

Global Economic Outlook

4TH QUARTER 2015 | ECONOMIC SCENARIOS UNIT



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Slowdown in global growth in 2015, with a limited improvement in 2016. Adjustment among the emerging markets and a risk of only slow recovery among the developed economies

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Central banks: room to act among the developed economies and China, but dilemmas among the emerging economies

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Real commodity prices, a preliminary analysis of their long-run trends

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Closing date: 10 November 2015

1 Editorial

The outlook for global growth has deteriorated in the past three months. According to our estimates, global GDP grew 3.4% in 2014, and will only expand 3.2% in 2015 and 3.5% in 2016, barely reaching the average of the past five years.

For the first time since the 80s, in 2011-15 there has been a simultaneous deceleration in GDP growth in the DMs and in the aggregate of the emerging economies. Above all, the exhaustion of the growth model in China, now the biggest economy in the world, is having an impact on the external demand of other EMs, particularly the commodity exporters and the economies that are more closely integrated with China into global value chains. **Any prospective improvement in global GDP growth from 2016 onwards will have to be supported by an improvement in the DMs, once they have digested the huge amount of debt built up by the private sector in the prior expansion.** For there to be sustainable GDP growth, productivity has to increase – to some extent driven by economic growth itself – given the secular downwards trend in population growth. While we acknowledge that improvements in GDP growth could be fostered by structural reforms that increase supply, we also have to assume that in this scenario China will manage the first deceleration in economic growth in its recent history without any serious mishap. However, as **has been the case since 2009, the risks remain skewed to the downside.**

First, **private-sector deleveraging in the DMs varies** by geography, and is more advanced in the US and in Japan, and less so in Europe. In addition, the stock of private-sector debt remains high, supported by swollen central-bank balance sheets and anchored interest rates. Second, the slowdown in the globalisation process – itself a reflection of increased restrictions on trade flows and the tsunami of regulation in the banking sector - is a worrying aspect, partly due to the impact that this could have on credit and economic activity.

The lack of inflationary pressures in the DMs and in those EMs with idle capacity and ample domestic savings (principally China) is another characteristic of the current scenario. This **gives their central banks unprecedented scope for intervention**, which can hold their policy rates low, and will continue to do so for the foreseeable future. **Meanwhile, it appears that the Fed is comfortable with raising rates more slowly, and that the ECB will introduce additional measures**, which will avoid the resulting euro appreciation in the absence of Fed action. In contrast, EM central banks seeking stable prices and having flexible exchange rates also have to keep an eye on the anchoring of inflationary expectations and the risks to their foreign-currency balances, particularly at the corporate level. As long as the former remain tilted to support growth, the latter should be able to deal with this dilemma.

Nonetheless, there are solid arguments on both sides of the current debate about the impact of the quantitative easing policies in place in the DMs, which are intended to encourage private-sector risk-taking. In particular, whether they are less effective than before or whether a greater stimulus could have been more effective by having pushed real interest rates even lower. What does seem clear is that in the absence of reforms to increase productivity, these policies are less efficient than they would have been if accompanied by said reforms. It remains significant that the European countries that have introduced supply-side reforms, principally the euro-area peripherals, are those that are posting the strongest growth in the region.

In any case, this scenario of interest rates at all-time lows together with central-bank balance-sheet expansion cannot continue for ever. If growth returns, there will be a mild increase in rates to “normal” levels, which could be slightly lower than in the past due to the supply restrictions noted above. But should the DM recovery fail to gather momentum, if China’s economy has a much harder landing than anticipated, or disruptive geopolitical events emerge, financial tensions would return in force in a context where monetary policy actions have been exhausted. Any other options would need to be even more imaginative. This scenario is very unlikely, but it is a risk.

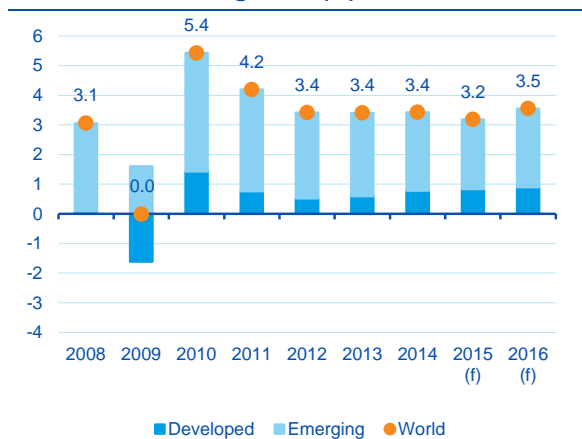
2 Slower global growth in 2015 and a limited improvement in 2016

According to our estimates¹, **global GDP has grown more slowly than we forecast and at a similar rate to that observed at the beginning of the year (+0.6% QoQ, +2.4% YoY)**, making four consecutive quarters of growth below the 2010-14 average. **At a global level, activity has performed worse than expected in the past few months, mainly due to the ongoing deceleration in the principal emerging economies**, in a context in which doubts over the strength of the economic cycle and the financial stability of China have triggered a significant spike in financial tensions and further corrections in commodity prices.

The balance of the first half of the year and the negative bias in the available activity indicators for the third quarter in geographies such as the US, Latin America and Mexico have been accompanied by a **downward revision of the growth forecasts for the principal emerging economies for the full year**. As a result, global GDP growth could close 2015 at an annualised 3.2% (0.2% less than we forecast three months ago), the lowest since 2009 (see Figure 2.1). The gradual recovery of the developed block will not be sufficient to offset the moderation in the emerging, given that the latter will grow barely 4% compared with average growth in the five previous years of more than 5.5%.

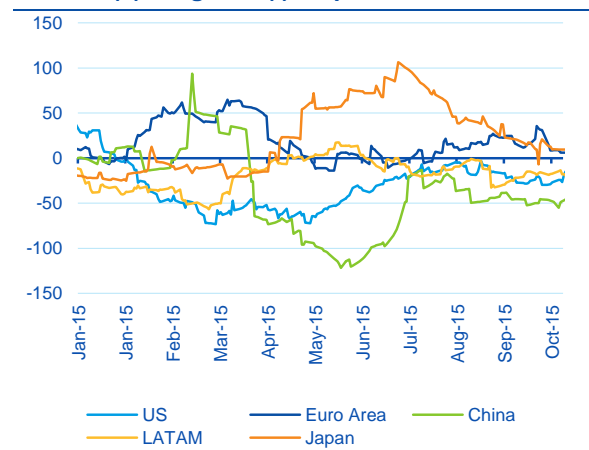
The outlook for 2016 is slightly more favourable (global growth could recover to 3.5%, 0.3% below our forecast three months ago), sustained by a better relative performance of both the developed and the emerging economies. Nevertheless, **the recent intensification of some of the risk spots with greater impact at a global level**, such as the deceleration of the manufacturing sector in China and its repercussions on the commodity cycle and world trade, **increases the uncertainty and accentuates the downside risks** for the recovery of those countries which are more dependent on external demand and savings. **The potential deterioration in the medium-term growth outlook of developed economies such as the US is another factor to take into account in the outlook for global growth.**

Figure 2.1
World GDP: annual growth (%). Forecasts 2015-16



Source: BBVA Research

Figure 2.2
Economic Surprise Index
Positive (+) / negative (-) surprises



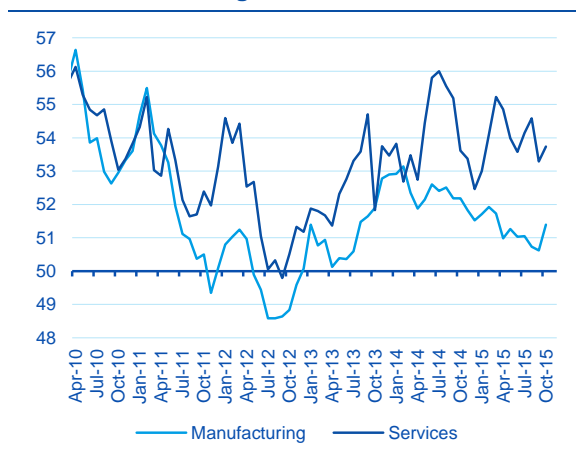
Source: BBVA Research and Citigroup

1: Estimate based on BBVA Research's global activity indicator. Methodology detailed at <http://bit.ly/1nI5RIn>

In contrast to other recent episodes, the intensity of the deceleration in the emerging block is the determining factor in the loss of momentum of world growth. The Economic Surprise Indices (Figure 2.2) for China, which is growing at less than 7% YoY, and Latin America, in contraction, are reflected in negative level practically since the beginning of the second half of 2015. For the time being, the recovery in domestic demand and the continuation of easing monetary conditions are limiting the impact of the correction in the emerging block on the principal developed economies, and in particular on the eurozone. However, the moderation of the business sentiment indicators in recent months, together with the stabilisation of growth in the US at slightly lower levels than we anticipated, are evidence that the differentiation between the economic blocks is starting to narrow, and that the risk of contagion could increase if the momentum of the recent deterioration in the emerging countries continues.

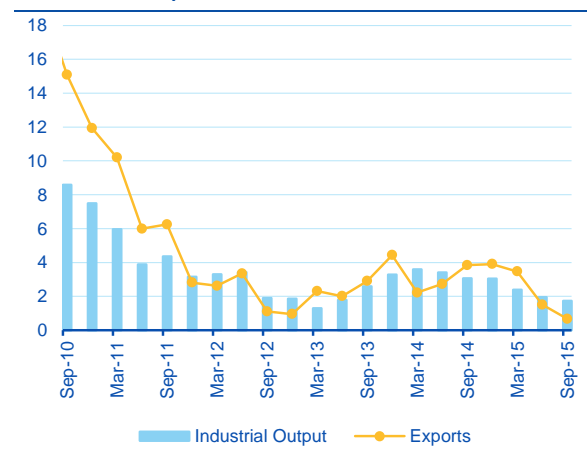
The divergence between the evolution of activity in the industrial and services sectors, which is favourable to the latter, is equally representative of the nature of the moderation of the global economic cycle. The progressive deceleration of the business confidence index for the manufacturing sector, which in September was close to levels compatible with a stagnation of activity, is in contrast to the services business confidence indicator, which remains in the expansion zone. This is reflected in global industrial production growth of less than 2% YoY in August (the slowest pace of growth since the beginning of 2013) and in a sharp deceleration of goods exports (in August, these were barely higher than a year ago). In contrast, retail sales growth in the US and in the eurozone have managed to stabilise at around 2% YoY (although, in the first case, this is a deceleration compared to the pace of growth in mid-2014), and in China, retail sales growth has also stabilised at 10%. This performance has been driven by the support provided by domestic demand in the developed economies block, partly thanks to help from factors such as the correction in the oil price and falling interest rates, and the increased weight of services in the demand of some emerging economies, such as China.

Figure 2.3
World manufacturing and services PMIs



Source: BBVA Research and Markit

Figure 2.4
World: industrial output and exports of goods (% YoY, quarterly frequency) at August 2015 (latest available data)



Source: BBVA Research and CPB

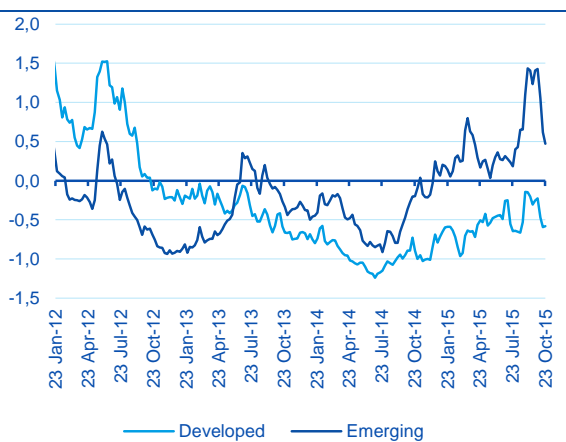
All in all, the stabilisation of commodity prices at low levels and the sustained rise in financial tensions in the emerging economies - accompanied by heavy capital outflows, sharp currency depreciation and a widening of sovereign spreads - are evidence that the balance of global risks is still to the downside.

The slowdown of demand appears to be the principal justification against the increased supply in order to explain the fall in oil prices from USD65/bbl in the middle of the year to a level below US\$50/bbl in October. The oil price dynamic is similar to that of other commodities such as copper and aluminium,

which is consistent with the existence of a common factor linked to the slowdown in demand. This is one of the elements that underlie the deterioration in the growth outlook for geographical areas such as Latin America, as well as for the energy and industrial sectors in the US, and which are obviously helping to maintain perceptions of financial risk at high levels in the whole emerging block. It is worth noting that the transition from a growth model based on the rising commodity cycle, the financial instability brought about by capital outflows and the potential impact of such substantial currency depreciation on inflation expectations constitute relevant sources of vulnerability.

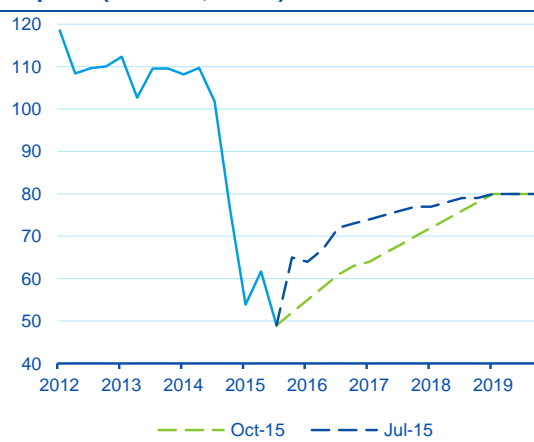
Since the end of 2014, the BBVA Financial Tensions Index of Emerging Markets has been at levels above the average of the last decade, retracing the all-time high for 2011 in October 2015 (Figure 2.5), and its highest levels since the financial crisis in 2008-09. The correction, triggered by China, has eventually extended to the principal economies, and even more particularly to Latin America, with these two geographies accounting for the bulk of the net capital outflows from the block which, at the end of October, had reached a similar amount to the outflows in the early months of 2013 (Fed's taper tantrum). The most significant spikes have been in countries most exposed to the commodity cycle and with greater external vulnerability, in terms of both deficit on the current account and foreign currency-denominated private-sector financing. **Idiosyncratic factors, such as political uncertainty and the existence of geopolitical risks in Brazil and Turkey, have reinforced the lack of confidence and accentuated the increase in financial volatility. As in other similar episodes of reallocation of capital flows and risk aversion, the financial assets of the developed economies have acted as safe havens, putting downward pressure on long-term public debt yields.**

Figure 2.5
BBVA Financial Tensions Index



Source: BBVA Research

Figure 2.6
Oil price (USD/bbl, Brent) and forecasts



Source: BBVA Research and Haver

The context of lower global growth and moderating commodity prices has put further downward pressure on prices and inflationary expectations in the medium term in the developed markets. This, together with the potential risks which would come hand in hand with a more pronounced correction of activity in China, has altered the **monetary policy strategy** expected of the principal central banks in the developed world. Specifically, the Fed did not raise its reference rate in September as had been expected, due to the financial instability observed during the summer months and the doubts about the cyclical strength of the emerging economies and the potential impact of this on the US recovery. Given the Fed's data-dependent strategy, the probability of a rate hike before the year-end depends on any new information and what conclusions the central bank draws from it. The meeting on 27 October once again reinforced the prospect of a hike in December, which remains the most probable (although highly uncertain) outcome. The delayed start to the Fed's monetary policy normalisation has had an impact on monetary conditions in the eurozone via the exchange rate which, together with the concerns about the slow convergence of inflation

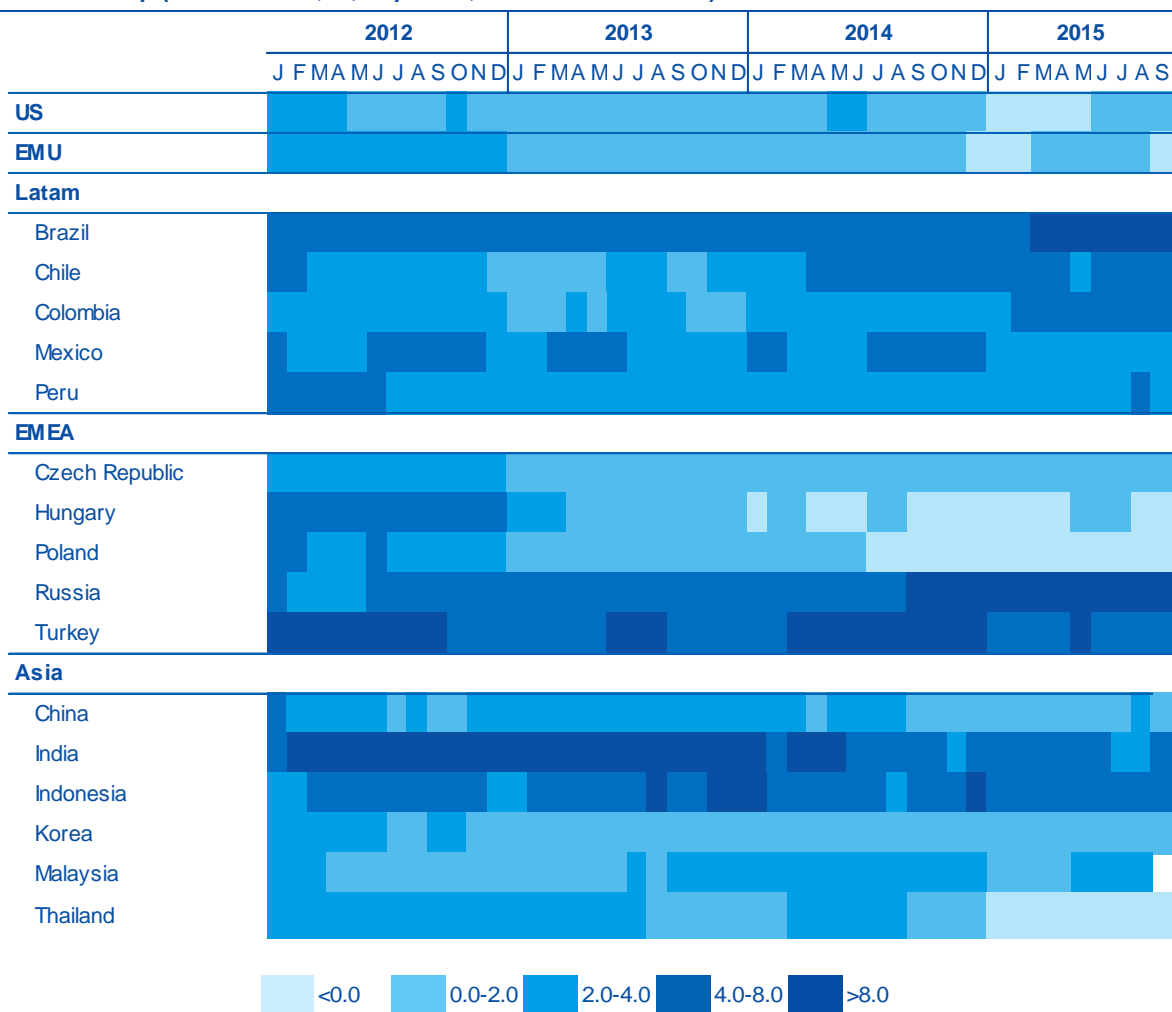
towards 2%, has triggered the ECB's announcement of possible additional stimulus measures. Both the decline in inflation and the recent appreciation of the euro are restricting the improvement in financial conditions brought about by the quantitative easing programme.

The emerging block's central banks are faced with the dilemma of dealing with the weakness of the economic cycle, while simultaneously anchoring inflation expectations (the currency depreciation is starting to translate into higher prices in some countries) **and the stability of their capital accounts.** As a result, and depending on the room for manoeuvre provided by the levels of real interest rates, some central banks have decided to lower their reference rates (this is the case in China, and also India and Korea). Meanwhile others, principally in Latin America (Chile, Colombia and Peru), have opted for monetary tightening due to the risk of inflation, which is consolidating above their target ranges. **In future, and independent of idiosyncratic factors, emerging central bank action will continue to be largely conditioned by the Fed's response** - whether it decides to introduce the first rate hike in December or to delay it even longer - and on any new monetary stimulus measures introduced by the ECB and/or the Bank of Japan.

Much of the recent stabilisation observed in risk assets and the capital inflows into emerging countries is precisely in response to the expectation that the principal central banks will maintain or reinforce their policies in support of the economic cycle: in the case of China to avoid a hard landing and in the case of the Fed and the ECB to support the recovery in a more uncertain external environment, with growing disinflationary pressures, little room to adopt counter-cyclical fiscal policies and restrictions on introducing structural reforms to kick-start sustained growth.

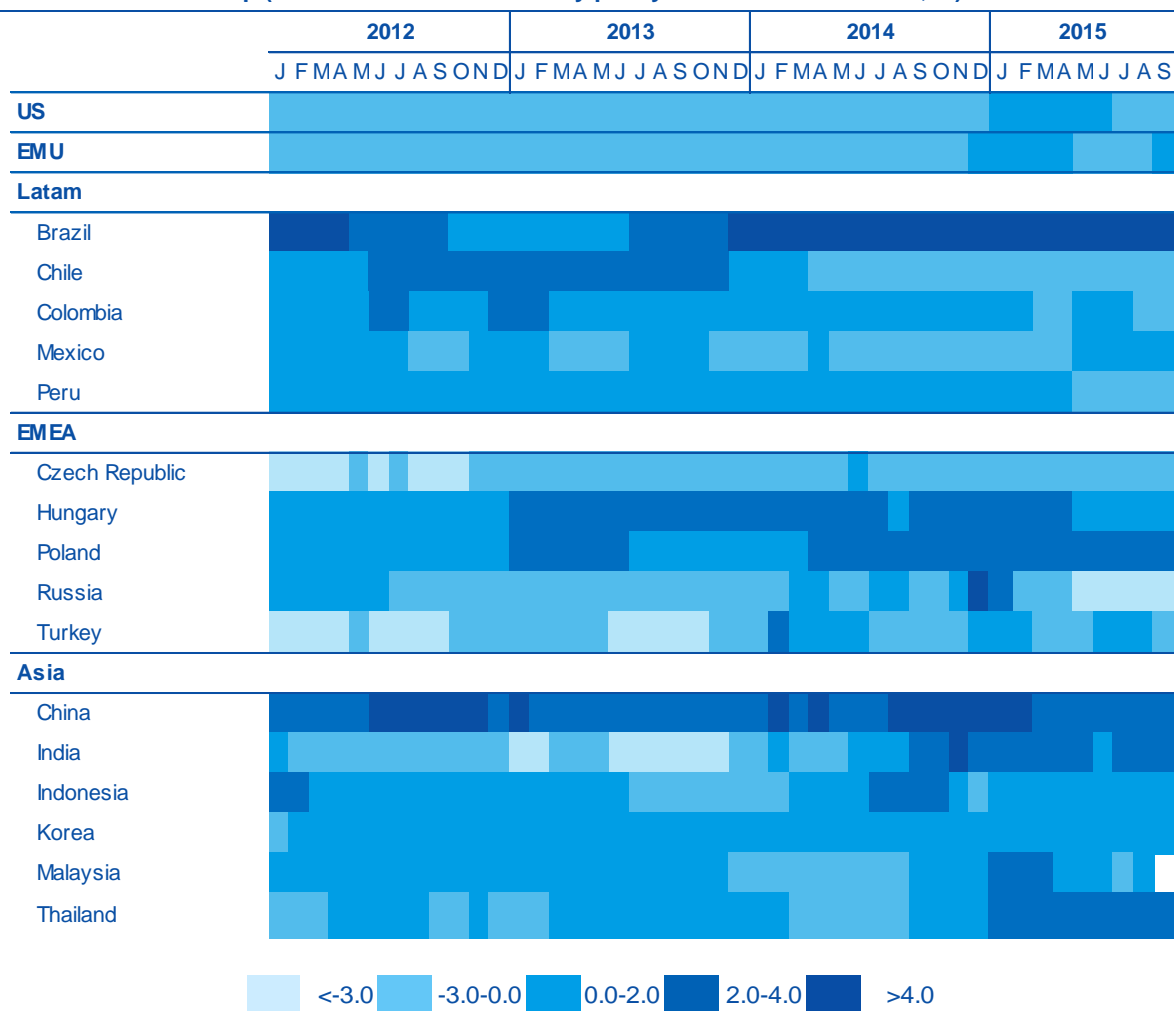
Even when monetary policy could mitigate the impact of a scenario of slower growth on global financial conditions, the scope it has to kick-start the economic cycle is reduced, taking into account the low levels of interest rates and the high volume of liquidity already in existence. **The combination of a financial shock in China, which takes the annual growth of that economy well below 6%, with an even slower recovery of the developed economies block than observed to date is a significant risk scenario, both because of its plausibility (limited, but not negligible) and its severity, given its potential impact on the world economy.**

Figure 2.7
Inflation heat map (headline rate, %, Sep 2015, latest available data)



Source: BBVA Research and Haver

Figure 2.8
Real interest rate heat map (reference rates of monetary policy less headline inflation, %)



Source: BBVA Research

USA: downwards revision to GDP growth expected for 2016 due to the deterioration in the external environment

As regards the detailed analysis of the principal economies, note the **stabilisation of economic growth in the US at lower rates** than in other recovery episodes. After the positive surprise in activity in the second quarter, that made up for the bad start to the year, GDP growth could close the third quarter at 1.5% YoY (vs. the 3.9% of the three preceding months) and maintain this pace of growth until the end of 2015.

Private consumption remains key to the healthy momentum of economic recovery, although the slower growth of employment in recent months and the moderate wage increases reduce its potential to increase the contribution to domestic demand and offset **the drops in both exports and investment in the energy sector** (the fall in production and the erosion of oil companies' profitability anticipate a sharper correction in investment in the sector). The rhythm of improvement in residential investment does not guarantee any substantial recovery in domestic spending in the short term.

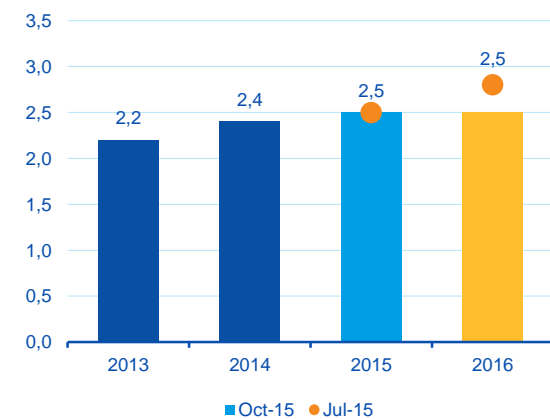
Also, the increasing weight of the emerging economies in US trade (exports to China, Mexico, Brazil and Chile account for slightly more than 25% of the total), together with the accumulated dollar appreciation since

the end of 2014, will continue to have a negative impact on US exports. For all the above reasons, **GDP growth could reach 2.5% in 2015 (in line with our forecast last quarter) and repeat this figure in 2016, which would imply a downwards revision of 0.3% vs. the previous forecast.**

The risks for the US economy in a more unfavourable global environment are determining the Fed's reaction function, in deciding to hold interest rates unchanged in September. These risks affect economic growth but also inflationary expectations: the correction of import prices pushed headline inflation back down to 0% in September, while core inflation (excluding housing) stood at 1%. The impact of dollar appreciation on exports is another factor to take into account, as is the uncertainty regarding the effect of higher interest rates in the US on global financial conditions.

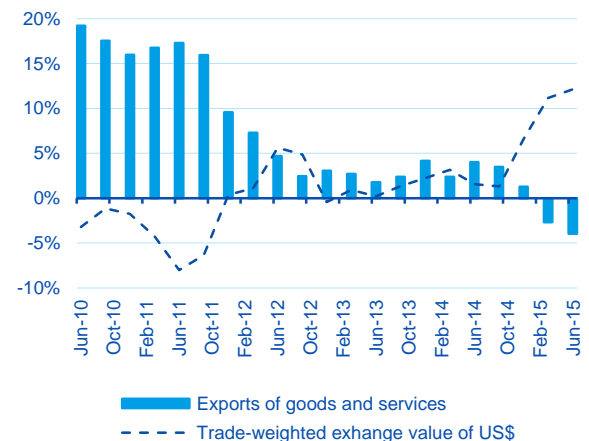
Although the Fed's communication strategy continues to emphasise the need to adapt the monetary tightening scenario to the flow of economic data, the lack of consensus among the FOMC members regarding whether to raise rates before the year-end or wait until 2016 has increased. In any case, the pace of rate increases is expected to be very gradual, probably reaching levels at end-2016 below those that we expected a quarter ago, and no higher than 1%. **The downward adjustment of economic growth forecasts beyond 2016 to rates slightly below 2.5% and inflation rates converging gradually towards 2.0% also justify a scenario of interest rates anchored at historically low levels.** Against this backdrop, the dollar would remain relatively strong vs. the principal currencies, due to the divergences in monetary policy strategy between the other central banks in the developed world (with possible increases in monetary stimulus on the part of the ECB and the Bank of Japan), and the vulnerabilities of the reference emerging economies.

Figure 2.9
USA, economic growth, % annual change



Source: BBVA Research

Figure 2.10
US exports and USD exchange rate, % YoY



Source: BBVA Research and Haver

China: upwards revision of GDP growth expected for 2015, although this will not dispel the uncertainties over the pace of future economic deceleration

China's cyclical position is obviously one of the principal variables to watch at a global level. The sharp stock market correction in August served as a warning of the risks posed by a financial shock in the country of a severity to compromise the growth in domestic spending. The magnitude of the capital outflows and the spike in financial volatility resulted in the introduction of a considerable battery of monetary policy measures directed at easing the deterioration in liquidity and its potential impact on the financing model of the corporate sector, which is heavily leveraged. The **unexpected official announcement regarding the**

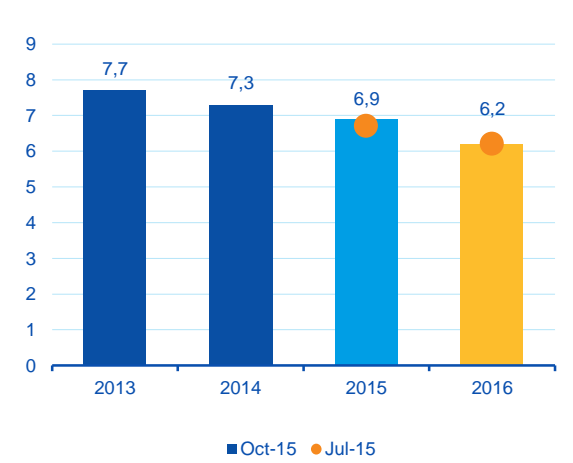
daily yuan exchange rate and the **progressive cuts in reference rates** fall into the same context, and are also characterised by a progressive deceleration of economic activity, which has taken GDP growth below 7% YoY in the third quarter.

Irrespective of the reliability or otherwise of national accounts statistics, what is clear is that the advance indicators of activity and business confidence reveal that **China has entered into a new phase of slower growth, led by the adjustment of the manufacturing sector, and one in which services are acquiring increasing importance** (in 2015, services represent 48% of GDP, 7pp more than in 2006) which, nonetheless, is not enough to make up for the contraction in industrial activity. The transition towards structurally lower rates of growth has relevant consequences for the global economic cycle, as is already being reflected in the performance of commodities and goods trade. At the domestic level, the persistent fall in producer prices since the beginning of 2012, together with the moderation of inflation towards 2% (both headline and core), is representative of the economic adjustment process in China.

The revision of earning expectations for quoted Chinese corporates, together with the increase in their leverage ratios and the moderation in bank credit, increase the risks of a more acute deterioration of domestic spending that observed to date. In addition, note that the extreme concentration of corporate debt in the hands of the most highly-leveraged companies (including public-sector companies) and those with greater exposure to the internal cycle (construction and the real estate market)² increases the vulnerability of the private sector – including the private-sector banks – to a financing shock and lower earnings.

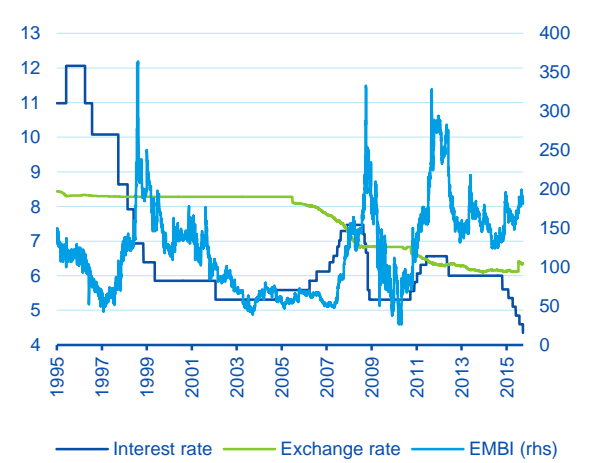
It seems that the authorities will continue to employ monetary stimulus measures (further interest-rate cuts have not been ruled out, in spite of the fact that there have already been five such cuts in the year to date) and to exploit the central government’s scope to use fiscal policy to ensure that economic growth does not fall below 6% YoY. **Our forecasts suggest GDP growth of 6.9% for 2015 and 6.2% for 2016, with inflation at 1.6% and 2.0% respectively.**

Figure 2.11
China, economic growth, % annual change



Source: BBVA Research

Figure 2.12
China: reference rate (%), USD/RMB exchange rate and sovereign spread (EMBI, bp)



Source: BBVA Research and Haver

2: See Corporate Leverage in Emerging Markets: a concern? IMF Global Financial Stability Report, October 2015.

Eurozone: resilient domestic demand with the ECB ready to avoid further declines in inflation

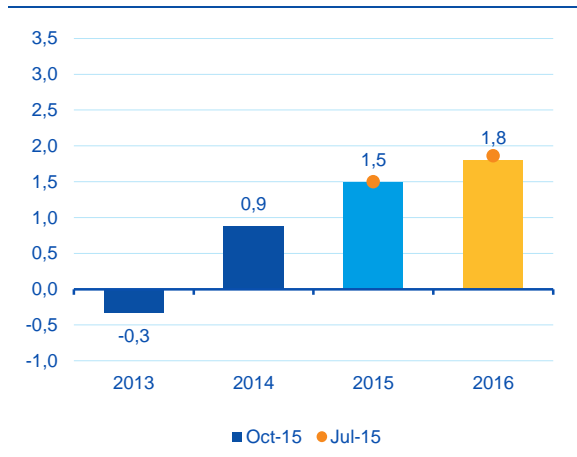
In the eurozone, the economic recovery continues although the pace has not intensified as we anticipated three months ago. The rate of QoQ GDP growth has stabilised at 0.3-0.4%, supporting the expectation that annual growth could reach 1.5% in 2015 as a whole. **The fall in the oil price, low interest rates and the incipient recovery in new flows of credit to the private-sector underlie the improvement in domestic demand (in particular, in consumption).** There continues to be very little improvement in fixed capital investment, despite the positive signals given by the business confidence indicators and the easier financing conditions. The relatively good performance of exports of goods in the area as a whole is in contrast to the more sluggish performance of world trade – which is, in turn, partly due to the fact that 60% of eurozone trade is with developed countries. Euro depreciation could also be favouring the competitiveness of exports.

Although **the area’s balance of risks to growth remains tilted to the downside**, due to both the uncertainties regarding the world economic cycle and the persistence of elements of idiosyncratic vulnerability (principally political instability associated with the electoral processes underway and some delay in the implementation of structural reforms in some key economies), the pace of **eurozone GDP growth could increase to 1.8% in 2016** (less than 10bp less than we expected last quarter). **Italy and France, where growth rates have remained low in 2015, should explain the improvement in the overall figure**, which has so far been sustained by the recovery in the peripheral economies.

In spite of this, the improvement in activity will continue to be gradual and will not come hand in hand with an upturn in inflationary expectations. At present, inflation figures are still responding to the fall in oil prices during recent months, such that the headline rate should remain at close to 0% until the end of this year, and close to 1% in 2016. For the time being, core inflation has stabilised at slightly below 1%.

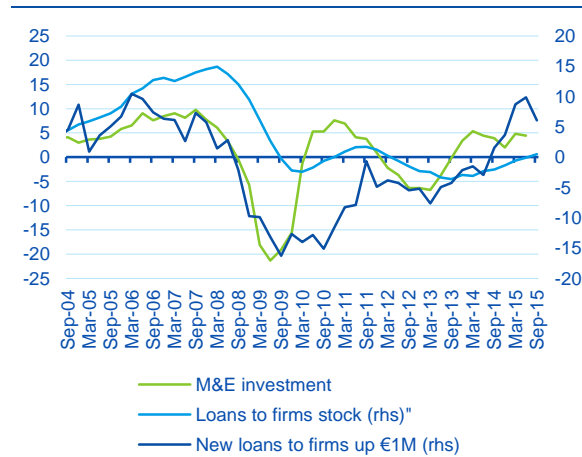
The accentuation of the risks to the downside to inflation forecasts, largely due to cheaper imported goods, **together with the recent appreciation of the euro, once again raises the question as to how much room for improvement there is in monetary conditions in the eurozone. The ECB is extremely sensitive to this scenario, and this would justify the adoption of new stimulus measures in the short term.** The combination of further reference rate cuts (probably the marginal deposit facility) and the expansion of the debt purchase programme (in terms of length and/or the amount of liquidity injected) will be in an endeavour to anchor long-term interest rates at low levels for longer, together with some euro depreciation to contain the deflationary pressures.

Figure 2.13
Eurozone, economic growth, % annual change



Source: BBVA Research

Figure 2.14
Eurozone: investment and bank lending (% YoY)



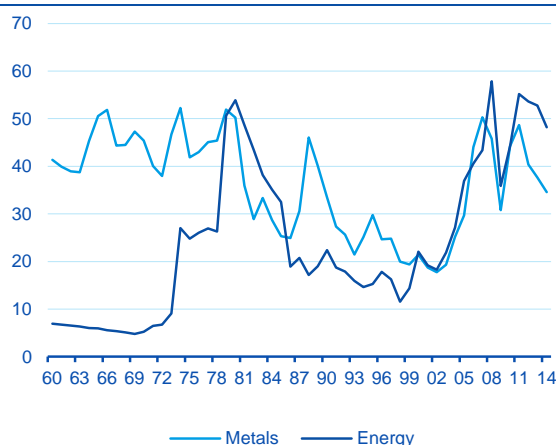
Source: BBVA Research, Eurostat and ECB

3 A preliminary analysis of the long-term trends of real commodity prices

Significant drop in commodity prices

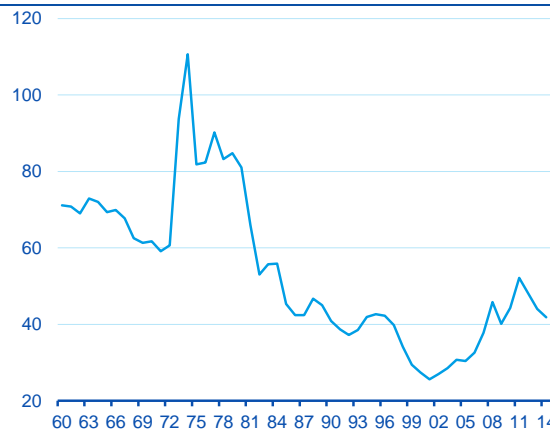
Commodity prices have recently experienced a significant fall. Following the surge recorded from the outset of the past decade, overall, commodity prices in real terms³ began to retrace their upward trend from 2011. To appreciate the scale of these falls we have grouped commodities into three broad categories: energy, metals and agricultural (see figures 3.1 and 3.2). Thus the biggest corrections since then have taken place among metal commodities, these being 29% on average, followed by agricultural, with 20%, then energy with 9%, the latter being affected by the markedly different performance of the oil price.

Figure 3.1
Non-Renewable commodities prices: energy and metal*



* In real terms at 1982 prices
Source: Banco Mundial y Haver

Figure 3.2
Renewable commodities prices: agriculture*



* In real terms at 1982 prices
Source: Banco Mundial y Haver

Should the heavy commodity price falls continue, this will have a major impact on the growth of export-intensive countries. The IMF has given over Chapter 2 of its latest World Economic Outlook⁴ to trying to show the channels through which a change in commodity prices affects the growth prospects of countries that export them, concluding that the recent dive in commodity prices could make an average negative impact of up to 1 percentage point in the medium term (2015-17).

In this piece, we look at the dynamics of real commodity prices and whether there is any long-term trend in the terms of trade of those economies which are most dependent on commodity production.

3: Using the US consumer price index (CPI) as a deflator.

4: "Where are commodity exporters headed? Output growth in the aftermath of the commodity boom". World Economic Outlook. IMF. October 2015.

Hypothesis with respect to commodity price trends

Long-run commodity price movements represent a subject that has been studied extensively in economic literature. Notable in this sense is the **hypothesis set out by ECLAC⁵ midway through the past century, which raises the issue of the inequality produced by the steady erosion of the terms of trade of exporters of primary products**. The so-called Prebisch-Singer thesis, which focusses on renewable primary commodities, concludes that exporters of primary products are forced to drop their prices in relative terms (i.e. real commodity prices have a secular downward trend) as a result of the low income elasticity of demand exhibited in the case of such products⁶.

More recently, the literature has laid less emphasis on equity and focussed on merely determining the long-run trend which commodity prices follow. An example of this is to be found in the work of Robert Pindyck. **In a classic paper,⁷ he tries to demonstrate that energy prices move around a trend and that such a trend is described by a convex quadratic function**. The price of non-renewable resources that are traded in a competitive market, where there is some agreement over the existing level of reserves, would fit this type of trend as, according to the author, it would reflect the marginal cost of production⁸.

To verify his hypothesis, Pindyck analyses three commodities: oil, coal and natural gas, for a sample which begins in 1870 in the case of the first two, and in 1919 in the case of natural gas, and which ends in 1996. In the first part of his paper (section 2) he runs a two-step test:

1. Estimating the parameters of the quadratic trend which best fits with the data.
2. Testing the assumption of price reversion to the previously estimated trend.

Since the results are not conclusive (the tests run do not provide enough information to establish the process with the best fit with the evolution of prices), in a second part of the work (section 4) a model is constructed for each product which jointly estimates both the trend and the difference with the observed price. Such estimation incorporates two assumptions in keeping with the hypotheses maintained in the paper:

1. Reversion of the prices to an unobservable long-run (marginal cost) trend
2. Both the level and slope of the trend show stochastic fluctuations over time⁹

According to the author, the results provide an acceptable tool for making long-run forecasts for the oil price, although it is less useful for coal and natural gas price projections.

Is expecting renewable and non-renewable commodities to follow a similar trend the right thing to do?

We aim to replicate the testing carried out by Pindyck for a different sample, 1960-2014, and for a very large number of commodities: 43 products which, besides energy, include metals and agricultural commodities.

One preliminary consideration which should be made, given that we are incorporating renewable commodities in the analysis, is whether the assumptions made in Pindyck's paper and which are in

5: Economic Commission for Latin America and the Caribbean, set up in 1947, whose first Executive Secretary was Raúl Prebisch.

6: The concept of low income elasticity of demand means that as income rises, the marginal increase in demand for such products rises by a smaller amount.

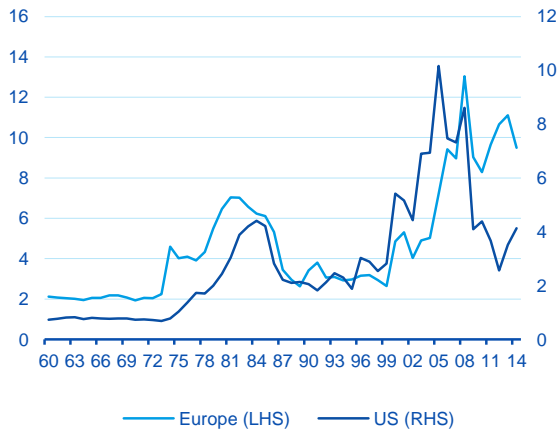
7: "The long-run evolution of energy prices", Robert S. Pindyck, The Energy Journal, 1999

8: According to research carried out at the beginning of last century by the economist Harold Hotelling, the most profitable way to exploit a non-renewable resource is one where its price is determined by the marginal net revenue from selling it and moves according to the interest rate and the expected stock of reserves.

9: These changes reflect technological innovations in commodity markets

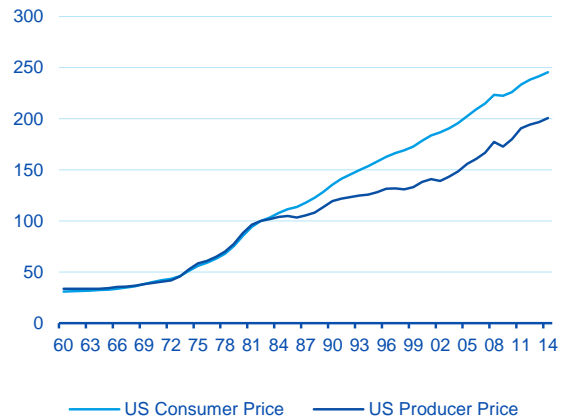
principle appropriate for non-renewable commodities, particularly for energy resources, **are also suitable for renewable commodities.**

Figure 3.3
Price of Natural Gas: US supplied. vs Europe*



* In real terms - index 2010 = 100 - log transformation
Source: World Bank

Figure 3.4
Evolution of different price indices



* Index 1982 = 100
Source: World Bank y Haver

First, the existence of a single price that is representative of the product in a competitive market has to be verified. This is a phenomenon that occurs in the case of the vast majority of renewable commodities (foods and agricultural products), which are highly tradable and devoid of monopolists. One example of a commodity where a single price is not to be found is natural gas, for which there are different geographical markets with different prices, which arises from the virtual non-existence of trading among them on account of a lack of infrastructure (figure 3.3) and the high cost of transport.

It is more relevant to check whether the trend which commodity prices follow is characterised by a convex quadratic function, not just in the case of non-renewable products, but also for renewables. As Pindyck makes clear in his study, as well as in some before it¹⁰, this trend derives from factors associated with marginal extraction costs and mainly with existing (proven) reserves. On the other hand, in the case of renewable commodities, it seems that the supply of these is replenished every year and that, since they are overwhelmingly perishable products, it is not possible to stockpile them for long periods of time. **This means that every year renewable commodity prices will primarily relate to supply factors, which in turn hinge on matters concerning nature (e.g. the weather, crop yield, etc.).** But then the long-run trend ought to be more determined by demand and technological factors in the production process. **Therefore, we would expect a priori that, given their different nature, non-renewable and renewable products would have separate specifications for their long-run trends — moreover with greater volatility in the case of renewables, given the influence of natural factors such as the weather.**

10: "Uncertainty and exhaustible resource markets". Robert Pindyck, Journal of Political Economy, 1980.

In general, movements in the real prices of different commodities revert to deterministic long-term trends

We carry out the testing suggested by Pindyck and extend the sample to 43 commodities, which include four energy resources, and 10 metal and 29 agricultural commodities. As an information source we have used the World Bank's commodity price database¹¹ with annual frequency for 1960-2014.

The nominal prices are expressed in real terms after using the US consumer price index as a deflator. Finally, the log real price for each commodity is taken and the testing performed on this transformation. The use of the price index as a deflator applied to the nominal prices of the commodities is in itself relevant. First because the **index has a trend which alters the commodity's nominal price trend when it is used as a deflator**. And second because **the relative cheapening or pricing up of the commodities, and therefore the conclusions regarding whether or not being a commodity producer is profitable in the long-run, depends entirely on the benchmark chosen** (figure 3.4).

Based on the transformations indicated, for each of the 43 commodities we estimate the quadratic trend parameters that best fit with the observed data. In practice, this means estimating the b_1 and b_2 coefficients for the equation below via straightforward regression (ordinary least squares), where T and T^2 are the linear and quadratic trends respectively.

$$\text{Log real price of the commodity} = a + b_1 * T + b_2 * T^2$$

After estimating regressions for the trend of each of the 43 commodity prices, we find the following results:

1. **Only 13 commodities reject the hypothesis of a quadratic trend**, i.e. the coefficient used with the quadratic trend (b_2) is not statistically significant. Of these 13, three are inputs for drinks (e.g. cocoa, coffee, etc.).
2. The other 30 commodities, which fall into the renewable and non-renewable categories in almost equal measure, exhibit significant coefficients, which means that a convex quadratic trend is an acceptable hypothesis for the long-run evolution of their prices.

Having accepted the quadratic trend hypothesis, we go on, as does Pindyck, to test whether prices move around that trend, or, which amounts to the same thing, we test whether prices revert to the estimated trend. To do this, the test which Pindyck proposes in his article is a unit root test on prices after controlling for the quadratic (deterministic) trend estimated beforehand. If the unit root hypothesis is rejected, the test means that we can accept that prices revert to the trend. In this case, the estimated trend becomes even more interesting since we can be sure that, after breaking away from it, prices will revert to it over time, which means that shocks which take place have only a transitory effect.

The unit root tests that were run do not yield very favourable results, since, of the 43 commodities, only in six cases could the unit root hypothesis be rejected. Moreover, we cannot really refer to a pattern, since the six favourable cases are spread across disparate commodities (cereals, textiles, woods, metals, etc.). This finding comes as no surprise to us for two reasons. First, because the literature warns of the low power which unit root tests tend to exhibit, i.e. the difficulty of rejecting the unit root hypothesis even if it is false. Second, because Pindyck runs into the same problems even though he has a significantly longer sample, which would give his tests more power.

An alternative way to test for reversion to the trend, given the lack of conclusiveness of the unit root test, is proposed by Pindyck himself, in the form of a variance ratio test. The thinking behind this test is that if the prices show a unit root, i.e. shocks have a permanent effect on them, the variance for two periods should

11: World Bank Commodity Price Data (The Pink Sheet). This database includes the prices of 65 commodities for 1960-2014. We have used only 43 commodities, as we reject those that do not have an available price for the entire sample.

grow when they break away, whereas if the prices revert to the trend, the variance for two periods ought not to grow whatever the interval between them.

Again, the results of the variance ratio test for each of the prices are not conclusive and throw up conflicting evidence, as for roughly half of the commodities we can reject the hypothesis that variance grows, whereas this result is unobtainable for the other half.

In summary, after extending the tests proposed by Pindyck to a considerably larger number of commodities, we can conclude that our findings are not very informative as they yield mixed evidence. **This means that we are not in a position to maintain that commodity prices move around a (quadratic) trend in much the same way as happens with Pindyck in section 2 of his piece. For this reason, we think that in any future article it would be a good idea to do as Pindyck has in section 4 and move on to slightly more sophisticated models which leave aside the assumption of a deterministic trend and accept stochastic trends.**

Analysis of prices by categories does not allow definitive conclusions to be reached either

One point worth considering is that, contrary to what our intuition tells us, we have not observed a different pattern between the results for renewable and non-renewable commodities. In this respect, both groups of commodities have shown that a convex quadratic function is an acceptable trend for movements in their prices, although in several cases it is hard (and the likelihood of this is almost the same for both groups) to find evidence that prices are mean-reverting. We therefore think it wise to run an additional test to try and address **whether there is a different pattern in the trend for renewable and non-renewable prices.** To do this we construct a price index for each of these two commodity categories thus:

1. We arrange the 43 commodities in our database into an initial group of non-renewables comprising the 14 energy and metal resources, and into a second group of renewables consisting of the 29 agricultural commodities.
2. We obtain the price index for each commodity category via two alternative procedures: i) calculating the median for the combined series for any one group, and ii) obtaining the first principal component for these.

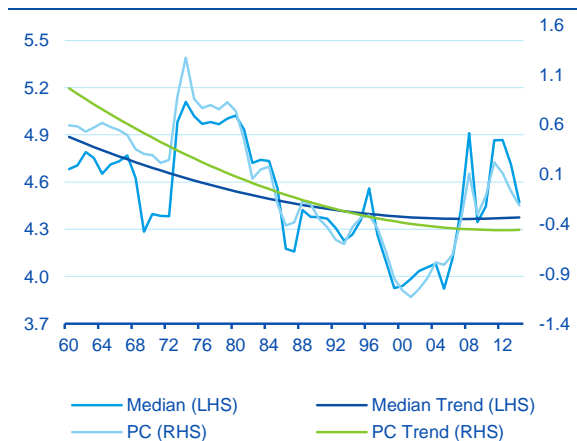
Figures 3.5 and 3.6 show that the indices for the prices obtained using the two methods exhibit similar dynamics for both sets of commodities¹².

As we did previously for each individual real commodity price, we estimate the quadratic trend which best fits the previously constructed series for renewable and non-renewable commodity prices and do this for each of the methods mentioned (median and principal components). **As can be seen again from figures 3.5 and 3.6, the trends for both groups of commodities have a clear convex quadratic shape. Furthermore, and given that the estimated coefficients of the equation are highly significant, we can accept the hypothesis that a quadratic trend suitably represents the long-run evolution of prices¹³.** Finally, we make the point that, as would be expected, there are no major differences in the trends that emerge from the median and principal component methods, given the similarity of the series.

12: It can also be seen that the movements in the price indices for both commodity categories are similar to those that would come from the World Bank data if the weights suggested by the multilateral institution are used to construct them.

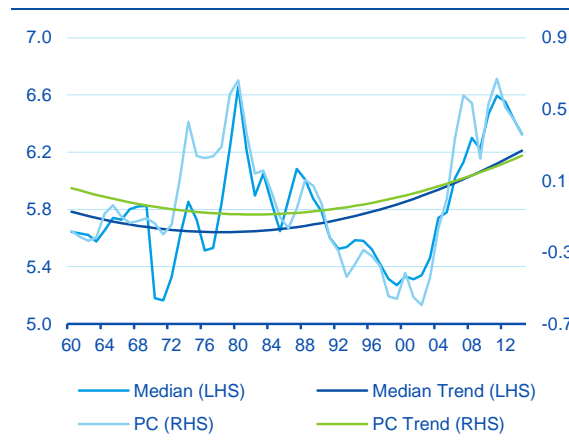
13: It is however necessary to make the point that it was not possible to reject the hypothesis that prices are not mean-reverting. That said, this test cannot be taken as conclusive as the statistics in almost all cases approached the rejection area and because of the low power that such tests tend to offer as we have noted previously.

Figure 3.5
Price index renewable commodities: median and principal component, and trends*



* In real terms at 1982 prices
Median in logs, principal component unscaled
Source: World Bank

Figure 3.6
Price index non-renewable commodities: median and principal component, and trends*



* In real terms at 1982 prices
Median in logs, principal component unscaled
Source: World Bank

Based on the evidence presented thus far, we can draw the following conclusions:

1. The evolution of most commodity prices can be fitted to a convex quadratic function, although in many cases we cannot accept reversion to this trend.
2. Perhaps counter-intuitively, there would not appear to be relevant differences between the long-run dynamics of renewable and non-renewable prices¹⁴.

These conclusions are nonetheless only of a preliminary nature, as we think that further tests are called for and, if possible, a longer data sample to work with to achieve greater power in the testing conducted, even though this could mean paring down the number of commodities examined. **As well as this, models with stochastic trends, which represent changes in the marginal production costs of commodities, are an interesting avenue to explore.**

When observing the evolution of series of renewable and non-renewable commodity prices, it can be seen that movements have been similar for the past two decades, although in the first part of the sample they are clearly different. Such different behaviour is greatly influenced by developments in the oil market, particularly the two oil crises (1973 and 1979). Stripping out the evolution of such a singular commodity from the group of non-renewable commodities, the price movements for both categories become more alike.

This similarity would, however, run counter to the hypothesis that renewable and non-renewable commodity prices should follow different patterns according to their different natures. **We think that the key to addressing this question lies in the existence of factors which have cross-cutting effects on all commodities regardless of their characteristics and the market where they are traded, an example of these being the economic cycle itself.**

14: As we have seen, this conclusion was arrived at both by running tests for individual commodity prices and grouping them into categories.

4 Tables

Table 4.1

Macroeconomic Forecasts: Gross Domestic Product

Annual Average, %	2012	2013	2014	2015	2016
United States	2.2	2.2	2.4	2.5	2.5
Eurozone	-0.8	-0.3	0.9	1.5	1.8
Germany	0.6	0.2	1.6	1.6	1.8
France	0.2	0.7	0.2	1.1	1.6
Italy	-2.8	-1.7	-0.4	0.8	1.4
Spain	-2.1	-1.2	1.4	3.2	2.7
UK	0.7	1.7	2.9	2.4	2.2
Latin America *	2.8	2.5	0.8	-0.3	0.5
Mexico	4.0	1.4	2.1	2.2	2.5
Brazil	1.8	2.7	0.2	-2.5	-0.5
EAGLES **	5.8	5.6	5.2	4.7	5.0
Turkey	2.1	4.1	2.9	2.8	3.3
Asia Pacific	5.7	5.9	5.7	5.6	5.4
Japan	1.7	1.5	-0.1	0.8	1.0
China	7.7	7.7	7.3	6.9	6.2
Asia (exc. China)	4.1	4.5	4.3	4.4	4.8
World	3.4	3.4	3.4	3.2	3.5

* Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

** Bangladesh, Brazil, China, India, Indonesia, Iraq, Mexico, Nigeria, Pakistan, Philippines, Russia, Saudi Arabia, Thailand and Turkey.

Forecast closing date: 10 November 2015.

Source: BBVA Research and IMF

Table 4.2

Macroeconomic Forecasts: Inflation

Annual Average, %	2012	2013	2014	2015	2016
United States	2.1	1.5	1.6	0.2	1.8
Eurozone	2.5	1.4	0.4	0.1	1.1
Germany	2.1	1.6	0.8	0.2	1.3
France	2.2	1.0	0.6	0.1	1.0
Italy	3.3	1.3	0.2	0.2	1.0
Spain	2.4	1.4	-0.2	-0.4	1.2
UK	2.8	2.6	1.5	0.1	1.3
Latin America *	7.8	9.2	12.6	16.4	26.6
Mexico	4.1	3.8	4.0	2.8	3.3
Brazil	5.4	6.2	6.3	8.9	6.8
EAGLES **	5.2	5.2	4.6	4.5	4.1
Turkey	8.9	7.6	8.9	7.7	8.5
Asia Pacific	3.8	4.0	3.3	2.3	2.8
Japan	0.0	1.6	2.7	0.4	1.2
China	2.6	2.6	2.1	1.6	2.0
Asia (exc. China)	4.8	5.2	4.4	2.9	3.5
World	4.5	4.2	3.9	3.8	4.8

* Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

** Bangladesh, Brazil, China, India, Indonesia, Iraq, Mexico, Nigeria, Pakistan, Philippines, Russia, Saudi Arabia, Thailand and Turkey.

Forecast closing date: 10 November 2015.

Source: BBVA Research and IMF

Table 4.3

Macroeconomic Forecasts: Current Account

Annual Average, % GDP	2012	2013	2014	2015	2016
United States	-2.8	-2.3	-2.9	-2.8	-2.8
Eurozone	1.2	1.8	2.1	2.6	2.4
Germany	6.8	6.5	7.6	7.6	7.1
France	-1.5	-1.4	-0.8	-0.9	-1.0
Italy	-0.5	0.9	1.9	1.4	2.2
Spain	-0.3	1.4	0.8	1.5	1.9
UK	-3.7	-4.5	-5.9	-5.2	-5.0
Latin America *	-1.6	-1.1	-2.8	-3.2	-2.5
Mexico	-1.3	-2.1	-2.1	-2.9	-3.0
Brazil	-2.4	0.0	-4.5	-3.9	-2.5
EAGLES **	0.9	0.7	0.5	0.4	0.4
Turkey	-6.1	-7.9	-5.7	-5.0	-5.3
Asia Pacific	1.1	1.3	1.7	2.2	1.9
Japan	1.0	0.7	0.5	1.6	1.3
China	2.6	2.0	2.1	2.5	2.4
Asia (exc. China)	-0.1	0.7	1.4	1.9	1.5

* Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

** Bangladesh, Brazil, China, India, Indonesia, Iraq, Mexico, Nigeria, Pakistan, Philippines, Russia, Saudi Arabia, Thailand and Turkey.

Forecast closing date: 10 November 2015.

Source: BBVA Research and IMF

Table 4.4

Macroeconomic Forecasts: Government Balance

Annual Average, % GDP	2012	2013	2014	2015	2016
United States	-6.8	-4.1	-2.8	-2.5	-2.4
EMU	-3.6	-2.9	-2.4	-2.2	-1.8
Germany	0.1	0.1	0.7	0.6	0.0
France	-4.8	-4.1	-4.0	-3.7	-3.2
Italy	-3.0	-2.9	-3.0	-3.0	-2.4
Spain	-6.6	-6.3	-5.7	-4.5	-3.0
UK	-8.3	-5.7	-5.7	-4.2	-3.6
Latin America *	-2.5	-2.5	-4.2	-5.2	-4.8
Mexico	-2.6	-2.3	-3.2	-3.5	-3.0
Brazil	-2.5	-3.1	-6.7	-7.8	-7.5
EAGLES **	-1.4	-2.0	-2.7	-4.3	-3.8
Turkey	-2.1	-1.2	-1.6	-1.2	-1.4
Asia Pacific	-2.6	-2.9	-2.8	-3.0	-2.9
Japan	-7.6	-9.2	-7.9	-6.5	-6.0
China	-1.1	-1.5	-1.8	-2.5	-2.5
Asia (exc. China)	-3.8	-4.1	-3.7	-3.5	-3.2

* Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

** Bangladesh, Brazil, China, India, Indonesia, Iraq, Mexico, Nigeria, Pakistan, Philippines, Russia, Saudi Arabia, Thailand and Turkey.

Forecast closing date: 10 November 2015.

Source: BBVA Research and IMF

Table 4.5

Macroeconomic Forecasts: 10-year government bond yield

Annual Average, %	2012	2013	2014	2015	2016
United States	1.8	2.3	2.5	2.1	2.4
Germany	1.6	1.6	1.2	0.5	0.7

Forecast closing date: 10 November 2015.

Source: BBVA Research and IMF

Table 4.6

Macroeconomic Forecasts: Exchange Rates

Annual Average	2012	2013	2014	2015	2016
USD-EUR	0.78	0.75	0.75	0.90	0.92
EUR-USD	1.29	1.33	1.33	1.11	1.09
GBP-USD	1.59	1.56	1.65	1.53	1.64
USD-JPY	79.8	97.5	105.8	121.44	130.92
USD-CNY	6.31	6.20	6.14	6.30	6.70

Forecast closing date: 10 November 2015

Source: BBVA Research and IMF

Table 4.7

Macroeconomic Forecasts: Official Interest Rates

End of period, %	2012	2013	2014	2015	2016
United States	0.25	0.25	0.25	0.50	1.00
Eurozone	0.75	0.25	0.05	0.05	0.05
China	6.00	6.00	5.60	4.35	4.35

Forecast closing date: 10 November 2015.

Source: BBVA Research and IMF

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This report has been produced by the Economic Scenarios Unit:

Chief Economist for Developed Economies

Julián Cubero
juan.cubero@bbva.com

Sara Baliña
mariasara.balina@bbva.com

Rodrigo Falbo
rodrigo.falbo@bbva.com

Rodolfo Mendez
rodolfo.mendez@bbva.com

Jorge Redondo
jorge.redondo.caballero@bbva.com

BBVA Research

Group Chief Economist

Jorge Sicilia Serrano

Developed Economies Area

Rafael Doménech
r.domenech@bbva.com

Spain

Miguel Cardoso
miguel.cardoso@bbva.com

Europe

Miguel Jiménez
mjimenezg@bbva.com

US

Nathaniel Karp
Nathaniel.Karp@bbva.com

Emerging Markets Area

Cross-Country Emerging Markets

Analysis
Alvaro Ortiz
alvaro.ortiz@bbva.com

Asia

Le Xia
le.xia@bbva.com

Mexico

Carlos Serrano
carlos.serranoh@bbva.com

Turkey

Alvaro Ortiz
alvaro.ortiz@bbva.com

LATAM Coordination

Juan Manuel Ruiz
juan.ruiz@bbva.com

Argentina

Gloria Sorensen
gsorensen@bbva.com

Chile

Jorge Selaive
jselaive@bbva.com

Colombia

Juana Téllez
juana.tellez@bbva.com

Peru

Hugo Perea
hperea@bbva.com

Venezuela

Julio Pineda
juliocesar.pineda@bbva.com

Financial Systems and Regulation Area

Santiago Fernández de Lis
sfernandezdelis@bbva.com

Financial Systems

Ana Rubio
arubiog@bbva.com

Financial Inclusion

David Tuesta
david.tuesta@bbva.com

Regulation and Public Policy

María Abascal
maria.abascal@bbva.com

Digital Regulation

Álvaro Martín
alvarojorge.martin@bbva.com

Global Areas

Economic Scenarios

Julián Cubero
juan.cubero@bbva.com

Financial Scenarios

Sonsoles Castillo
s.castillo@bbva.com

Innovation & Processes

Oscar de las Peñas
oscar.delaspenas@bbva.com

Contact details:

BBVA Research

Azul Street, 4
La Vela Building - 4 and 5 floor
28050 Madrid (Spain)
Tel.: +34 91 374 60 00 and +34 91 537 70 00
Fax: +34 91 374 30 25
bbvaresearch@bbva.com
www.bbvaresearch.com
Legal Deposit: M-31256-2000