



OECD Economics Department Working Papers No. 1167

Factors behind the Decline
in Real Long-Term
Government Bond Yields

**Romain Bouis,
Kei-Ichiro Inaba,
Łukasz Rawdanowicz,
Ane Kathrine
Christensen**

<https://dx.doi.org/10.1787/5jxvvgg7q1322-en>

Unclassified

ECO/WKP(2014)63

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

13-Oct-2014

English - Or. English

ECONOMICS DEPARTMENT

ECO/WKP(2014)63
Unclassified

**FACTORS BEHIND THE DECLINE IN REAL LONG-TERM GOVERNMENT
BOND YIELDS**

ECONOMICS DEPARTMENT WORKING PAPERS No. 1167

By Romain Bouis, Kei-Ichiro Inaba, Łukasz Rawdanowicz and Ane Kathrine Christensen

OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed are those of the author(s).

Authorised for publication by Jean-Luc Schneider, Deputy Director, Policy Studies Branch, Economics Department.

All Economics Department Working Papers are available through OECD's Internet website at
<http://www.oecd.org/eco/Workingpapers>

JT03363704

Complete document available on OLIS in its original format

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

English - Or. English

OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed are those of the author(s).

Working Papers describe preliminary results or research in progress by the author(s) and are published to stimulate discussion on a broad range of issues on which the OECD works.

Comments on Working Papers are welcomed, and may be sent to the Economics Department, OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France, or by e-mail to eco.contact@oecd.org.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

© OECD (2014)

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for commercial use and translation rights should be submitted to rights@oecd.org

ABSTRACT/RÉSUMÉ

Factors behind the Decline in Real Long-Term Government Bond Yields

This paper describes developments in real long-term interest rates in the main OECD economies and surveys their various determinants. Real long-term government bond yields declined from the 1980s to very low levels in the recent period, though they have not reached the historical lows of the 1970s. The decline in real interest rates has been driven by a combination of factors whose importance has varied over time. In the 1990s, the decline in inflation levels and in volatility was key. In the 2000s, purchases of US government bonds by official investors in emerging market economies, played an important role. More recently, quantitative easing and other unconventional monetary policy action, and possibly the Basel-III-induced increase in bank demand for safe assets, have been main drivers. Higher perceptions of risks after the last crisis do not seem to have put lasting downward pressures on government bond yields.

JEL classification codes: E43, E58, G15.

Keywords: real interest rates, government bond yields, monetary policy, quantitative easing, foreign exchange reserve accumulation.

Facteurs à l'origine de la baisse des rendements des obligations d'État à long terme

Ce document décrit l'évolution des taux d'intérêt réels à long terme dans les principales économies de l'OCDE et en recense les différents facteurs déterminants. Les rendements réels des obligations d'État à long terme ont diminué à partir des années 80 pour s'établir récemment à des niveaux très peu élevés, sans toutefois atteindre les plus bas niveaux historiques des années 70. La baisse des taux d'intérêt réels est attribuable à une combinaison de facteurs dont l'importance a varié au fil du temps. Dans les années 90, la baisse de l'inflation et la volatilité ont été les principaux facteurs. Dans les années 2000, les achats d'obligations d'État américaines par les investisseurs officiels des économies de marché émergentes ont joué un rôle important. Plus récemment, ce sont l'assouplissement quantitatif ainsi que d'autres mesures non conventionnelles de politique monétaire, et potentiellement l'augmentation de la demande d'actifs sûrs de la part des établissements bancaires, induite par l'Accord de Bâle III, qui ont primé. La plus grande perception des risques depuis la dernière crise ne semble pas avoir durablement pesé sur les rendements des obligations d'État.

Codes JEL : E43 ; E58 ; G15.

Mots clés : Taux d'intérêt réels, rendements des obligations d'État, politique monétaire, assouplissement quantitatif, accumulation des réserves de change.

© OECD (2014)

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for commercial use and translation rights should be submitted to rights@oecd.org

TABLE OF CONTENTS

FACTORS BEHIND THE DECLINE IN REAL LONG-TERM GOVERNMENT BOND YIELDS5

 Introduction.....5

 Real long-term government bond yields have declined to low levels.....5

 Determinants of real long-term government bond yields9

 Monetary policy9

 Bond purchases by foreign official institutions.....14

 Domestic and official interventions in the US government bond market16

 Private investor demand for sovereign bonds16

BIBLIOGRAPHY20

Figures

1. Real 10-year government bond yields have declined from the 1980s.....6

2. The supply of government bond securities has increased9

3. Government bond purchases by central banks have surged10

4. Inflation volatility and mean have declined since the early 1980s.....12

5. Central banks’ foreign exchange reserves have increased in EMEs13

6. The ownership structure of US Treasury securities is changing15

7. Banks' holdings of sovereign bonds have grown17

8. Risk-taking indicators18

9. The Anxious Index19

Boxes

1. Alternative measures of long-term real interest rates.....7

2. Does the “global saving glut” drive real interest rates down?.....14

FACTORS BEHIND THE DECLINE IN REAL LONG-TERM GOVERNMENT BOND YIELDS

By Romain Bouis, Kei-Ichiro Inaba, Łukasz Rawdanowicz and Ane Kathrine Christensen¹

Introduction

Nominal and real interest rates have declined significantly over the past decades, reaching very low levels recently. This has renewed interest in determinants of real rates.² Against this background, this paper analyses trends in real government bond yields, and reviews several hypothesis that contributed to their decline over the past decades. The focus is on determinants of market interest rates from a single country perspective and not global equilibrium rates as recently analysed for instance by IMF (2014) and Blanchard et al. (2014).

The paper first describes developments in real government bond yields in main OECD economies and discusses alternative measures of real interest rates. Then, it surveys their various determinants – including monetary policy and demand for safe assets.

The main findings are as follows. Real long-term government bond yields declined from the 1980s to very low levels in the recent period, though have not reached the historical lows of the 1970s. The decline in real interest rates has been driven by a combination of factors whose importance has varied over time. In the 1990s, the decline in inflation levels and in volatility was key. In the 2000s, bond purchases by official investors from emerging market economies, especially in the United States, played an important role. More recently, quantitative easing and other unconventional monetary policy action, and possibly the Basel-III-induced increase in bank demand for safe assets, have been main drivers. Higher perceptions of risks after the last crisis do not seem to have had lasting downward pressures on government bond yields.

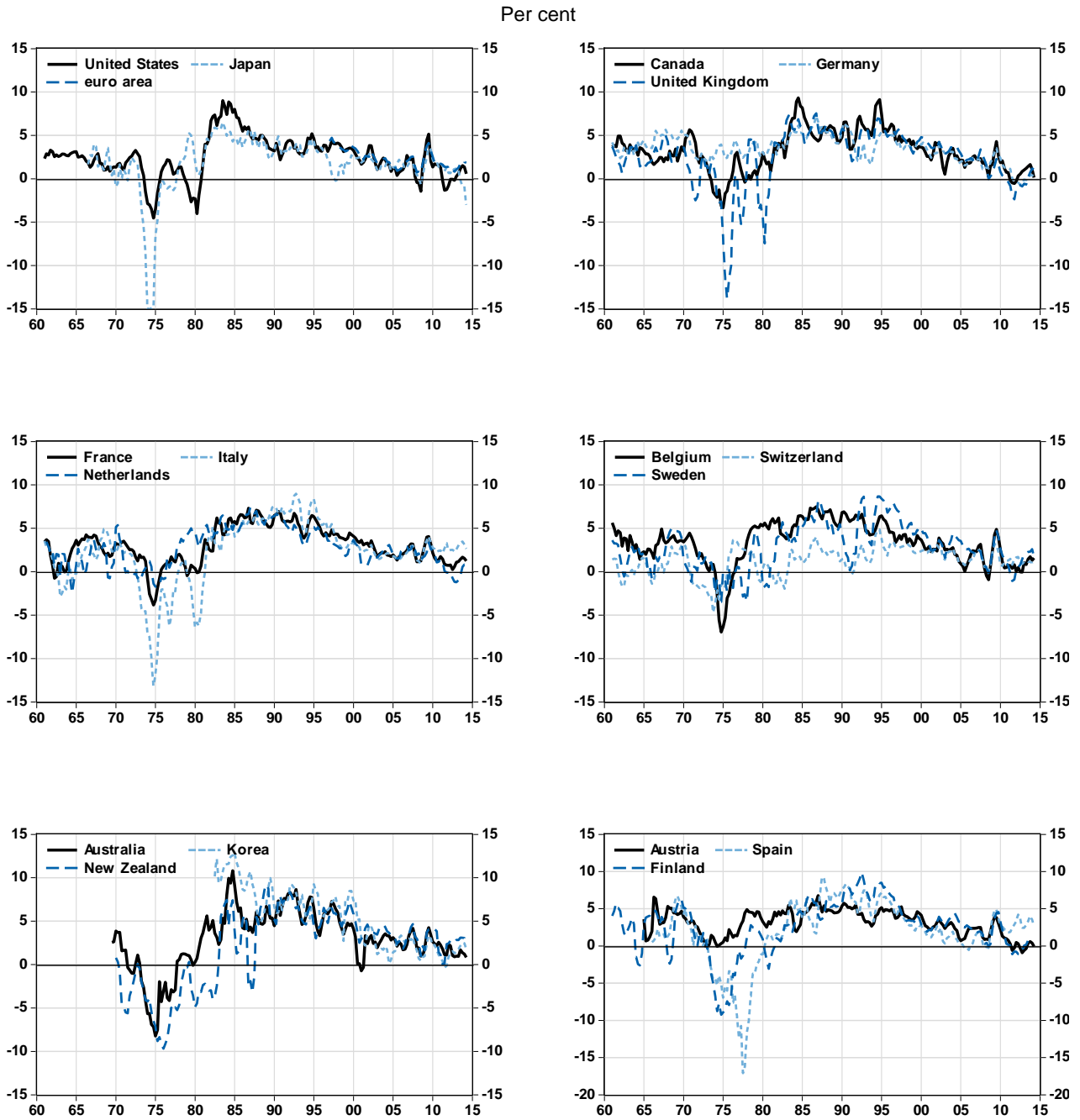
Real long-term government bond yields have declined to low levels

Real long-term government bond yields have declined to low levels in many advanced OECD economies. They approached zero or even turned negative around 2013 and since then they have rebounded slightly (Figure 1). Real bond yields are still significantly lower than in the 1980s and the 1990s but not lower than in the 1970s (Figure 1; IMF, 2014).

The trends depicted in Figure 1 are consistent with other measures of real interest rates. Real interest rates are defined in this paper as the difference between nominal 10-year government bond yields and the annual rate of actual consumer price inflation. This approach assumes that economic agents form their inflation expectations based on a random walk model. Alternative measures are available only for shorter spans and fewer countries but they confirm the declining trend in real interest rates over the past three decades (Box 1; King and Low, 2014).

-
1. The authors at the time of writing the paper were members of the Macroeconomic Policy Division of the Economics Department. They are indebted to Sveinbjörn Blöndal for his useful comments. The authors are also grateful to Isabelle Fakih and Maartje Michelson for help in the final document preparation.
 2. Several hypotheses on the determination of real interest rates were reviewed in earlier OECD publications – see for instance Tease et al. (1991), Brook (2003) and Ahrend et al. (2006).

Figure 1. Real 10-year government bond yields have declined from the 1980s



Source: OECD Economic Outlook 95 database; and OECD Main Economic Indicators.

Box 1. Alternative measures of long-term real interest rates

Inflation-linked government bond yields provide a direct measure of real interest rates. The bond yields are available on a daily basis and reflect views of a large number of investors. However, not many countries issue such bonds and available time series vary greatly in length (King and Low, 2014). Among G7 governments, the United Kingdom has issued such bonds since 1981, the United States since 1997, France since 1998, Japan since 2004 though with a 5-year break, and Germany only since 2006. In addition, inflation-linked government bond yields can be affected by liquidity and risk premia that vary with market conditions and the maturity of underlying bonds (Campbell et al., 2009). Liquidity premia can blur the true value of real interest rates when markets are illiquid as is the case in Japan or in the initial phase of introducing such bonds.¹

An alternative way to calculate real interest rates is to deduct one of the possible proxies of inflation expectations from nominal interest rates:

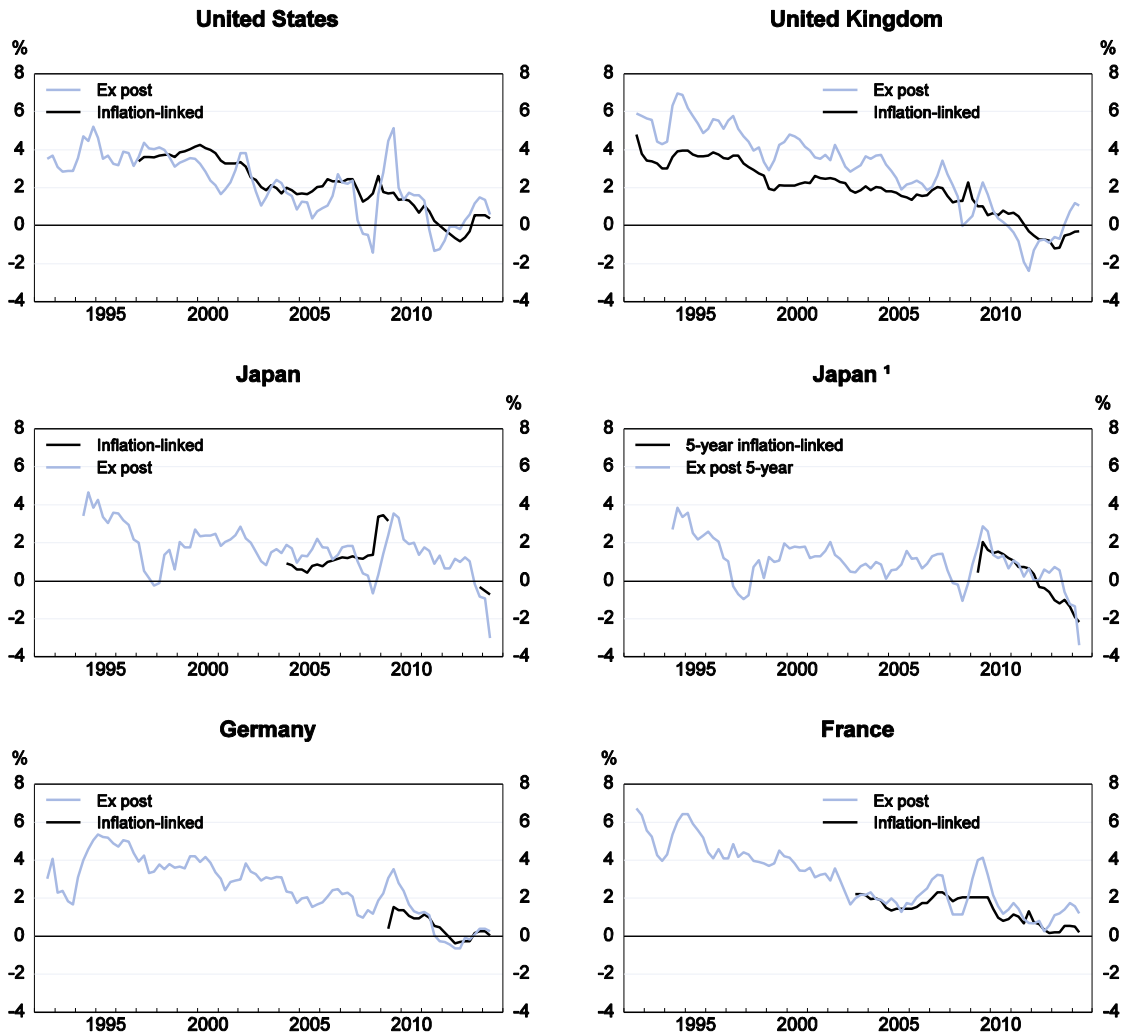
- **Surveys of inflation expectations.** Surveys of households have the advantage of representing views of a large group of consumers. However, they are usually conducted at low frequency and answers are sometimes qualitative and they require special techniques, based on restrictive assumptions, to translate them into inflation rates (Henzel and Wollmershäuser, 2005). Moreover, the answers could be biased due to framing, especially for long-term inflation expectations (Mishkin, 2009). While professional forecasters' responses may not suffer from such bias, there is no guarantee that their views represent general inflation expectations. Their expectations also tend to be very stable (Mishkin, 2009), likely reflecting challenges in projecting inflation in the long run.
- **Model projections.** Inflation expectations could be derived from economic or time series models. A common method is to use autoregressive models (Fujii and Chinn, 2001; and IMF, 2014). It is, however, not clear if such expectations correspond to views of households and businesses. One simple approach is to assume that inflation expectations are formed based on the random walk model, where the best prediction of future inflation is its last value. This approach is applied in this paper. Real interest rates derived in this way are often referred to as ex post rates. A modification of this approach involves calculating inflation trend and assuming that economic agents expect inflation to remain constant at the latest value of the trend. Orr et al. (1995) use the Hodrick-Prescott filter to calculate the trend but this approach suffers from shortcomings² and economic interpretation of the trend may be problematic.

In the United Kingdom and the United States, ex post real government bond yields calculated in this annex and inflation-linked bond yields evolve in a similar way though they differ in levels (box figure below). Ex post rates are usually more volatile and are generally higher than inflation-linked bond yields (especially over the past year and in the United Kingdom), but they co-move closely.³ Similar patterns are observed for Japan, Germany and France, though time series are much shorter. In addition, ex post real government bond yields in the main OECD countries move closely with real yields based on inflation expectations derived from surveys of professional forecasters (Ahrend et al., 2006).

-
1. As of mid-2013, inflation-linked government bonds yields accounted for 23% of total government bonds in the United Kingdom, 11.7% in France, 8.1% in the United States, 4.6% in Germany and 0.4% in Japan.
 2. This includes the end-sample problem and challenges with the choice of the smoothing parameter. In addition, when actual inflation rates are not stationary, the Hodrick-Prescott filter can generate spurious cyclical patterns (Harvey and Jaeger, 1993).
 3. Long-term relationship between the two measures of real interest rates is formally confirmed by the Engle-Granger cointegration test for the United States and the United Kingdom where long time-series of inflation-linked bonds are available.

Box 1. Alternative measures of long-term real interest rates (Cont.)

10-year real government bond yields

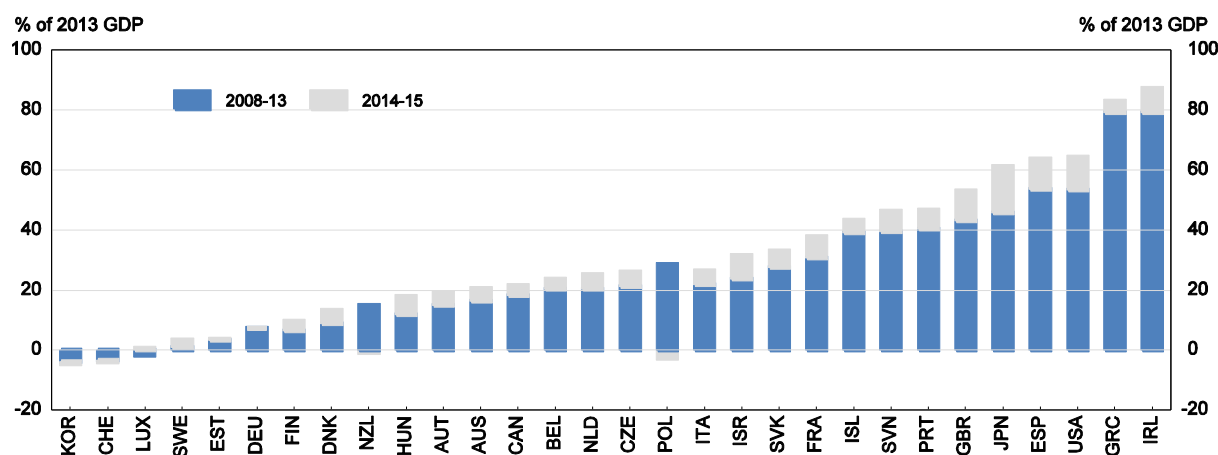


Note: Ex post yields are nominal bond yields deflated with the annual rate of headline CPI inflation. All bond yields are quarterly averages of daily market data.

1. Japanese 10-year inflation-linked government bond yields are not available between 2009Q3 and 2013Q3. For reference, 5-year yields are shown.

Source: Bloomberg; OECD Economic Outlook 95 database; and authors' calculations.

Figure 2. The supply of government bond securities has increased



Note: The figure depicts the sum of general government deficits.

Source: OECD Economic Outlook 95 database.

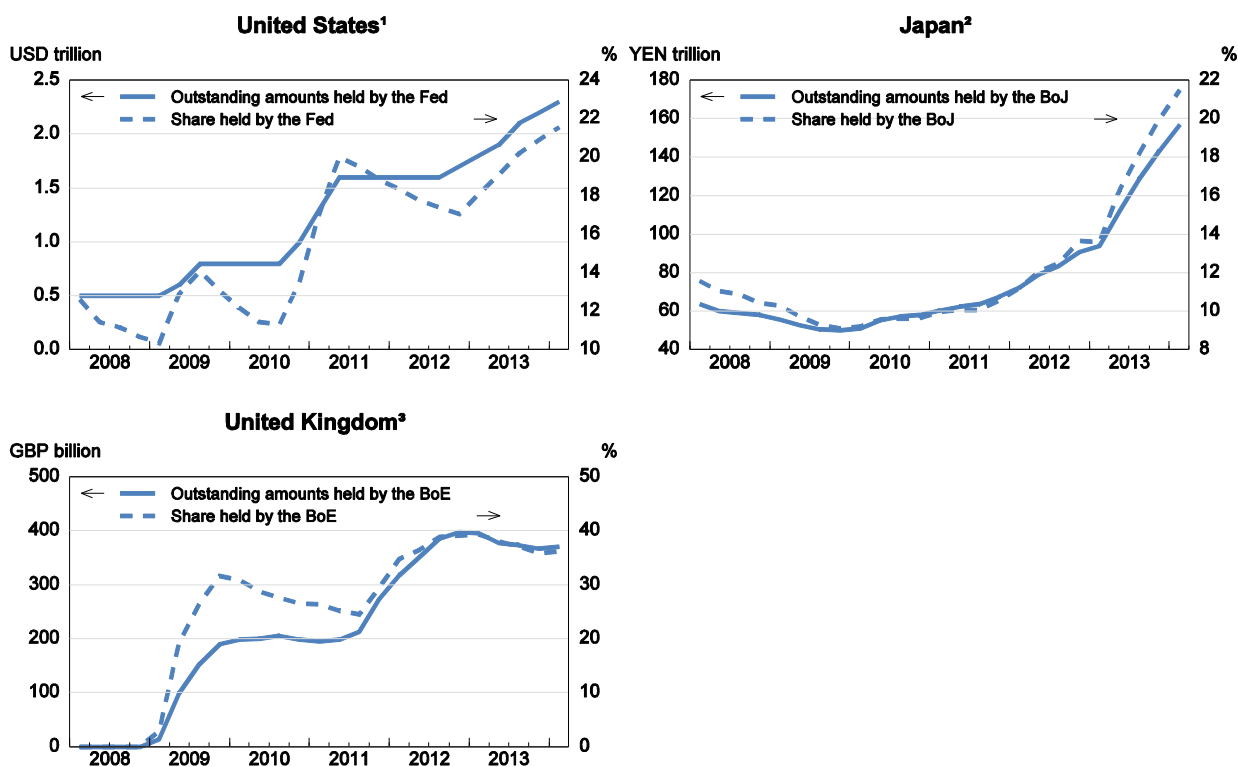
The supply of government bonds in most OECD countries has increased as governments have run large budget deficits. Between 2008 and 2013, cumulative general government deficits amounted to 25% of (2013) GDP in the euro area, between 40% and 50% of GDP in Japan, the United Kingdom and the United States, and by over 50% of GDP in some vulnerable euro area countries (Figure 2).³ Other things equal, larger supply should have driven bond yields up. The fact that they have come down suggests that demand factors have played an important role. The supply of government bonds is expected to increase less rapidly in the coming years and resulting upward pressure on bond prices should thus moderate.

Determinants of real long-term government bond yields

Monetary policy

Monetary policy has an important bearing on government bond prices via its effects on financial conditions and economic growth. Long-term interest rates reflect compounded expected short-term interest rates and risk premia and thus are bound to reflect interplay between policy interest rates, market expectations of a monetary policy stance and risk premia. During recent business cycles, monetary policy in the main OECD areas tended to be too loose during booms and then eased too aggressively during busts (Borio, 2012, 2014). Such a strategy would reduce longer-term yields compared with a more symmetric policy action in upswings and downswings. Since the start of the financial crisis, monetary authorities in the main OECD economies have also purchased government bonds in secondary markets, raising their prices. Moreover, they have helped lower bond yields by keeping policy interest rates low and by conditional commitments to keep them low for long (forward guidance).

3. However, programme euro area countries benefited from foreign official loans of at least 15% of GDP as of end-2013. Cumulative deficits are a better measure of changes in the supply of government debt securities than changes in the general government debt-to-GDP ratio based on the national account concept as the latter are affected by variation in market prices of bonds.

Figure 3. Government bond purchases by central banks have surged

1. Treasury securities, excluding savings securities and Treasury bills, and including special U.S. Treasury securities held by Federal Home Loan Banks.
2. Treasury securities, excluding Treasury discount bills, and including Fiscal Investment and Loan Programme (FILP) bonds.
3. Conventional gilts.

Source: Board of Governors of the Federal Reserve System; Bank of Japan; UK Debt Management Office; and authors' calculations.

Monetary policy interventions

Through their quantitative easing (QE) programmes, central banks in Japan, the United Kingdom and the United States have become important government bond investors (Figures 3 and 6). Central bank purchases were especially important when government bond issuance increased: in the United States in 2009H2, in Japan in 2013H2, in the United Kingdom in 2009Q1 and 2012Q2-Q4. At the beginning of 2014, central banks held around 22% of total outstanding government bonds in Japan and the United States, and 36% in the United Kingdom.

Quantitative easing is expected to work via three channels. First, the available local supply/scarcity channel implies that a purchase by central banks of assets with specific maturity increases prices of securities with similar maturities. Second, the duration channel suggests that reducing aggregate duration of the outstanding stock of Treasury debt diminishes term premium on securities across all maturities. Third, the signalling/expectations channel operates by reducing market expectations of the short-term policy rates.

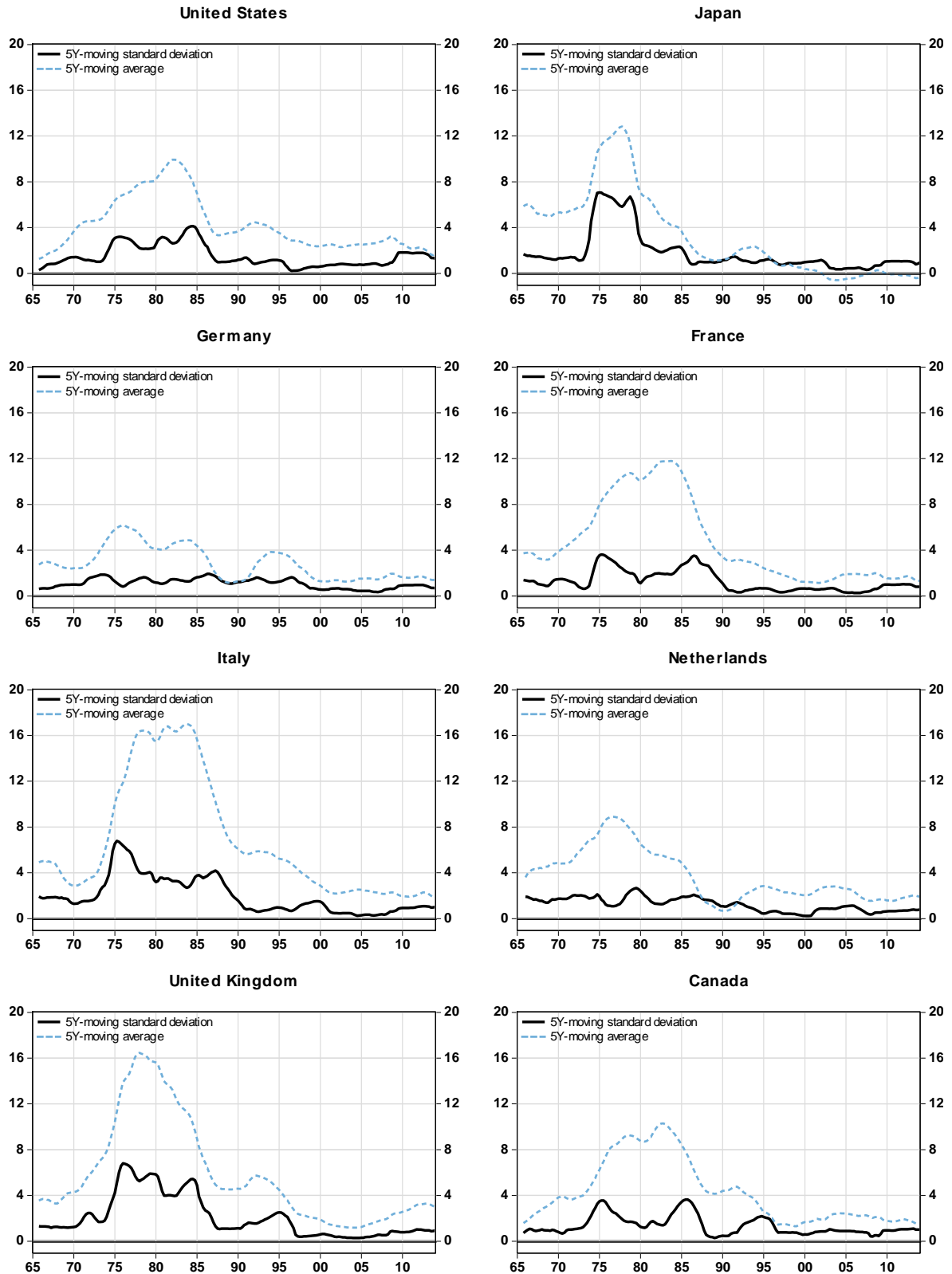
Quantitative easing helped lower government bond yields but the magnitude and durability of its effects are debated. Many studies investigating the impact of QE, mainly for the United States and the United Kingdom, have focused on event studies. They show that within a span of few days around the announcement of QE nominal government bond yields declined by 8 basis points on average for each 1% of GDP of asset purchase (Bouis et al., 2013). This should translate into a similar drop in real government bond yields as inflation expectations are unlikely to change substantially within few days. Event studies indicate flow effects and thus say little about the durability of these effects. This problem is addressed by approaches based on structural models of demand for government bonds, which could be treated as stock effects. For instance, in the United States, Kaminska and Zinna (2014) find that QE measures in 2009-12 lowered 10-year real US government bond yields by around 140 basis points (i.e. 13 basis points for purchases of 1% of 2009 GDP).⁴ Similarly, in the United Kingdom, QE is estimated to have pushed down real long-term interest rates by about 80 basis points in 2009 (i.e. 7 basis points for purchases of 1% of 2009 GDP), with the increase in inflation expectations playing only a marginal role (Hofmann and Zhu, 2013; and Meaning and Zhu, 2011).⁵

Based on the above estimates, QE measures implemented from 2009 to early-2014 could have lowered long-term government yields by 90 basis points in the United Kingdom and 230 basis points in the United States. This is equivalent to 3.5-basis point and 20-basis point reductions for each 1% of period-average GDP of purchases of government bonds, excluding treasury bills, in the United Kingdom and the United States, respectively. No equivalent estimations are available for Japan. Assuming similar demand functions and given the corresponding increase in the share of central bank holdings in total outstanding debt, interventions by the Bank of Japan between 2009 and early-2014 could have reduced long-term interest rates by 25–250 basis points. This wide range reflects differences in estimates from other countries about QE effects.⁶ This is equivalent to 1.2-12-basis point reduction for each 1% of period-average GDP of purchases of government securities other than treasury discount bills. No such estimations are available for the euro area, which partly reflects the small size of the ECB's QE programme.⁷ These calculations should be considered as rough estimates of the upper bound. Over the estimation period, demand curves are likely to have been unstable and the bond maturity of purchased bonds was controlled imperfectly. As argued in Bouis et al. (2013), the impact of QE programmes on yields may have diminished, especially as yields get lower given the non-linear relationship between bond prices and yields.

Recent central bank forward guidance should lower nominal long-term interest rates by affecting the future path of short-term interest rates and their uncertainty (Bank of England, 2013). Empirical evidence regarding the impact of recent guidance issued by central banks in the main OECD areas on government bond yields is, however, unclear, but some support is found for the reduction in uncertainty about policy rates at short horizons (Filardo and Hofmann, 2014).

-
4. The Fed increased its share in the government debt market by 6.1 percentage points, implying a 23-basis point increase in the long-term interest rate for each percentage point increase in the Fed's share.
 5. The Bank of England increased its share in the government debt market by 31.7 percentage points, implying a 2.5-basis point increase in the long-term interest rate for each percentage point rise in its share.
 6. Based on the elasticities for the United Kingdom and the United States (see two previous footnotes) and given the increase in the Bank of Japan's the share in the government debt market of 11 percentage points between 2009 and early 2014. The average effect is 138 basis points.
 7. The ECB purchased only 220 billion euro of government debt in the context of the Securities Markets Programme (SMP) from early 2010 to 2012. Eser and Schwaab (2013) estimate that SMP purchases have on average reduced yields at the five year maturity for each billion of euros by 1-2 basis points in Italy, 3 basis points in Ireland, 4-6 basis points in Spain, 6-9 basis points in Portugal, and up to 17-21 basis points in Greece.

Figure 4. Inflation volatility and mean have declined since the early 1980s



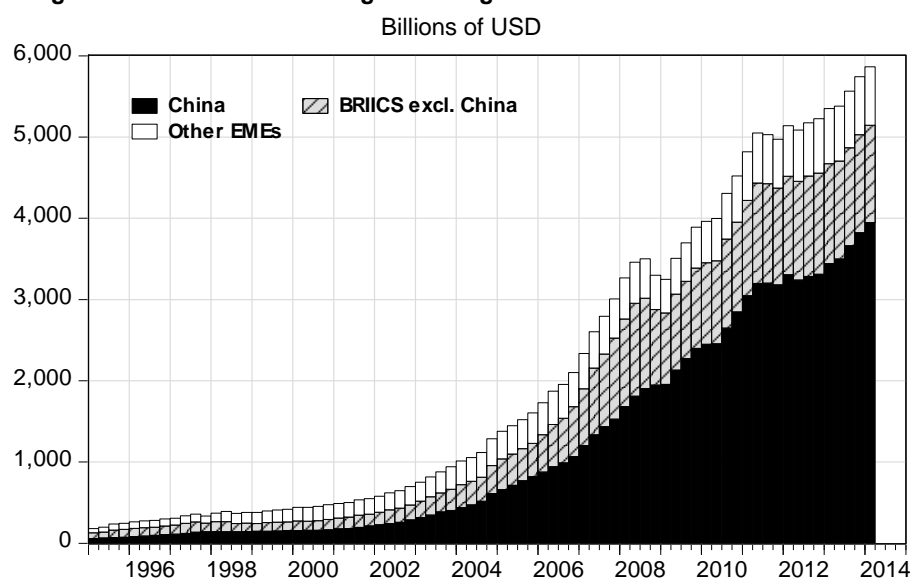
Source: OECD Main Economic Indicators; and authors' calculations.

Inflation volatility

The reduction in inflation volatility in the 1980s and 1990s contributed significantly to reducing real bond yields. Monetary policy can lower real interest rates by ensuring stable and low inflation and its expectations since investors are likely to demand smaller risk premia. The evidence from surveys among professional forecasters in the United States and the euro area suggests that long-term expected inflation declined gradually throughout the 1990s, but has moved little since 2000 (Ahrend et al., 2006). Similar patterns were observed regarding long-term inflation uncertainty as proxied by the dispersion of individual forecasts in surveys among professional forecasters. This coincides with the decline in average inflation and its variability and their subsequent stabilisation (Figure 4) and the associated adoption of monetary policy frameworks that credibly targeted low inflation. The role of lower inflation volatility in the past is supported empirically (Turner and Spinelli, 2013).⁸ Since the beginning of the financial crisis inflation volatility has increased, even if its levels remained very low. This, however, has not been translated into higher risk premia so far.

In Japan, inflation has recently increased in contrast to other advanced OECD economies, without any visible pass-through to nominal interest rates. Higher inflation mainly owes to rapidly rising energy prices, due to stronger demand for imported energy since the earthquake in 2011 and the large depreciation of the yen, and more recently due to the increase in the consumption tax rate. The higher inflation level and volatility have not yet been reflected in higher risk premia, and real interest rates have actually declined. This could be explained by offsetting effects from continued quantitative and qualitative monetary easing. Looking forward, if inflation levels and volatility were to increase further in Japan, and in other advanced OECD countries, there is a risk that real interest rates will not decline proportionally as risk premia will push nominal interest rates up.

Figure 5. Central banks' foreign exchange reserves have increased in EMEs



8. In Turner and Spinelli (2013), the decline in inflation volatility explains the fall in the differential between the interest rate paid to service government debt and the growth rate of nominal GDP and not the real long-term government bond yields, but the two are somewhat related.

Bond purchases by foreign official institutions

Foreign exchange reserve accumulation by central banks in emerging market economies (EMEs) has boosted demand for US government bonds and reduced their yields. This reserve accumulation is the outcome of increased demand for EMEs' goods and assets and the management of exchange rates. Reserve accumulation is conceptually a better factor explaining the fall in real interest rates than current account surpluses (the so-called excess saving hypothesis – Box 2). EMEs' foreign exchange reserves have grown rapidly since the late 1990s (Figure 5). A large part of these reserves were invested in US assets, in particular US Treasury securities, given the international status of the US dollar, and the safety and liquidity of these assets. Consequently, official foreign investors, mainly comprising central banks and sovereign wealth funds, doubled their share in the US Treasury securities market from around 25% in the mid-1990s to 2013 (Figure 6). In contrast to many private investors, central banks in EMEs frequently buy US Treasuries with little consideration of their prices as purchases are largely determined by capital inflows (Krishnamurthy and Vissing-Jorgensen, 2012). This can prevent corrections of disequilibria in bond markets.

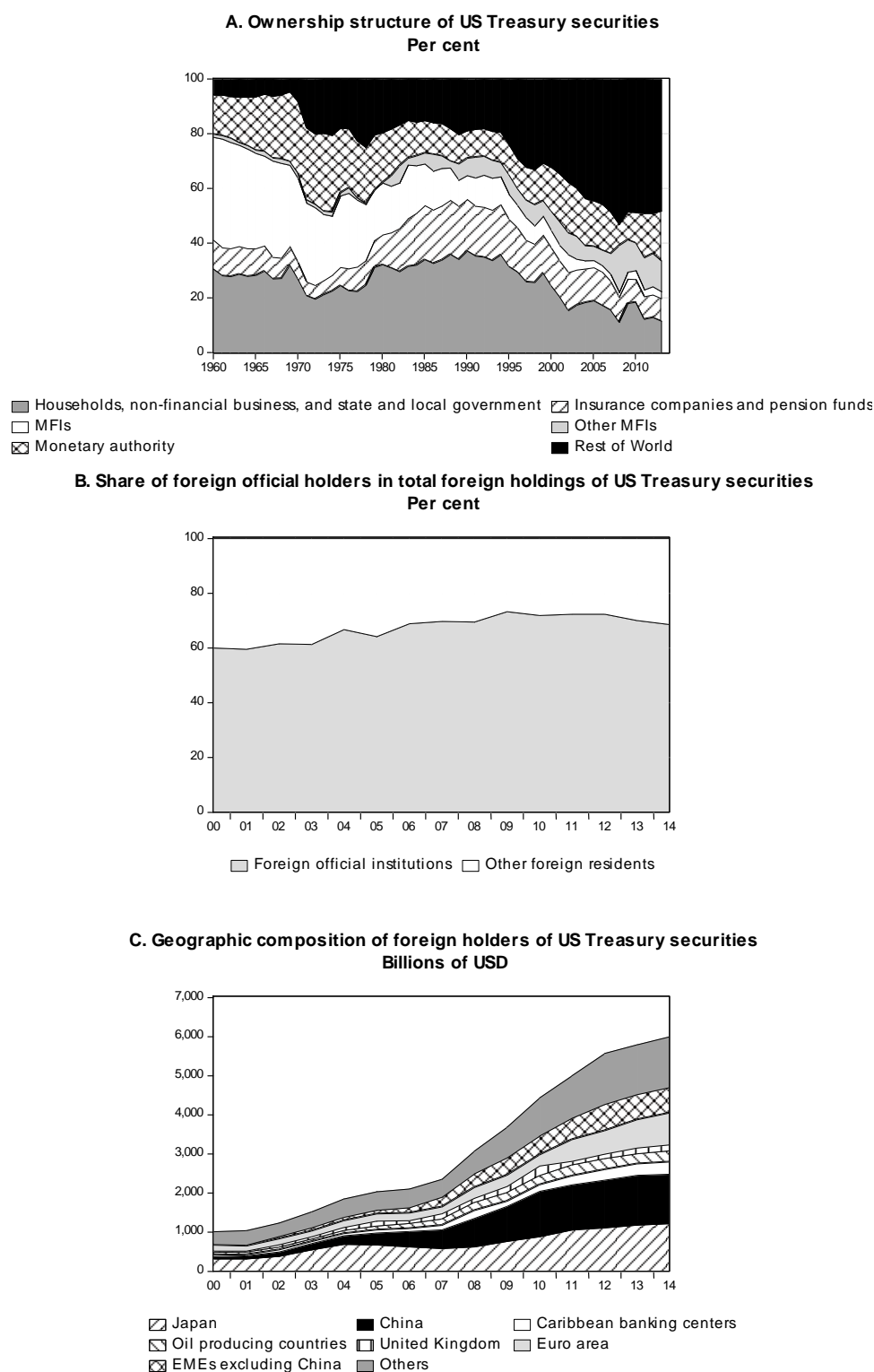
Box 2. Does the “global saving glut” drive real interest rates down?

The “global saving glut hypothesis” suggests that excess saving, as measured by current account balances, primarily in emerging market economies (EMEs) and oil producing countries, contributed to the decline in real interest rates in advanced countries (Bernanke, 2005; Roubini and Setser, 2005). The rise in net savings started in the late 1990s and came mainly from newly-industrialised Asian economies and other EMEs. Following the 1997 financial crisis, many East Asian countries increased their saving and reduced capital spending to below historical norms. The timing of the regional shift in global saving seems consistent with the decline in global interest rates as both the rise in EMEs saving and the decline in industrialised countries investment have been occurring progressively over past decades. This hypothesis is supported by several empirical studies (Desroches and Francis, 2007).

The saving glut hypothesis is, however, problematic for two reasons:

- Motivation for saving-investment imbalances comes from closed-economy models of the real neutral interest rate, which is determined by the balance between ex ante saving and ex ante investment. This concept is less relevant for the determination of market interest rates, which are affected primarily by the policy interest rates, market expectations of a monetary policy stance, and asset-specific preferences of official and private investors. Besides, ex ante saving and investment are not observable and, on a global level, current account balances add up to zero, with little implications for shifts in global ex ante saving and investment (Borio and Disyatat, 2011). Nevertheless, it is possible that higher saving in EMEs indeed coincided with shifts in saving-investment imbalances.
- Current accounts reveal little about financing and the role a country plays in international borrowing (Borio and Disyatat, 2011). The reason is that net capital flows capture changes in net claims on a country arising from trade in goods and services but exclude the underlying changes in gross flows. Thus, a country can purchase a given amount of foreign assets and have very different current account balances. Besides, current account surpluses of a country or a region do not indicate actual financing of a foreign country. For instance, as discussed in Borio (2012), external financing of the US credit boom came largely from countries with a current account deficit (the United Kingdom) or in balance (the euro area). Thus, to explain increased demand for government bond yields it is more suitable to look at gross flows, which is, however, complicated in practice due to data limitations. Empirical findings of the role of current account surpluses in EMEs in driving down market rates may thus stem from the fact these surpluses coincided with foreign reserve accumulation by central banks in EMEs and ensuing purchases of government bonds in advanced economies (see the main text).

Figure 6. The ownership structure of US Treasury securities is changing



Note: Data in panel B and C are not adjusted for breaks in the series.

Source: FED Flow of Funds; and the US Department of the Treasury, Treasury International Capital (TIC) data.

Foreign official purchases have likely depressed US Treasuries' yields. Warnock and Warnock (2009) show that foreign official investors pushed down US nominal government bond yields by 80 basis points from the mid-1980s to around 2005. Similarly, Kaminska and Zinna (2014) find that such interventions reduced real long-term government bond yields between 2001 and 2008 by 80 basis points.⁹

Domestic and official interventions in the US government bond market

The combined effects of the purchases of US government bonds by the Fed and foreign official investors in the United States are substantial. Blundell-Wignall and Roulet (2014) show that foreign official and Fed interventions between the early 2000s and end-2012 reduced nominal yields by around 200 basis points. This accounted for around half of the decline in nominal yields during this period.

Private investor demand for sovereign bonds

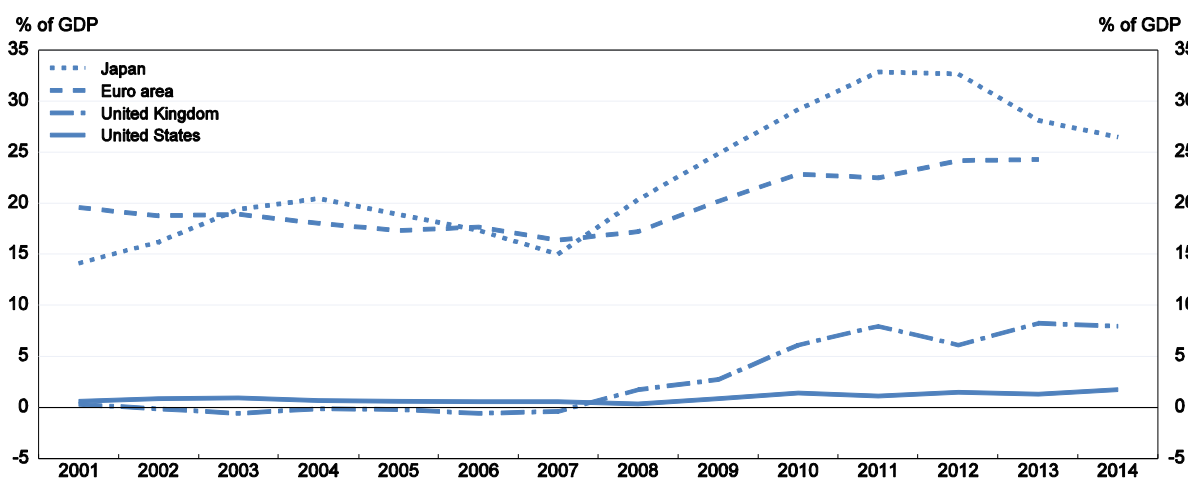
Changing financial market regulations

Changing prudential regulations require financial institutions to hold more safe assets, including sovereign bonds, and thus can put upward pressures on the price of safety:

- **Bank regulation:** New liquidity requirements as Basel III rules are gradually phased in from 2015 to 2019 are likely to increase banks' demand for government debt given its favourable treatment in satisfying the liquidity coverage ratio. This favourable treatment is both with respect to the minimum share of liquid assets that have to be held as government bonds and no haircut being applied to such assets in contrast to other liquid securities. According to the Quantitative Impact Study of the Basel Committee on Banking Supervision (2010), if the minimum (in the absence of financial stress) liquidity coverage ratio (LCR) had been in place in 2009, large G20 banks would have required approximately 2.2 trillion dollars in additional liquid assets, partly in the form of sovereign debt securities. Extrapolating this estimate to small banks (not only in G20 countries), the LCR requirements alone could have further increased demand for safe liquid assets worldwide by some 2 to 4 trillion US dollars (IMF, 2012), equivalent to, at most, 4.5% to 9.0% of total global sovereign debt at end-2013. In addition, risk-weighted capital requirements could boost demand for government bonds. Since sovereign debt can be subject to zero credit risk weights, especially in the EU countries (OECD, 2014), increasing the share of government bonds in total assets helps shrink the risk-weighted assets and thus lower capital needs. Indeed banks increased holdings of sovereign debt since 2007 in several countries but changes in bank regulations are unlikely to be the only factor (Figure 7).
- **Insurance company regulation:** The upcoming implementation of the Solvency II regulation, scheduled to come into effect on 1 January 2016, may also stimulate stronger demand by European insurance companies for sovereign bonds. Under the current proposal for Solvency II, insurance companies would, for instance, not be required to hold regulatory capital against exposures to government bonds that are issued by the member states of the European Economic Area or to government guarantees backed by multilateral development banks, regardless of their credit rating or risk premia. Forthcoming changes in capital regulation for globally systemically important insurers by the International Association of Insurance Supervisors (IAIS) will also likely contribute to stronger demand for safe and liquid assets, including government bonds.

9. Their results are likely to be overestimated due to the use of break-unadjusted series on of foreign official investors' holdings of US Treasuries. These data exaggerate the increase in the share of foreign official investors in total outstanding bonds during 2001-08. The adjusted series suggest that this share actually declined after 2008, reflecting a rapid increase in bond supply. According to Kaminska and Zinna (2014) model, this would exert an upward pressure on bond yields.

Figure 7. Banks' holdings of sovereign bonds have grown



Note: For the United States: Treasury securities held by US chartered depository institutions, excluding credit unions; for the euro area: general government liabilities (Maastricht definition) held by monetary financial institutions; for Japan: Treasury securities held by domestically licensed banks, excluding Japan Post Bank; for the United Kingdom: market values of gilts held by banks and building societies. Treasury bills are excluded. The figures become negative when the holders have net short positions.

Source: US Federal Reserve; European Central Bank; Bank of Japan; Japanese Cabinet Office; UK Debt Management office; and Datastream.

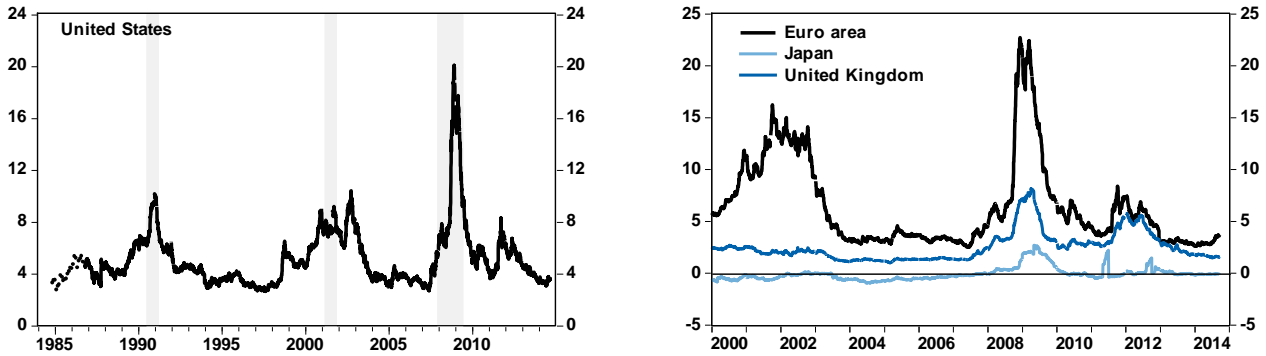
Perception of risks

At the time of heightened uncertainty and financial market turbulence, private investors are likely to increase demand for sovereign bonds. High liquidity, reliable store of value, and insurance against future crises offered by sovereign bonds in advanced OECD countries, and especially in the United States, make these instruments attractive for some private investors. The resulting low demand price elasticity, as in the case of official investors, may lead to persistently high prices of government bonds. Thus, the fall in real interest rates could be also explained by a higher perceived level of risk (Barro, 2006; Miles et al., 2005). A higher risk aversion of investors implies that safe assets become more attractive and the wedge between the returns on them and on more risky assets increases. Large and prolonged recessions, especially associated with financial crises, can durably increase the perceived likelihood and impact of extreme bad events. This is in contrast to long episodes of stable and strong economic growth.

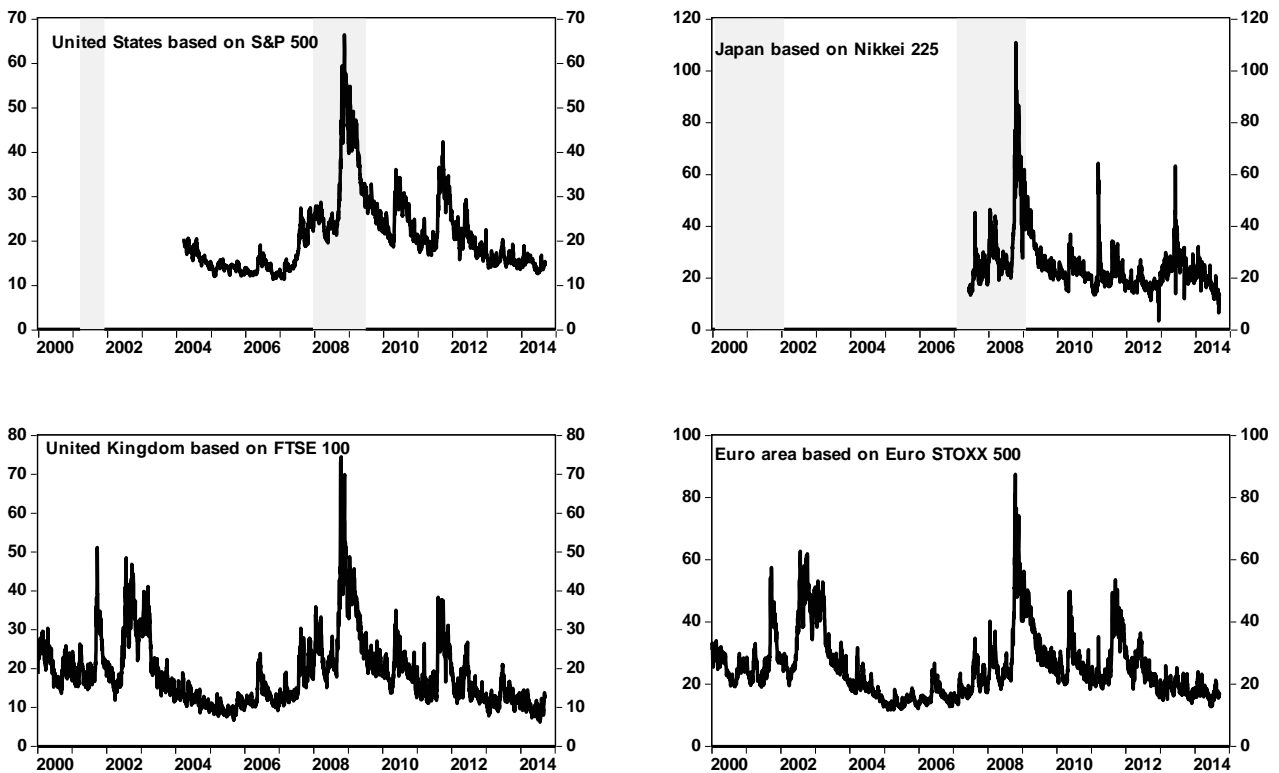
Financial indicators of risk attitude indeed tend to rise during recessions but the increase is usually short-lived. In the United States, the spread between government bond yields and high-yield corporate bond yields increased significantly during the past three recessions, in particular in the aftermath of the latest financial crisis (Figure 8). Nevertheless, it has declined considerably since its peak in 2008 and now is close to the historical minimum. Stock market volatility in the United States – another proxy of risk aversion – shows a similar pattern (Figure 8). In several other advanced OECD countries, for which long time series are available, measures of financial uncertainty follow similar trends. Correspondingly, economic forecasts do not suggest persistent perceptions of downturns. In the United States, the anxious index based on the Federal Reserve Bank of Philadelphia's survey of professional forecasters indicates that the probability of a decline in real GDP in a next quarter drops relatively fast after the end of recession (Figure 9).

Figure 8. Risk-taking indicators

A. Spreads between corporate and government bond yields ¹
Percentage points



B. Stock market volatility ²



1. The spreads for Japan and United Kingdom are between the 10-year government bond yield and the corporate bond yield of BBB grade. The spreads for Euro area and United States are between the 10-year government bond yield and the high-yield corporate bond yields.

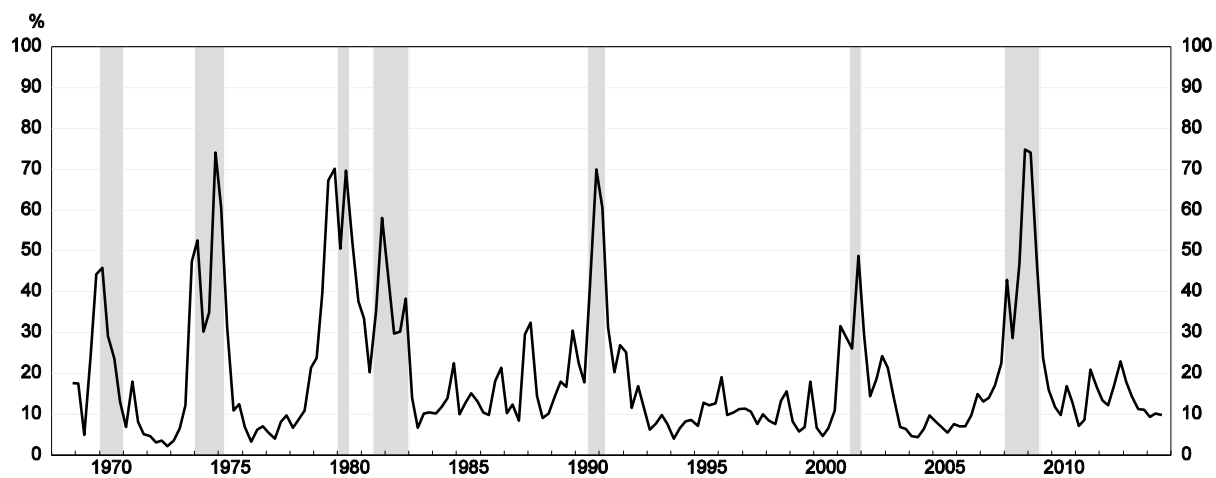
2. Stock market volatility is the implied volatility of a call option on the main stock market index in-the-money.

Note: Shading refers to the recession periods.

Source: Datastream; Japanese Cabinet Office; and NBER.

Figure 9. The Anxious Index

Probability of a decline in real GDP



Note: The survey asks panellists to estimate the probability that real GDP will decline in the quarter in which the survey is taken and in each of the following four quarters. The anxious index is the probability of a decline in real GDP in the quarter after a survey is taken.

Source: Federal Reserve Bank of Philadelphia.

BIBLIOGRAPHY

- Ahrend, R., P. Catte and R. W. Price (2006), “Factors Behind Low Long-Term Interest Rates”, *OECD Economics Department Working Papers*, No. 490, OECD Publishing.
- Bank of England (2013), *Monetary Policy Trade-Offs and Forward Guidance*, August.
- Barro, R. J. (2006), “Rare Disasters and Asset Markets in the Twentieth Century”, *Quarterly Journal of Economics*, Vol. 121(3), pp. 823-866.
- Basel Committee on Banking Supervision (2010), “Results of the Comprehensive Quantitative Impact Study”, Bank for International Settlements, 16 December.
- Bernanke, B. (2005), *The Global Saving Glut and the U.S. Current Account Deficit*, remarks at the Sandridge Lecture, Virginia Association of Economics, Richmond, Virginia.
- Blanchard, O. J., D. Furceri and A. Pescatori (2014), “A Prolonged Period of Low Interest Rates?”, in C. Teulings and R. Baldwin (eds), *Secular Stagnation: Facts, Causes and Cures*, A VoxEU.org eBook.
- Blundell-Wignall, A. and C. Roulet (2014), “Problems in the International Financial System”, *OECD Journal: Financial Market Trends*, Vol. 2014/1, OECD Publishing.
- Borio, C. E. V. (2012), “The Financial Cycle and Macroeconomics: What Have We Learnt?”, *BIS Working Papers*, No. 395.
- Borio, C. E. V. (2014), “Monetary Policy and Financial Stability: What Role in Prevention and Recovery?”, *BIS Working Papers*, No. 440.
- Borio, C. E. V. and P. Disyatat (2011), “Global Imbalances and the Financial Crisis: Link or No Link?”, *BIS Working Papers*, No. 346.
- Bouis, R., Ł. Rawdanowicz, J.-P. Renne, S. Watanabe and A. K. Christensen (2013), “The Effectiveness of Monetary Policy since the Onset of the Financial Crisis”, *OECD Economics Department Working Papers*, No. 1081, OECD Publishing.
- Brook, A. (2003), “Recent and Prospective Trends in Real Long-Term Interest Rates: Fiscal Policy and other Drivers”, *OECD Economics Department Working Papers*, No. 367, OECD Publishing.
- Campbell, J. Y., R. J. Shiller and L. M. Viceira (2009), “Understanding Inflation-Indexed Bond Markets”, *Brookings Papers on Economic Activity*, Vol. 40(1), pp. 79-138.
- Desroches, B. and M. Francis (2007), “World Real Interest Rates: A Global Savings and Investment Perspective”, *Bank of Canada Working Papers*, No. 16.
- Eser, F. and B. Schwaab (2013), “Assessing Asset Purchases within the ECB’s Securities Markets Programme”, *ECB Working Papers*, No. 1587.
- Filardo, A. and B. Hofmann (2014), “Forward Guidance at the Zero Lower Bound”, *BIS Quarterly Review*, March, pp. 37-53.
- Fujii, E. and M. Chinn (2001), “Fin de Siècle Real Interest Parity”, *Journal of International Financial Markets, Institutions and Money*, Vol. 11, pp. 289-308.

- Harvey, A. C. and A. Jaeger (1993), “Detrending, Stylized Facts, and the Business Cycle”, *Journal of Applied Econometrics*, Vol. 8, pp. 231-247.
- Henzel, S. and T. Wollmershäuser (2005), “Quantifying Inflation Expectations with the Carlson-Parkin Method: A Survey-based Determination of the Just Noticeable Difference”, *Journal of Business Cycle Measurement and Analysis*, Vol. 2, pp. 321-352.
- Hofmann, B. and F. Zhu (2013), “Central Bank Asset Purchases and Inflation Expectations”, *BIS Quarterly Review*, March, pp. 73-83.
- IMF (2012), “Safe Assets: Financial System Cornerstone?”, Chapter 3 of *Global Financial Stability Report*, April.
- IMF (2014), *World Economic Outlook*, Chapter 3, Spring.
- Kaminska, I. and G. Zinna (2014), “Official Demand for U.S. Debt: Implications for U.S. Real Interest Rates”, *IMF Working Papers*, No. 66.
- King, M. and D. Low (2014), “Measuring the ‘World’ Real Interest Rate”, *NBER Working Papers*, No. 19887, February.
- Krishnamurthy, A. and A. Vissing-Jorgensen (2012), “The Aggregate Demand for Treasury Debt”, *Journal of Political Economy*, Vol. 120(2), April, pp. 233-267.
- Meaning, J. and F. Zhu (2011), “The Impact of Recent Central Bank Asset Purchase Programmes”, *BIS Quarterly Review*, December, pp. 73-83.
- Miles, D., V. Pillonca and M. Baker (2005), “What Should Equities and Bonds Be Worth in a Risky World?”, *Morgan Stanley Global Economics*, September 12.
- Mishkin, F. S. (2009), “Comments and Discussion”, in Campbell, et al., “Understanding Inflation-Indexed Bond Markets”, *Brookings Papers on Economic Activity*, Vol. 40(1), pp. 79-138.
- OECD (2014), *OECD Economic Surveys: Euro Area 2014*, OECD Publishing.
- Orr, A., M. Edey and M. Kennedy (1995), “The Determinants of Real Long-Term Interest Rates: 17 Country Pooled-Time-Series Evidence”, *OECD Economics Department Working Papers*, No. 155, OECD Publishing.
- Roubini, N. and B. Setser (2005), “Will the Bretton Woods 2 Regime Unravel Soon? The Risk of a Hard Landing in 2005-2006”, paper presented at the symposium of the Federal Reserve Bank of San Francisco and the University of California Berkeley, “Revised Bretton Woods System: A New Paradigm For Asian Development?”, San Francisco, February.
- Tease, W., A. Dean, J. Elmeskov and P. Hoeller (1991), “Real Interest Rate Trends: The Influence of Saving”, *OECD Economic Studies*, No. 17, Autumn.
- Turner, D. and F. Spinelli (2013), “The Effect of Government Debt, External Debt and their Interaction on OECD Interest Rates”, *OECD Economics Department Working Papers*, No. 1103, OECD Publishing.
- Warnock, F. E. and V. C. Warnock (2009), “International Capital Flows and U.S. Interest Rates”, *Journal of International Money and Finance*, Vol. 28, pp. 903-919.

WORKING PAPERS

The full series of Economics Department Working Papers can be consulted at www.oecd.org/eco/workingpapers

1166. *The effect of the global financial crisis on OECD potential output*
(October 2014) by Patrice Ollivaud and David Turner
1165. *Determinants of households' investment in energy efficiency and renewables – evidence from the OECD Survey on household environmental behaviour and attitudes*
(October 2014) by Nadia Ameli and Nicola Brandt
1164. *Addressing high household debt in Korea*
(September 2014) by Randall S. Jones and Myungkyoo Kim
1163. *Reducing the high rate of poverty among the elderly in Korea*
(September 2014) by Randall S. Jones and Satoshi Urasawa
1162. *Promoting the financing of SMEs and start-ups in Korea*
(September 2014) by Randall S. Jones and Myungkyoo Kim
1161. *Fostering inclusive growth by promoting structural change in the business sector*
(September 2014) by Rauf Gönenç, Oliver Röhn, Vincent Koen and Fethi Ögünç
1160. *Reducing macroeconomic imbalances in Turkey*
(September 2014) by Oliver Röhn, Rauf Gönenç, Vincent Koen and Evren Erdoğan Coşar
1159. *Reinvigorating the EU Single Market*
(September 2014) by Jean-Marc Fournier.
1158. *An exploration of the determinants of the subjective well-being of Americans during the great recession*
(August 2014) by Aida Caldera Sánchez and Caroline Tassot.
1157. *Boosting the development of efficient SMEs in the Netherlands*
(September) by Rafał Kierzenkowski and Jochebed Kastaneer
1156. *Making the banking sector more resilient and reducing household debt in the Netherlands*
(September 2014) by Rafał Kierzenkowski, Olena Havrylchyk and Pierre Beynet
1155. *US long term interest rates and capital flows to emerging economies*
(July 2014) by Eduardo Olaberria
1154. *Productivity measurement with natural capital and bad outputs*
(July 2014) by Nicola Brandt, Paul Schreyer and Vera Zipperer
1153. *Reducing income inequality and poverty and promoting social mobility in Korea*
(July 2014) by Randall S. Jones and Satoshi Urasawa
1152. *Fostering a creative economy to drive Korean growth*
(July 2014) by Randall S. Jones and Myungkyoo Kim

1151. *Economic uncertainties and their impact on activity in Greece compared with Ireland and Portugal*
(July 2014) by Jan-David Schneider and Claude Giorno
1150. *Workplace stress in the United States: issues and policies*
(July 2014) by Michael Darden
1149. *Taxing the rent of non-renewable resource sectors: a theoretical note*
(July 2014) by Julien Daubanes and Saraly Andrade de Sá
1148. *Health, work and working conditions: a review of the European economic literature*
(July 2014) by Thomas Barnay
1147. *Making the best of new energy resources in the United States*
(July 2014) by Douglas Sutherland
1146. *Improving well-being in the United States*
(July 2014) by Aida Caldera Sánchez, Patrick Lenain and Sarah Fléche
1145. *Deconstructing Canada's housing markets: finance, affordability and urban sprawl*
(July 2014) by Calista Cheung
Restructurer les marchés canadiens du logement : financements, accessibilité financière et étalement urbain
(Juillet 2014) par Calista Cheung
1144. *Women's role in the Swiss economy*
(July 2014) by Richard Dutu
Le rôle des femmes dans l'économie suisse
(Juillet 2014) par Richard Dutu
1143. *Overcoming skills shortages in Canada*
(July 2014) by David Carey
Comblent les pénuries de compétences au Canada
(Juillet 2014) par David Carey
1142. *Trade patterns in the 2060 world economy*
(July 2014) by Jean Chateau, Lionel Fontagné, Jean Fouré, Åsa Johansson and Eduardo Olaberria
1141. *The Demand for Skills 1995-2008: A global chain perspective*
(July 2014) by Bart Los, Marcel P. Timmer and Gaaitzen J. De Vries
1140. *International migration: The relationship with economic and policy factors in the home and destination country*
(July 2014) by Ben Westmore
1139. *Gross earning inequalities in OECD countries and major non-member economies: determinants and future scenarios*
(July 2014) by Henrik Braconier and Jenifer Valenzuela Ruiz
1137. *Managerial capital and business R&D as enablers of productivity convergence*
(September 2014) Dan Andrews and Ben Westmore