inflation in the United Kingdom.⁴ Moreover, D'Agostino and Surico show that forecasts of US inflation that are based, inter alia, on measures of global liquidity constructed with monetary aggregates are significantly more accurate than those of other models including only national variables.⁵

Effects on asset price inflation

When assessing the effects of global liquidity on asset prices, it is useful to distinguish between different asset price categories, such as house prices and commodity prices.

Belke, Bordon and Hendricks study aggregate data for ten OECD countries and the euro area, and find that a global liquidity measure based on broad money aggregates is a useful indicator of commodity price inflation.⁶ Belke, Orth and Setzer show that ample global liquidity, measured by broad monetary aggregates, contributed to house price inflation between 2002 and 2006. They also suggest that the fall in house prices resulting from the subprime crisis caused liquidity to inflate commodity prices.⁷ In addition, the IMF has recently examined the links between global liquidity expansion, asset prices and capital inflows in emerging market economies.⁸ It found that rising global liquidity is associated with rising equity returns and declining real interest rates in 34 “liquidity-receiving” economies. Alessi and Detken show that global monetary liquidity measures derived from a narrow money aggregate and a credit aggregate are more informative than real variables in detecting boom and bust cycles.⁹

Using a measure of global monetary liquidity constructed by obtaining the sum of the US monetary base and international reserves, Darius and Radde find an asymmetric impact on the different asset price classes, with a much stronger effect on house prices compared to equity and commodity prices.¹⁰ Their result is broadly consistent with the findings of other studies in the literature that are based on more standard measures of global liquidity.

3 Ruffer, R. and Stracca, L., “What is Global Excess Liquidity, and does it Matter?”, *Working Paper Series*, No 696, ECB, 2006.

4 Mumtaz, H. and Surico, P., “The Transmission of International Shocks: A Factor-Augmented VAR Approach”, *Journal of Money Credit and Banking*, Vol. 41, No 1, 2009, pp. 71-100.

5 D'Agostino, A. and Surico, P., “Does Global Liquidity Help to Forecast U.S. Inflation?”, *Journal of Money Credit and Banking*, Vol. 41, No 2-3, 2009, pp. 479-489.

6 Belke, A., Bordon, I.G. and Hendricks, T.W., “Global Liquidity and Commodity Prices – a Cointegrated VAR Approach for OECD Countries”, *Applied Financial Economics*, Vol. 20, 2010, pp. 227-242.

7 Belke, A., Orth, W. and Setzer, R., “Liquidity and the Dynamic Pattern of Asset Price Adjustment: A Global View”, *Journal of Banking and Finance*, Vol. 34, 2010, pp. 1933-1945.

8 “Global Liquidity Expansion: Effects on ‘Receiving’ Economies and Policy Response Options”, *Global Financial Stability Report*, IMF, Chapter 4, April 2010.

9 Alessi, L. and Detken, C., “Quasi realtime early warning indicators for costly asset price boom/bust cycles: a role for global liquidity”, *European Journal of Political Economy*, Vol. 27, No 3, 2011, pp. 520-533.

10 Darius, R. and Radde, S., “Can Global Liquidity Forecast Asset Prices?”, *IMF Working Papers*, No 10/196, 2010.

5 CONCLUSIONS

This article has defined global liquidity from the viewpoint that is most convenient for the purpose of monetary policy. This definition of global liquidity builds on the two concepts of global monetary liquidity, defined as the ease of converting monetary assets into goods and services, domestically and across borders, and global financial market liquidity, defined as the ease of trading in assets relative to trading in money, reflecting the cost of converting a financial asset into money. From a monetary policy perspective, monetary and financial market liquidity should not be seen in isolation, but as two concepts that influence each other. Global monetary liquidity conditions have an impact on domestic price developments. Global financial market liquidity is important for the functioning of financial markets. However, excessive financial market liquidity can trigger asset price inflation, with ultimate consequences for domestic price stability. The financial crisis has shown that liquidity can evaporate quickly, with important consequences for output and for risks to price stability.

These observations suggest that the implications of global liquidity need to be adequately reflected in the monetary policy strategies of central banks. In particular, monetary policy needs to take into account the impact of global liquidity in its assessment of risks to price stability over the medium term, granting a significant role to the analysis from a domestic and global perspective of money, credit and, more broadly, liquidity conditions.

Given the multi-dimensional nature of global liquidity and the lack of a catch-all indicator to capture its development, it is important that a broad range of measures are monitored, with a view to maximising the information available to policy-makers.