**Special Report – Economics**

**Money supply – The forgotten indicator**

**Highlights**

- Theory and historical evidence suggest that broad money and GDP growth should be closely linked. But the link has weakened in the face of financial innovation. We examine an alternative measure of money, Divisia, and believe it can resurrect money as an indicator.

- Standard money supply data simply sums the components included. Divisia money weights components by their usefulness in transactions. We find support for studies that show Divisia money growth to be a good indicator of the stance of monetary policy and a useful predictor of GDP growth. Our Divisia measures are also based on broad measures of money which has a bigger impact on economic activity.

- We provide our own in-house estimates of Divisia money for China, the euro area, India and Japan. For China we produce our own estimates of broad money supply, M3 and M4. Our global index also includes the US and UK. We plan to provide regular updates on all six major economies.

- Divisia money growth is higher than two to three years ago, except in the UK; but it remains slower than pre-2008, except in Japan, suggesting that monetary conditions are still not buoyant. We believe this supports our view that the global upswing will continue but stay disappointing and that further stimulus will be necessary.

**Acknowledgements**

We would like to acknowledge the contribution of John Calverley, Chief Economist, Calverley Economic Advisors Ltd.
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## Special Report – Economics: Money supply – The forgotten indicator

**DIVISIA MONEY TRENDS**

<table>
<thead>
<tr>
<th>Country</th>
<th>Latest rates, %</th>
<th>Change in last 2 years</th>
<th>Change since 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>3.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>6.8</td>
<td>11.8</td>
<td>4.0</td>
</tr>
<tr>
<td>Euro area</td>
<td>7.2</td>
<td>4.0</td>
<td>-4</td>
</tr>
<tr>
<td>India</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>15.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OUR TAKE**

- **Japan**: Slow but higher than pre-crisis
- **US**: Slow but up since 2013; supports our below-consensus growth forecast
- **UK**: Moderate, but down since 2013
- **Euro area**: Strong, but much higher since 2013; growth surprise?
- **India**: Moderate, well down on pre-crisis
- **China**: Moderate, up since 2013; supports our above-consensus growth forecast

Source: Standard Chartered Research
CALCULATING DIVISIA MONEY

\[
\begin{align*}
\text{M2} & = \text{Cash} + \text{Checking accounts} + \text{Time deposits} \\
& = 10 + 10 + 10 \\
& = 30
\end{align*}
\]

Adjusted for usefulness in transactions*, then...

\[
\begin{align*}
\text{Divisia M2} & = \text{Cash} + \text{Checking accounts} + \text{Time deposits} \\
& = 10 + 10 + \frac{1}{2} \times 5 \\
& = 25
\end{align*}
\]

*Based on a benchmark rate of 4% and a time deposit rate of 2%

WHY DIVISIA IS BETTER

- It captures the relative ‘moneyness’ of each component
- It can better accommodate new instruments
- It is a theoretically consistent approach
- It provides a more reliable signal of GDP trends

Source: Standard Chartered Research
Executive summary

Why look at Divisia money?
Economic theory suggests that growth in broad money supply is a good gauge of monetary policy stance and likely GDP trends. In practice, financial innovation has made 'simple sum' (SSM) measures of money unreliable as an indicator in recent years. Divisia (named after French economist Francois Divisia, 1889-1964) money uses a sophisticated weighting mechanism to adjust for the relative ‘moneyness’ of different components, so it can take account of substitution between them, and the emergence of new instruments. This makes it a more trustworthy money indicator than official series. We find it performs much better as an indicator, and did so especially during the 2008-09 global financial crisis (GFC).

We present data unavailable elsewhere
In this report we present Divisia money growth estimates for six major countries. Currently neither the US nor China publish a money indicator broader than M2, but it is important to look at broad measures to gauge liquidity properly. Our data covers M4 for China, India, the UK and the US, and M3 for the euro area and Japan (though definitions vary). We use the official Divisia series for the UK, the only country to publish regular estimates, while US data is calculated by the Center for Financial Stability. The estimates for China, the euro area, India and Japan are our own.

What Divisia money growth says
Money growth has been weak since 2008
Our measure of the global Divisia broad money supply (aggregating the six major countries using GDP weights) illustrates the weakness of money growth since the GFC, despite large-scale quantitative easing (QE). While central banks have been adding money by purchasing securities, private-sector deleveraging has subtracted money. Moreover, not all central bank purchases impact the broad money supply; purchases from banks may only lead to higher central bank reserves.

Money is picking up, but is still lack-lustre
Divisia money growth picked up in 2015, led by acceleration in the euro area and China. But the global measure, as well as the country measures (except Japan), are still growing more slowly than pre-2008 (Figures 1-2). This supports our view that the global upswing will continue but remain disappointing and more stimulus is needed.

Figure 1: Global Divisia money has been weak since 2008
Divisia and simple sum money, % y/y

Source: Standard Chartered Research

Figure 2: Divisia money is turning up except in Japan and the euro area, % y/y

Source: Standard Chartered Research
China – The fastest rate in three years
Our measure of Divisia M4 has picked up over the last year to its fastest rate in three years (Figure 3, page 7). We believe this pick-up reflects monetary easing, including cuts in interest rates and reserve requirements as well as easing in macro-prudential measures (see Special Report, 23 November, 2015, ‘Asian housing: Ride the cycle’). This momentum supports our view that an imminent hard landing is unlikely and our above-consensus forecast of 6.8% GDP growth for 2016.

Euro area – A strong bounce in 2015
Since late 2014 Divisia M3 growth has accelerated markedly, reaching 7.2% y/y (Figure 4). This surge puts money growth only slightly below the 2003-07 average and likely reflects both active QE and the recent rise in lending to the private sector. But GDP growth has been lacklustre and most indicators suggest it will remain modest: Our 2016 GDP forecast of 1.4% is close to consensus. In contrast, strong Divisia money growth could be pointing to a growth surprise.

India – Running slowly since 2012
Trends in Divisia M4 fit well with the growth slowdown and the fall in the inflation rate since 2012 (Figure 5). Divisia M4 has firmed slightly over the last year, suggesting economic growth could pick up or at least continue at recent moderate rates.

Japan – Up with Abenomics
Growth in Divisia M3 has picked up since QE was expanded in 2013 as part of ‘Abenomics’ (Figure 6). But money growth is still only modest, suggesting QE is struggling to boost broad money. That said, our analysis finds the relationship between money and GDP in Japan is not as reliable as in other countries.

UK – Slower recently
In the UK, Divisia growth is a good match with GDP trends, much better than the simple-sum M4 measure. Currently Divisia M4 is growing at 6.8%, below the 7-10% growth rate seen pre-2008 and also down from the level in 2013 (Figure 7). GDP growth has indeed slowed since 2013 from 3% to about 2%. This is consistent with the Bank of England (BoE) remaining on hold, in our view.

US – Stuck in low gear
Our analysis finds that Divisia money fits better than official M2 with trends in GDP. US Divisia M4 is expanding at 4% currently, well below the 6-7% rate prevailing before the GFC and helping to explain why GDP growth remains disappointing (Figure 8). Slow Divisia money growth supports our below-consensus 2016 GDP forecast of only 1%, with GDP growth held down also by demand leaking abroad due to the strong US dollar.

Conclusion – Add Divisia money to your dashboard
Our analysis, as well as academic studies, finds that Divisia money is a good measure of monetary policy stance and a useful indicator for GDP trend. Divisia money is not a magic crystal ball, but we believe analysts should add it to their dashboard. It usually performs better than simple-sum measures. Divisia measures will likely become more important in emerging countries as financial systems deepen, widening the gap with simple sum measures. We plan to provide regular updates.
Figure 3: China DM4 and real GDP
% y/y

China DM4
China real GDP (RHS)

Source: ChinaBond, Standard Chartered Research

Figure 4: Euro-area Divisia M3 and real GDP
% y/y

Euro-area Real GDP (RHS)
Euro-area DM3

Source: Bruegel, Eurostat, Standard Chartered Research

Figure 5: India Divisia M4 and real GDP
% y/y

India Divisia M4
India CPI
India real GDP

Source: India Central Statistical Organisation, RBI, Standard Chartered Research

Figure 6: Japan DM3 and real GDP
% y/y

DM3
Japan real GDP (RHS)

Source: Bloomberg, Economic and Social Research Institute Japan

Figure 7: UK Divisia M4 and real GDP
% y/y

UK real GDP (RHS)
UK DM4

Source: Bloomberg, BoE, Standard Chartered Research

Figure 8: US Divisia M4 and real GDP
% y/y

US DM4 incl USTs
US real GDP

Source: Bloomberg, Centre for Financial Stability, BEA
Why money supply is important

Theory and history
For more than 200 years economic theory has recognised a close link between money and GDP. One way of thinking of this is that for people to make transactions they need to get the money together first. Another is that people try to keep the ratio of their money holdings to other assets broadly constant, so if they accumulate more money relative to other assets they will seek to spend it to restore equilibrium. That said, economists since Keynes have often disputed the direction of causation between money and GDP. And since the failure of the monetarist experiments in the 1980s, many have doubted the practicality of using money as an indicator, particularly since financial innovation continues to generate new instruments that can be used for transactions (see Appendix 1 for more on the historical context).

The quantity theory of money
The clearest formulation of the quantity theory is usually known as the Fisher equation

\[ MV = PT \]

or

\[ \text{Money} \times \text{Velocity} = \text{Prices} \times \text{Transactions} \]

Velocity (V) is the number of times money changes hands. Note that transactions (T) include not just goods and services, i.e., GDP. It includes all transactions including financial transactions. Hence a rise in money may portend an increase in stock or house purchases. This effect can be seen in some of our analysis – e.g., the jump in US money growth in 1987 ahead of the stock-market crash of that year and again during the stock and housing bubbles around the turn of the century.

While strictly speaking the Fisher equation is an accounting identity, not a causal relationship, classical theory (and monetarists) insists that a rise in M will flow through to more transactions (and eventually higher prices). Some analysts argue that an expanding money supply might have little effect because velocity may simply decline to offset it. However, this view goes against more than two centuries of theory and experience. That said, the links between money supply and the economy come with what economist Milton Friedman called ‘long and variable lags’.

Simple sum money measures are unstable
The practical problem with using money supply as an indicator is that since the 1980s SSMs have proven relatively unstable and not well-correlated with GDP trends. China is one of the few countries that still uses a money supply target for reference; most central banks pay little attention to money supply. Modern financial systems have too many instruments that have some degree of moneyness. Simple sum aggregation can provide misleading signals.

Divisia may be the answer
The use of Divisia measures of money addresses these problems and provides more confidence we are looking at a meaningful measure of money. This may be especially important amid current low and even negative interest rates, as the usefulness of interest rates as an indicator of the economy or policy stance is in question. For example, few people now are confident that low rates mean that monetary policy is super-stimulatory and that growth will surge. We need an alternative way to look at monetary conditions.
Money supply and quantitative easing

Another reason for looking at money supply is that central banks are now employing QE as a stimulus technique. Many of them view QE primarily as a way to signal their intention to keep interest rates low for a long time by bringing down long-term interest rates. But its success as well as the inflation risk involved can also be judged by what happens to money growth. If broad money growth picks up to a healthy rate the amount of QE is probably about right. What is a healthy rate? For a developed economy somewhere in the 4-7% range is probably about right, in our view. For China and India a range of 10-15% may be enough to support GDP growth of 6-8%, moderate inflation and some financial deepening.

QE does not necessarily boost money supply

There is a more or less 1-1 relationship between central bank purchases and M0 or so-called central bank money. But broader measures of money from M1-M4 only include money in circulation, which is what affects GDP. And reserves tucked away at the central bank (included only in M0) are not in circulation. This is why the big rise in M0 since 2009 in the US and other developed countries has not brought either an economic boom or higher inflation.

Unfortunately, when central banks purchase securities from banks there is no direct impact on the money supply beyond M0. Banks simply substitute reserves at the central bank for the securities they have sold. QE only raises money in circulation if the securities are purchased from non-bank institutions such as pension funds or insurance companies. The central bank directly credits those institutions’ bank accounts with newly created money.

QE may have been inadequate

We believe our Divisia estimates give us a good way of assessing whether the right amount of QE has been done. Evidence suggests that if anything, quantitative easing has been less than required since 2009. Money growth in the US, UK and euro area remains far less buoyant than pre-GFC. This is likely partly because too much was purchased from banks. Also QE needed to be enough to compensate for deleveraging. Especially in the immediate aftermath of the GFC, the private sector was paying down debt and banks were raising capital and trying to reduce their balance sheets. These actions have the effect of reducing the money supply.

The good news is that money growth has picked up in the past year, notably in the euro area where QE began in Q1-2015. But the euro area and Japan will likely need to continue QE for a long time yet, and we cannot rule out further QE from the US and UK if growth disappoints. Money growth in the US is at the low end of our ‘healthy’ rate of 4-7%.

Figure 9: Money supply components as a share of GDP

<table>
<thead>
<tr>
<th>M0</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>8.7</td>
<td>56.0</td>
<td>198.4</td>
<td>215.4</td>
</tr>
<tr>
<td>India</td>
<td>10.6</td>
<td>17.4</td>
<td>17.8</td>
<td>80.4</td>
</tr>
<tr>
<td>Euro area</td>
<td>10.3</td>
<td>99.7</td>
<td>136.6</td>
<td>148.0</td>
</tr>
<tr>
<td>Japan</td>
<td>18.2</td>
<td>126.4</td>
<td>237.2</td>
<td>245.1</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>4.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>United States</td>
<td>7.6</td>
<td>17.1</td>
<td>69.0</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Bloomberg, IMF, Standard Chartered Research
How Divisia money is calculated

Weighting money components by their usefulness as money

Conventional measures of money supply are calculated by simply adding together the components, ranging from currency and demand deposits in M1, time deposits and money market funds in M2 and instruments such as CDs, commercial paper and short-term debt securities for broader measures such as M3 and M4 (see Appendix 2). The moneyness of each asset is assumed to be the same.

In reality the degree of moneyness varies, depending on ease and convenience of use and reliability as a store of value. Currency and checking accounts are the purest form of money and are mostly held for transactions. Using time deposits for payments may incur a penalty or a delay or involve some inconvenience (such as visiting a branch). Often time deposits are intended to be held for the longer term. Securities such as commercial paper or short-term bonds can usually be sold easily but may require time for settlement and their value could change due to market or credit conditions.

A theoretically robust method

Divisia money is a theoretically robust method for weighting the components of money supply according to their degree of moneyness. The technique is named after French economist Francois Divisia (1889-1964) and has been developed and championed primarily by US economist William Barnett. The weights are calculated according to the interest rate paid on each component; those which are less useful for transactions will enjoy a higher rate. Cash and checking accounts which pay zero interest have the highest weight while relatively illiquid assets that earn closer to the benchmark rate have the lowest weight. The weights will change as the structure of interest rates change, allowing Divisia money to compensate for shifts among components.

How to construct a Divisia money index

To calculate a Divisia index for money requires the following:

- The amounts outstanding, and interest rates earned for each component.
- A ‘benchmark’ interest rate against which the rate for each component can be compared. This benchmark asset should enjoy the typical interest rate return in the economy but be relatively illiquid and not be used for transactions.

The infographic on page 4 includes a simple illustration of how to calculate M2, assumed to consist of cash, checking accounts and time deposits, where the first two earn zero interest, time deposits earn 2% and the benchmark rate is 4%. M2 simply sums the three components. Divisia M2 includes only half the time deposits (calculated by taking 4/2). In practice the calculation is made using growth rates, so the weighting of the growth of time deposits is cut in half.

If interest rates fell to 1% on time deposits and 3% on the benchmark asset, a higher weight is given to the growth of time deposits, two-thirds. So is the money supply suddenly larger? It depends, because people will respond to different interest rates by moving assets from one component to another. When interest rates fall people hold relatively more in demand deposits, because there is less advantage to keeping money in time deposits.
A comparison of trends in US M1 and M2 with the federal funds target rate shows this behaviour clearly: M1 and M2 move in opposite directions when interest rates shift, more in M1 when rates go down and more in M2 when rates go up (Figure 10). This shift in money supply measures is one of the key reasons why simple sum money was found to be unstable in the past. The other was new instruments, which could be used for money.

**Choosing the benchmark rate**

In practice it is hard to find an asset that exactly matches the requirements for the benchmark asset; most assets have some degree of liquidity, while those that have less, such as small stocks or private equity, involve high risk and volatility and are hard to value. Moreover, since the benchmark rate must not be below the rate paid on the money components (as negative moneyness makes no sense), this rules out using a long-term bond yield as the yield curve can sometimes be inverted.

One approach is to use a bank lending rate (as we do for India). Another approach formerly used by the BoE is to arbitrarily add a spread to a rate, in this case local government bills plus 200bps. Yet another technique, which the BoE now uses, assumes that the benchmark asset is the component of money supply that pays the highest interest rate at any given time.

Despite these difficulties, research suggests that the choice of benchmark rate is less important than it may appear because it is primarily used to measure the relative moneyness of different components. The trend of Divisia growth rates turns out to be not much affected by the choice of benchmark rates (Barnett 2011).

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**Figure 10: M1 and M2 go in opposite directions when rates change**

*US M1, M2 less M1 % y/y, and the federal funds target rate %*

Source: US Federal Reserve, Standard Chartered Research
Why Divisia money is superior

Better in theory

In summary, Divisia monetary aggregates are better in principle than simple sum counterparts for four reasons:

1. The simple sum approach implies that all components of money stock are substitutes or alike in their moneyness, which is plainly not true.

2. Simple sum fails to take into account substitution effects in the event of a change in the relative interest rates on different monetary assets (as discussed in the example above). Simple sum aggregates especially do not cope well with extreme situations such as inverted yield curves or QE policies.

3. Using Divisia instead of simple sum overcomes many of the distortions of new monetary instruments because the degree of moneyness of the new instruments is automatically taken into account.

4. Using relative interest rates to derive the weights is a theoretically consistent approach.

Better in practice too

Studies covering at least 10 countries have found that Divisia money aggregates are better than simple sum (Figure 11). Divisia money is not a magic crystal ball but it is generally found to be more reliably correlated with GDP than simple sum aggregates. Moreover, several studies find that it adds useful information for forecasters and nowcasters (gauging the state of the economy ahead of other indicators). Our investigations also find that Divisia money performs better than simple sum aggregates for most countries, though the stories vary.

Our approach

In our country analysis, we focus on the linkages between changes in money growth and changes in real GDP. This is a simplification of the theory that suggests that the linkage should be between nominal money growth and nominal domestic demand (GDP plus imports less exports). We present this data in Figures 28-33 for those interested. But gauging nominal trends in demand does not tell us the breakdown between real demand and prices. We believe it is better to view money growth as first influencing real growth, then after time it may influence inflation. For example weaker money growth is likely to first slow real demand growth, then lower the inflation rate.

What about the distinction between domestic demand and GDP? This matters periodically, when a country sees a big change in its net export picture. For example, it is likely to be important for the US this year because the strong USD means that aggregate demand will likely be higher than GDP. But the difference is usually fairly small. Some analysts prefer to compare real money growth (after subtracting inflation) with real GDP (see Figures 34-39).
**Figure 11: Past studies suggest Divisia is better than SSMs**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Studies producing Divisia Monetary Aggregates</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><em>The New Divisia Monetary Aggregates</em> – William Barnett, Edward Offenbacher and Paul Spindt</td>
<td>First empirical comparisons of Divisia monetary aggregates with SSM in policy applications; Divisia money, especially at higher levels of aggregation, usually performs better than simple sum when tested against conventional policy-relevant criteria.</td>
</tr>
<tr>
<td>United States</td>
<td>2011</td>
<td><em>How Better Monetary Statistics Could Have Signaled the Financial Crisis</em> – William Barnett and Marcelle Chauvet</td>
<td>Most recessions in the past 50 years were preceded by contractionary monetary policy, which is better indicated by Divisia than by SSM data. Divisia monetary aggregate growth rates were generally lower than SSM growth rates in the period preceding the mid-1980s and higher since.</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2005</td>
<td><em>Divisia Money</em> – Matthew Hancock</td>
<td>BoE produces an improved measure of UK Divisia money and argues for its usefulness.</td>
</tr>
<tr>
<td>Euro area</td>
<td>2014</td>
<td><em>Does Money Matter in the Euro Area? Evidence from a New Divisia Index</em> – Zsolt Darvas (Bruegel)</td>
<td>Divisia money reacts to user costs. Most of these results are not significant when SSM is used.</td>
</tr>
<tr>
<td>China</td>
<td>2015</td>
<td><em>Chinese Divisia Monetary Index and GDP Nowcasting</em> – William Barnett and Biyan Tang</td>
<td>Divisia monetary aggregates contain more indicator information than SSM aggregates; factor model produces the best available nowcasting results. Divisia money showed that China’s money supply declined at the beginning of 2010 after which the growth rates of Divisia M1, M2, M3 and M4 all steadily decreased, reflecting the tightened monetary conditions in China.</td>
</tr>
<tr>
<td>India</td>
<td>2010</td>
<td><em>The Divisia Monetary Indices as Leading Indicators of Inflation</em> – M. Ramachandran, R. Das and Binod Bhoi</td>
<td>Empirical evidence suggests that Divisia monetary aggregates might have an edge over SSM in a liberalised financial market regime in predicting inflation. As countries such as India continue to liberalise their interest rate structure and deepen their financial systems, Divisia measures will become more important.</td>
</tr>
<tr>
<td>Japan</td>
<td>2009</td>
<td><em>Comparison of Simple Sum and Divisia Monetary Aggregates Using Panel Data Analysis</em> – S. Celik and S. Uzun</td>
<td>Divisia monetary aggregates are superior over SSM in that they perform better for the financial innovation period of the early 1980s and 1990s. Divisia seems to overcome simple sum aggregates’ inability to react to financial innovation and provide a stable money demand function.</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2010</td>
<td><em>Financial Liberalisation and Money Demand in Indonesia: Implications for Weighted Monetary Aggregates</em> – Hiew Lee Chea</td>
<td>Looks at Indonesia’s monetary regime changes and the significance of Divisia monetary aggregates in shaping monetary policy in Indonesia from 1981-2005. Empirical findings indicate that Divisia monetary aggregates have proven to be superior to SSM as a useful measure of money for Indonesia.</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2008</td>
<td><em>Revisiting Money Demand in Malaysia: Simple-Sum Versus Divisia Monetary Aggregates</em> – Chin-Hong Puan, Choi-Meng Leong et.al</td>
<td>Attempts to determine whether Divisia monetary aggregates are superior monetary instruments in Malaysia where monetary targeting has been replaced by interest rate targeting due to the inadequacy of SSMs in predicting economic activities.</td>
</tr>
<tr>
<td>Germany</td>
<td>2015</td>
<td><em>The Information Content of Monetary Statistics for the Great Recession: Evidence from Germany</em> – Wenjuan Chen and Dieter Nautz</td>
<td>Introduces a Divisia monetary aggregate for Germany. Divisia money and SSM are highly correlated in normal times but began to diverge before the 2008 crisis, suggesting that Divisia was a better predictor of the crisis.</td>
</tr>
<tr>
<td>UAE</td>
<td>2012</td>
<td><em>Divisia Monetary Aggregates for the GCC Countries</em> – Ryadh Alkhareef and William Barnett</td>
<td>Divisia indexes are superior to the officially published SSM aggregates in monitoring business cycles. Divisia money provides critical information to policy makers regarding liquidity conditions.</td>
</tr>
<tr>
<td>Turkey</td>
<td>2009</td>
<td>An Empirical Study of Simple Sum and Divisia Monetary Aggregation: A Comparison of their Predictive Power Regarding Prices and Output in Turkey – Dogan Karaman (PhD thesis, University of Kansas)</td>
<td>Uses several models and methods to compare SSM and Divisia aggregates in predicting Turkish inflation and output growth in the last two decades; overall, money provides a good amount of information in predicting inflation and output in Turkey. In high-inflation periods, Divisia aggregates clearly provide better information than SSM, while in low-inflation periods simple sum aggregates are a better predictor.</td>
</tr>
</tbody>
</table>

Source: Centre for Financial Stability, Standard Chartered Research
Country studies

Global – Picking up but still lacklustre

Our aggregate is heavily influenced by China

We aggregate the six major countries in this study to create a global index and compare it with a global index using simple sum money in each country and also with GDP trends (all using the same aggregation methodology, see below). We find that Divisia matches GDP trends better than SSMs especially during the global financial crisis. In 2008-09, when Divisia money growth declined sharply in line with the economic slowdown, simple-sum money actually accelerated, reflecting quantitative easing (Figure 12).

From 2009-11 Divisia money growth was weak, in line with the weak global recovery. It briefly approached a 7% growth rate in 2012 before slowing again. The most recent reading shows Divisia money growth of 7.6% y/y, the fastest since 2008 (Figure 13).

That said, a comparison with 2008 needs to allow for the hugely increased weight for China: 21% in 2015 versus 8% in 2007. With China’s Divisia money growing at 15% compared with developed country rates of 4-6%, the aggregate rate of growth is hiding big changes in composition. (Calculated at China’s 2006 weight, global Divisia money would be growing at only 6.2%). This is another reminder of the increase in importance of policy and performance in China compared with less than 10 years ago. Still, we view the acceleration in our global Divisia aggregate since 2014 as positive, as it reflects a significant pick-up in the euro area and China.

A note on the aggregation methodology

The six countries here cover 68% of world GDP and all the major reserve currencies. To weight countries, we use market exchange rates but smooth changes over three years to avoid sharp exchange rate moves dominating money supply moves. Otherwise a sudden change in the euro (EUR) could significantly affect the global money supply in a way that we doubt makes sense in analysing the relationship between money growth and GDP. This method still allows us to capture broad shifts in economic gravity. Since 2007 the euro-area weight declined from 31% to 25%, the US from 39% to 35% and China increased from 8% to 21%. The rise of China reflects mainly its GDP growth and to a lesser extent exchange rate appreciation. The EUR exchange rate changes little over the period using our smoothing method. The large decline in weight reflects its poor GDP performance.
China – Fastest rate in three years
We publish new broad money statistics

Official money supply statistics from the Peoples Bank of China (PBoC) provide data for M1 and M2. We construct new broad money measures for China covering M3 and M4 based on a research paper by Barnett (2015). The official M2 aggregate includes currency in circulation and corporate, personal and other deposits. Our wider definitions take into account debt instruments up to three years, including commercial bank bonds, corporate bonds, commercial paper, local and central government bonds and also money market funds. The broader definitions are comparable to the broader definitions available elsewhere, including in the UK, US, and euro area.

Divisia is a better fit with GDP than official M2

For China, official M2 and our calculations of Divisia M4 mostly track fairly closely but there is one major exception, in 2012 (Figures 14 and 15). Official M2 bounced strongly in that year, yet GDP did not, suggesting that official M2 gave an inferior signal. Barnett’s analysis also found that Divisia aggregates contain more indicator information than simple sum aggregates and were better at now-casting China GDP.

Divisia M4 differs comparatively little from simple sum M4 (both calculated by us). But China has liberalised interest rates only recently and plans further financial-sector liberalisation. We expect this to lead to more flexibility and eventually bring the potential for greater divergence between Divisia and SSMs. That said DM4 was stronger than simple M4 in 2009-10, which probably more accurately reflected the strength of the economy then. In general as financial markets deepen in emerging markets, we expect Divisia money to diverge more from SSMs. For this reason it will be increasingly important to monitor Divisia.

Divisia money is picking up

Money supply growth, both the official M2 and our Divisia M4 estimate, has picked up since the middle of 2015, suggesting the economy may stabilise this year. This supports our view that a hard landing is unlikely and our above-consensus GDP forecast of 6.8%. The government has cut interest rates and reserve requirements, as well as stoked fiscal policy and we expect more stimulus in coming months. China has also relaxed macro-prudential policies, bringing a rise in housing-market activity (see Special Report, 23 November 2015, ‘Asian housing: Ride the cycle’).
Euro area – A strong bounce in 2015

Divisia money grew very slowly during 2010-14

Divisia euro-area money supply at times differs quite markedly from its SSM counterpart, in terms of both profile and growth rate (Figure 16). In the 2004-07 period Divisia M3 did not accelerate as much as official M3, making it a better fit with real GDP growth, which was only mildly up (Figure 17). The European Central Bank (ECB) raised rates in 2006-07 and even hiked again in July 2008, despite the worsening financial crisis. The main fear was that higher oil prices would feed into inflation expectations, but the double-digit growth in simple M3 may have been a concern too. The Divisia measure, in contrast, peaked at 10% in September 2007 and slowed significantly by mid-2008.

Both measures did decline significantly during and after the GFC. This is different to the experience in the UK and US, where simple sum surged initially and could be because the ECB did not do quantitative easing at the time. During 2010-14 Divisia money grew slowly, especially compared with pre-GFC growth, underlining the weakness of monetary conditions. This sluggishness suggests that the ECB should have begun QE long before it did in January 2015.

Divisia is now growing at 7%

Both measures of M3 have accelerated in the past 18 months, with Divisia money now growing about 7%. This puts money growth only slightly below the 2003-07 average and likely reflects both active QE and the recent rise in lending to the private sector. But GDP growth has been lacklustre and most indicators suggest it will remain modest: Our 2016 GDP forecast of 1.4% is close to consensus. In contrast strong Divisia money growth could be pointing to a growth surprise.

ECB studies (2001 and 2010) and others have concluded that Divisia monetary aggregates display favourable econometric properties. The Bruegel Institute publishes quarterly estimates of euro-area Divisia M3. Its analysis comparing Divisia money with simple-sum measures reaches a number of conclusions: Divisia aggregates have impacts on euro-area output and prices, output is impacted three to nine quarters after a Divisia-money shock, the output shock is temporary, and the ECB in practice reacts to developments in monetary aggregates. When measured via SSM, the results are less meaningful.

Figure 16: Euro-area M3 vs Divisia M3

Source: Bruegel, Standard Chartered Research

Figure 17: Euro-area M3 vs real GDP

Source: Bruegel, Eurostat, Standard Chartered Research
India – Running slowly since 2012
Divisia M4 diverges significantly from simple M4
Our analysis finds that Divisia M4 (DM4) shows a closer correlation with GDP than does simple M4 (published by the Reserve Bank of India, ‘RBI’). The two series diverge in four periods (Figure 18). From late 2006 to 2008 signs of overheating in India’s economy are better captured by the Divisia measure, which was running higher. During this period India sustained GDP growth at over 8.5% and the RBI tightened policy to control inflation.

In 2008-09 the growth of Divisia money fell sharply, which seems to fit well with the sharp economic slowdown at the time. In contrast, simple M4 remained high during the crisis, giving misleading signals. It likely picked up the effects of the RBI’s policy actions (multiple cuts in the cash reserve ratio and interest rates) to inject liquidity and arrest India’s declining growth rate. In April 2009 the growth in DM4 started to pick up, reflecting the economic recovery, before falling sharply when India’s growth slowed again. In contrast, simple sum M4 only rose and fell slightly.

Divisia picks up trends in inflation too
India differs from the other countries in this study in that there was a major change in the inflation rate during the period. Wholesale price inflation of 10-11% in 2010-12 came down to the 5-6% range in 2014 before falling even more in response to lower commodity prices. Consumer price inflation, the central bank’s target now, has also fallen significantly from 10-12% in 2009-13 to 5-6% now (Figure 19). We believe our Divisia index is broadly consistent with this trend. Moreover the volatility in our measure of DM4 seems to pick up the volatility of consumer prices during 2011-14, falling sharply, then spiking then falling again.

Since 2012 both measures have moved broadly sideways in line with GDP, though DM4 has been on a slight strengthening path while simple M4 has been slowing a bit. Divisia is signalling an improvement in economic growth or at least suggests a continuing moderate pace.
Japan – Up with Abenomics
Divisia differs little from simple money
Data limitations and the flatness of Japan’s yield curve mean that when we estimate Divisia money differentiation between assets is limited. The series therefore differs little from simple money (Figure 20). That said, the trends in Japanese money are hard to interpret. Japan’s economy grew quite solidly during 2003-07 (averaging about 1.75% p.a. despite the declining labour force) and deflation even eased up, with core CPI climbing to zero in early 2008. Yet money growth slowed in this period and even went negative in 2007 (Figure 21).

The expected relationship with GDP growth is missing
One possible reason for this weak money growth is that the Bank of Japan (BoJ) ended its first QE programme in 2005 (it began in 2001) and cut the size of its balance sheet in 2006). Still, the expected linkage to GDP is lacking for Japan. So, while faster growth of Divisia money in the last two years is encouraging, it is difficult to be confident that this points to stronger GDP growth or higher inflation. Moreover, despite substantial QE, with the BoJ balance sheet much larger as percentage of GDP than the that in the US or euro area, the fact that broad money is still growing ‘only’ 4% suggests scope for an even faster pace of QE.
UK – Slower recently

In the UK Divisia money seems to fit much better with economic trends than SSMs such as M4 (Figures 22 and 23). During the early 2000s upswing DM4 remained solid in the 7-10% range from 2001 until late 2007. In contrast, simple M4 showed a distinct uptrend in 2005-07. Yet economic growth did not accelerate in this period. Headline inflation and wages picked up a little but house-price growth slowed. It is not clear that the acceleration in simple M4 was a useful signal. The base rate was raised significantly in 2006-07 but monetary policy may have been too lax throughout the period, as is implied by DM4 growing at a high 7-10%, rather than that monetary tightening was especially warranted in 2006-07.

Divisia has performed especially well since 2007

Since 2007 DM4 has been a much better indicator than simple M4. DM4 growth began to slow in 2007 and slumped to near zero well ahead of the Lehman bankruptcy, correctly signalling the recession. In contrast, simple M4 slowed slightly in 2007 but remained high and then soared during 2008-09, giving misleading signals as it picked up the effects of liquidity provision and quantitative easing.

In 2010 DM4 recovered to growth of about 5%, reflecting the initial economic upswing, before falling back again when UK growth slowed during the 2011-12 euro crisis. Simple M4 slumped to below zero in early 2011, again distorted by financial conditions. Since then it has roughly followed the same profile as DM4 but whereas DM4 has averaged growth around 6%, consistent with the solid recovery since then, simple M4 has ranged around 0%. The most recent Divisia growth rate is slightly lower than two years ago, again consistent with the slowdown to around 2% GDP growth currently from 3% previously.
US – Stuck in low gear
Money supply is largely ignored
In the US simple money aggregates like M2 have proven unhelpful in understanding the economy especially in the short and medium term, and neither the Federal Reserve (Fed) nor most private economists pay much attention to these measures. The Fed no longer even publishes broader measures of money, such as M3.

Yet Divisia M4 (DM4) calculated by the Centre for Financial Stability does seem to perform much better than M2 historically (see Barnett 2011). In particular, the two measures diverged sharply during two crucial episodes: the monetarist experiment in 1979-82 and the GFC (Figures 24-25).

DM4 correctly signalled the double-dip recessions in 1980-82
The US monetarist experiment beginning in November 1979 aimed to bring inflation down gradually without a recession by targeting reduced money growth. It was abandoned in November 1982 after two recessions in two years, which occurred despite buoyant M2 growth. But DM4 did signal both recessions, suggesting that by focusing on simple money measures, the Fed erred with overly tight policy.

Simple M2 growth gave false signals in 2008-09 and 2012
The most recent big divergence has been since 2007 (Figure 26). At the height of the crisis in late 2008, M2 soared, reflecting the various emergency liquidity measures taken by the Fed and the first round of QE beginning in November 2008. But DM4 collapsed, reflecting the economic slump, a much more useful signal. M2 surged to show growth of almost 10% in the first half of 2012, suggesting a robust recovery and even supporting some inflation concerns. DM4 was much weaker, particularly in H1 2012, correctly signalling the sluggish nature of the recovery and the need for QE3, which duly began in September 2012.

Divisia money is still growing slower than pre-2008
In the past two years DM4 has picked up a bit but at 4% y/y is still at the floor of our suggested healthy range of 4-7%. It is also well below the 6-8% range prevailing pre-2008. The recent pick-up suggests a new recession, as some have feared, will likely be avoided. But the strength of the US dollar means that some spending in the US will leak abroad. Overall the weakness of Divisia money growth combined with the strong USD supports our below-consensus GDP forecast of 1% for 2016.
Divisia and the USD

We find a good relationship between money trends and the major multi-year swings in the US dollar over the past 40 years (Figure 27). When money growth is accelerating, the trade-weighted index tends to be rising and vice-versa. The intuition here is straightforward. Accelerating money supply growth occurs when the economy is strengthening; this also tends to be when the US dollar is strong.

However the relationship between money growth and exchange rates is complex because it depends on whether the change in money growth is caused by increased money demand (as in the US case) or increased money supply (as in the case of Japan in recent years). Japan’s QE programme, promising faster money growth, led to a sharp fall in the exchange rate. Because of these complications and also because a full analysis of exchange rates requires looking at relative money growth between different countries, we leave the subject for future discussion.
Why don’t central banks use Divisia?

Despite the evidence for its usefulness, only the UK’s central bank regularly publishes Divisia data. While others have looked at it, Divisia has yet to catch on in a major way either in central banks or academic circles. Money supply is out of fashion. We think there are six reasons for this:

1. Modern economic theory, the so-called Keynesian-Neoclassical synthesis, uses only a short-term interest rate to link the financial sector to the real economy, (though this proved hopelessly inadequate in 2008 when models based on this theory had no way to incorporate a financial crisis).

2. When theorists go beyond the interest rate they tend to focus on credit more than money. Former Fed Chairman Bernanke based his prior academic career on the case that credit rather than money is the key to the economy. And the Bank for International Settlements, which is critical of standard theory, also emphasises the credit cycle rather than money trends.

3. The monetarist experiments in the late 1970s and early 1980s left an institutional distaste in many central banks for focusing on money. They believe that the inflation-targeting regime, perhaps supplemented by macro-prudential measures, is the best approach. And, with fears that money trends can be misleading, especially in the short and medium run, central banks are reluctant to draw much attention to money.

4. Concerns remain that financial innovation can confuse trends and that Divisia money might not neutralise the effect.

5. Calculations of Divisia money can be hard to explain and may appear to be a ‘black box’. See Appendix 2 for a further discussion of this issue

6. Even if Divisia money has outperformed in the past, it remains to be seen whether it can still work well with low or negative interest rates and flat yield curves. Our research suggests that it is effective, but it is early days. The case of Japan is a concern.

Conclusion – Add Divisia to your dashboard

Our findings suggest that using Divisia estimates instead of simple-sum measures significantly improves money growth as an indicator. The method of estimating makes it a theoretically more trustworthy indicator of trends in money growth and it can be used as a guide both to monetary policy stance and GDP trend.

Significant acceleration or deceleration in Divisia growth rates (2-3ppt or more) seem to presage moves up or down in the GDP growth rate. Particularly slow money growth, of 4% or below, seems to correlate with disappointingly slow GDP growth, while fast growth rates of 7% or more in developed countries (as prior to 2008) or rates of 20% or more in China and India are associated with overheating economies.

Divisia is not a magic crystal ball, but it looks like a useful indicator to monitor alongside the usual closely watched activity and survey data. We hope central banks will pay more attention as more data on the components of money supply and the interest rates they earn could improve the precision of Divisia estimates. We plan to provide regular updates and keep a close eye on Divisia.
Figure 28: China Divisia and domestic demand
% y/y, annual avg Divisia growth rate

Source: ChinaBond, National Bureau of Statistics, Standard Chartered Research

Figure 29: Euro area Divisia and domestic demand
% y/y

Source: Eurostat, Standard Chartered Research

Figure 30: India Divisia and domestic demand
% y/y, INR bn

Source: RBI, Bloomberg, Standard Chartered Research

Figure 31: Japan DM3 and nominal aggregate demand
% y/y

Source: Ministry of Finance Japan, Standard Chartered Research

Figure 32: UK Divisia and domestic demand
% y/y

Source: Eurostat, Standard Chartered Research

Figure 33: US DM4 and domestic demand
% y/y

Source: Bloomberg, Standard Chartered Research
Appendix 1: The quantity theory of money

Quantity theory used to be central to economics

Until the 1930s the quantity of money was a major focus of economics. Famous monetary theorists including Hume, Ricardo, Marshall, Fisher and Keynes (in his earlier writings) argued that a rise in the money supply led to increased economic growth in the short run, though in the long run GDP would fall back leaving only a rise in the price level. The workings of the Gold Standard were much studied and seen as operating through changes in the money supply and in wages.

The publication of Keynes’ ‘General Theory’ in 1936 transformed economic theory by suggesting that, at least in times of inadequate aggregate demand, wages might not adjust properly and even active monetary policy (freed from the constraints of the Gold Standard) might be incapable of restoring growth (Keynes 1936). Instead expansionary fiscal policy would be needed. Theory after Keynes has continued to emphasise the key role of aggregate demand. Changes in interest rates, which would influence aggregate demand, became both the instrument and measure of monetary policy, in place of the quantity of money.

The monetarist revival

For a brief period in the 1970s and early 1980s the quantity theory came back to the forefront of economics during the monetarist experiments. Central banks in the US, UK and Europe tried to target the growth of money supply with the aim of gradually bringing down high inflation without a recession. For a few years money supply releases became the most-watched economic indicator, moving markets in a way that employment or purchasing managers indices do today.

Inflation did come down (under the guidance of Paul Volcker at the Fed and Margaret Thatcher in the UK) but only at the expense of severe recessions and high unemployment. Meanwhile the targeted quantities (principally M2 in the US and Sterling M3 in the UK), proved unpredictable and unstable. Within a few years monetarism was abandoned and mainstream theory shifted back to the focus on interest rates, increasingly ignoring money supply trends.

Why did monetarism fail?

There were several reasons for the failure of monetarism. If a particular measure of money is targeted it becomes unreliable as an indicator of economic trends (known as Goodheart’s law after monetary theorist Charles Goodheart). This is because investors know it is targeted and seek to make money from the expected central bank response, which distorts the outcome. Meanwhile, during the monetarist experiments interest rates were high and volatile, again changing money demand and supply in ways that models were unable to predict. Finally the 1970s and 1980s was also the beginning of a period of rapid financial innovation, partly due to deregulation but also in response to high interest rates, high inflation and monetary targeting itself. New liquid assets appeared and holdings grew rapidly, including money market funds and various short-term securities. Central bankers lost faith in the meaning of simple measures of money supply and concentrated instead on interest rates.

In the 2010s interest rates are no longer a reliable signal

In past cycles, low interest rates were a clear signal that monetary policy was expansionary and the economy should strengthen. Today, amid fears that demand is so weak that interest rates cannot be pushed low enough, low interest rates are not necessarily a signal of coming expansion, or a reliable policy instrument.
QE and the money supply

Although central banks have actively used quantitative easing, they have generally understood this in terms of interest rates not the quantity of money, despite the name. (QE is only the modern name for what used to be called ‘open market operations’, a standard policy in the past.) In the US QE1 was widely seen as an exercise to bring down credit spreads, particularly on mortgage securities, as a way of boosting growth. It is generally seen as a major success.

QE2 and QE3, introduced when credit spreads were more normal, have been heavily criticized and remain controversial, as does ongoing QE in Japan and the euro area. Standard theory takes it that the driver of spending decisions is expected future real short-term interest rates. So QE is seen as a tool to help drive down expected future real short-term interest rates and is used alongside inflation targets and explicit forward guidance, as the BoJ and ECB do today.

Central banks have therefore looked at the impact of QE on long-term interest rates as an indicator of success, since long-term rates can be seen as the sum of future short term rates. But if QE is expected to boost growth prospects and future inflation then it should raise long-term bond yields, not cut them. So trying to gauge the success of QE by looking for a fall in bond yields is flawed.

Using money supply to judge QE effectiveness

Since bond yields are misleading, a better approach theoretically is to look at the impact on money supply. Here some analysts made a basic mistake. They saw the rise in the monetary base, which is caused by QE (on essentially a one-for-one basis), as hugely inflationary. But the monetary base consists largely of reserves tucked away at the central bank. These excess reserves have no influence on the economy (and are not included in money supply measures such as M1 to M4). Classical theory is quite clear that these broader measures, that is money in circulation, are what matters.

QE only directly increases the money supply (M1 upwards) in two circumstances. One is if the bonds are purchased from non-bank entities such as pension funds or insurance companies, in which case the central bank pays the seller in newly created money. The other is if the bonds are purchased from banks and the banks respond with new lending and/or purchases of securities from non-banks. Unfortunately, if central banks purchase bonds from banks who simply replace them with reserves at the central bank, there is no increase in broad money and no economic effect.

In principle, a good way to measure whether QE is effective is to see whether broad money is expanding. Bear in mind that if the private sector is deleveraging or banks are ultra-conservative, broad money could decline. As people repay bank loans or banks raise their capital ratios banks shrink both their assets and liabilities. Hence QE has to be enough to offset this if money supply is to rise. As discussed above, our findings are that money supply growth, properly measured by Divisia, has picked up but remains well below pre-2007 levels. This suggests that QE has played an important role but more may be needed.
Appendix 2: Calculating Divisia money

Calculating Divisia

Divisia money is calculated as a weighted average of the growth rate of the different components of money supply. The weights for the components are determined by their usefulness for making transactions, which is proxied by the user cost of holding these assets.

The user cost of a component is measured by the difference between the benchmark rate, which is the post-tax interest rate paid on balances with no use for transactions, and the post-tax interest rate paid on the component balance. Divisia money supply growth is therefore calculated as follows:

$$\frac{\Delta D_t}{D_{t-1}} = \frac{1}{N} \sum_{i=1}^{N} \frac{W_{i,t}}{M_{i,t-1}} \left( \frac{\Delta M_{i,t}}{M_{i,t}} - r_{i,t} \right)$$

Where:

- $M_i$ = the level of the $i$th money holding
- $W_i$ = the weight on the $i$th component
- $r_B$ = the rate on the benchmark asset
- $r_i$ = the rate on the $i$th asset

Figure 40: Definitions of money supply

Lowest measure of money supply that includes component

<table>
<thead>
<tr>
<th>Component</th>
<th>China</th>
<th>Euro area</th>
<th>India</th>
<th>Japan</th>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency in circulation</td>
<td>M0</td>
<td>M0</td>
<td>M0</td>
<td>M0</td>
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<td>M0</td>
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<td>Demand deposit/other checkable deposits</td>
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<td>M1</td>
<td>M1</td>
<td>M1</td>
<td>M4</td>
<td>M1</td>
</tr>
<tr>
<td>Savings deposits</td>
<td>M2</td>
<td>M1</td>
<td>M1</td>
<td>M1</td>
<td>M4</td>
<td>M3</td>
</tr>
<tr>
<td>Time deposits</td>
<td>M2</td>
<td>M3</td>
<td>M1</td>
<td>M4</td>
<td>M4</td>
<td>M3</td>
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<tr>
<td>Foreign currency deposits</td>
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<td></td>
<td></td>
<td></td>
<td>M3</td>
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<td>Other deposits</td>
<td>M2 (deposits redeemable at a period of notice up to 3 months)</td>
<td>M2 (quasi-money)</td>
<td>M4</td>
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<td>Money market funds</td>
<td>M3 (SC)</td>
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<td></td>
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<tr>
<td>Repurchase agreement</td>
<td>M3</td>
<td>M4</td>
<td>M3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Postal savings deposit</td>
<td>M2 (post office savings deposits), M4 (other post office deposits)</td>
<td>M3</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Certificate of deposit</td>
<td>M3</td>
<td>M4</td>
<td>M2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Debt instruments</td>
<td>M3 (SC): Central bank bonds, Policy bonds, Commercial bank bonds, corporate bonds, commercial paper, T-bills, M4 (SC): Treasury bonds, local government</td>
<td>M3 (debt securities up to 2 years)</td>
<td>M4 (bonds, commercial paper, FRNs, instruments of up to and including five years original maturity, bank bills) , M4 (commercial paper), M4 (T-bills)</td>
<td></td>
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</tbody>
</table>

Source: Standard Chartered Research
### Divisia money growth produced by Standard Chartered Bank (SC)

#### Figure 41: China

<table>
<thead>
<tr>
<th>Money supply</th>
<th>Components</th>
<th>Interest rate for Divisia calculation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 (official)</td>
<td>Currency in circulation</td>
<td>Assumed zero</td>
<td>People’s Bank of China</td>
</tr>
<tr>
<td>M1 (official)</td>
<td>M0 Corporate demand deposits</td>
<td>Corporate demand deposit</td>
<td>People’s Bank of China</td>
</tr>
<tr>
<td>M2 (official)</td>
<td>M1 Corporate deposits Personal deposits Other deposits</td>
<td>3-month time deposit</td>
<td>People’s Bank of China</td>
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<tr>
<td>M3 (SC)</td>
<td>M2 Central bank bonds Policy bank bonds Commercial bank bonds Corporate bonds Commercial paper Money market funds</td>
<td>Central bank bill rate Inter-bank policy bank bond yield Inter-bank commercial bank bond yield Chinabond corporate bond yield Inter-bank commercial corporate bond yield One-day interbank repo-rate</td>
<td>China Central Depository and Clearing Corporation Limited</td>
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<tr>
<td>M4 (SC)</td>
<td>M3 Treasury bonds Local government bonds</td>
<td>Inter-bank treasury bond yield Chinabond local government security yield</td>
<td>China Central Depository and Clearing Corporation Limited</td>
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</table>

Benchmark rate: Short term corporate bond yield + 100 bps

Source: Standard Chartered Research

#### Figure 42: India

<table>
<thead>
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<th>Money supply</th>
<th>Components</th>
<th>Interest rate for Divisia calculation</th>
<th>Source</th>
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<td>Currency in circulation</td>
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<td>Reserve Bank of India (RBI)</td>
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<td>M1 (official)</td>
<td>M0 Deposit money of the public (includes demand deposits with Banks and other deposits with Banks)</td>
<td>Prime lending rate</td>
<td>RBI</td>
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<td>M2 (official)</td>
<td>M1 + Post Office Savings Deposits</td>
<td>Post Office savings Bank account rate 1 year time deposit rate Average of 1yr and 3 yr time deposit rates 3 yr time deposit rate 5 yrs and above time deposit rate</td>
<td>RBI</td>
</tr>
<tr>
<td>M3 (official)</td>
<td>M1 + time deposits with banks</td>
<td></td>
<td>State Bank of India</td>
</tr>
<tr>
<td>M4 (official)</td>
<td>M3 + total Post Office deposits</td>
<td>Post Office time deposit account rate</td>
<td>RBI</td>
</tr>
</tbody>
</table>

Benchmark rate: Prime lending rate

Source: Standard Chartered Research

#### Figure 43: Euro area

<table>
<thead>
<tr>
<th>Money supply</th>
<th>Components</th>
<th>Interest rate for Divisia calculation</th>
<th>Source</th>
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<tbody>
<tr>
<td>M1 (official)</td>
<td>Currency in circulation Overnight deposits</td>
<td>Currency rate assumed zero Overnight deposit rate</td>
<td>European Central Bank (ECB)</td>
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<tr>
<td>M2 (official)</td>
<td>M1 Deposits with agreed maturity of 2 years Deposits redeemable at a period of notice up to 3 months</td>
<td>The rate on deposits with agreed maturity of 2 years The rate on deposits redeemable at notice of up to three months</td>
<td>ECB</td>
</tr>
<tr>
<td>M3 (official)</td>
<td>M2 Repurchase agreements Money market funds Debt securities up to 2 years</td>
<td>The rate on repurchase agreements Eonia rate BoA Merrill Lynch 1-3 year Euro Financial Index</td>
<td>ECB Bloomberg</td>
</tr>
</tbody>
</table>

Benchmark rate: BoA Merrill Lynch 1-3 year Euro Financial Index + 100 bps

Source: Standard Chartered Research
Figure 44: Japan

<table>
<thead>
<tr>
<th>Money supply</th>
<th>Components</th>
<th>Interest rate for Divisia calculation</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>M0</td>
<td>Currency in circulation</td>
<td>Assumed zero</td>
<td>Bank of Japan</td>
</tr>
<tr>
<td>M1</td>
<td>Currency in circulation + demand deposits</td>
<td>Assumed zero</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>M1 + quasi-money (household)</td>
<td>2-3 yr deposit rate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quasi-money (corporate)</td>
<td>3m deposit rate</td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>M2 + CDs</td>
<td>CD rate</td>
<td></td>
</tr>
</tbody>
</table>

Benchmark rate Average rate on short-term loans, city banks

Source: Standard Chartered Research

Divisia money growth produced by others

Figure 45: UK

<table>
<thead>
<tr>
<th>Money supply</th>
<th>Components</th>
<th>Divisia</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 (official)</td>
<td>Currency in circulation</td>
<td></td>
</tr>
<tr>
<td>M4 (official)</td>
<td>Deposits (including certificate of deposits)</td>
<td>Divisia M4 produced by Bank of England</td>
</tr>
<tr>
<td></td>
<td>Commercial paper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bonds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRNs and other instruments of up to and including five years of original maturity issued by UK MFIs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Repos</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bank bills</td>
<td></td>
</tr>
</tbody>
</table>

Source: Standard Chartered Research

Figure 46: US

<table>
<thead>
<tr>
<th>Money supply</th>
<th>Components</th>
<th>Divisia</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 (official)</td>
<td>Currency in circulation</td>
<td></td>
</tr>
<tr>
<td>M1 (official)</td>
<td>Demand deposits</td>
<td></td>
</tr>
<tr>
<td>M2 (official)</td>
<td>M1</td>
<td>Centre for Financial Stability produces Divisia M1, Divisia M2, Divisia M3 and Divisia M4</td>
</tr>
<tr>
<td>M3 (Centre for Financial Stability)</td>
<td>Large time deposits</td>
<td></td>
</tr>
<tr>
<td>M4- (Centre for Financial Stability)</td>
<td>Commercial paper</td>
<td></td>
</tr>
<tr>
<td>M4 (Centre for Financial Stability)</td>
<td>T-bills</td>
<td></td>
</tr>
</tbody>
</table>

Source: Standard Chartered Research
Practical problems in calculating Divisia money

While we have made every effort to calculate useful data there are some practical difficulties in estimating Divisia, where more central bank data could help:

1. **Data availability issues.** Full breakdowns of different instruments and their interest rates are not always available, especially for long time series. Sometimes simplifying assumptions have to be made, for example applying the interest rate on one-year time deposits to all time deposits.

2. **Bundled services.** The interest rate may not always be the full return on a particular instrument. For example checking accounts often provide free transaction services and automatic overdraft facilities. Time deposits sometimes have complex introductory teaser rates or even gifts (from toasters to telephone minutes).

3. **Choice of the benchmark interest rate.** The Benchmark interest rate is often difficult to choose or not easy to fully justify. That said, Divisia growth money trends (if not rates) are not unduly sensitive to this because what matters is the relative moneyness of each asset.

4. **No allowance for adjustment time and costs.** As discussed above, when interest rates change, Divisia money automatically changes the weights on components but in practice, asset holdings are only adjusted over time, which may be partly due to inertia and partly to costs of switching. Divisia assumes that assets holdings are always at their desired values. This means that trends in Divisia can only be watched over time; short-term moves may be misleading.

---

**Figure 47: Divisia and our forecasts**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>15.4</td>
<td>14.2</td>
<td>6.8</td>
<td>6.5</td>
</tr>
<tr>
<td>Euro area</td>
<td>7.7</td>
<td>3.5</td>
<td>1.4</td>
<td>1.6</td>
</tr>
<tr>
<td>India</td>
<td>11.8</td>
<td>10.3</td>
<td>7.6</td>
<td>7.4</td>
</tr>
<tr>
<td>Japan</td>
<td>3.5</td>
<td>2.9</td>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>5.4</td>
<td>5.2</td>
<td>1.9</td>
<td>2.1</td>
</tr>
<tr>
<td>United States</td>
<td>3.8</td>
<td>3.3</td>
<td>1.0</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Source: Standard Chartered Research
References


Barnett W and Biyan Tang, 'Chinese Divisia Monetary Index and GDP Nowcasting', University of Kansas and Centre for Financial Stability, New York, October 2015.


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Special Report – Economics: Money supply – The forgotten indicator

The forgotten indicator

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Special Report – Economics: Money supply – The forgotten indicator

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