



In This Issue

- 1 Public Debt in Advanced Economies and Its Spillover Effects on Long-Term Yields
- 1 Expansionary Fiscal Contractions: The Empirical Evidence
- 6 Q&A: Seven Questions about Income Inequality
- 10 IMF Working Papers
- 13 IMF Economic Review
- 14 Staff Discussion Notes

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Research Summaries

Public Debt in Advanced Economies and Its Spillover Effects on Long-Term Yields

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Following the recent financial crisis and the associated rise in the already high levels of public debt, concerns for fiscal sustainability remain elevated in many advanced economies. This article analyzes the likely effect of the high and rising government debt of large advanced economies (AEs) on the borrowing rates of small open economies, as well as most of the emerging market economies (EMEs). The results indicate that beyond a threshold, a rise in public debt ratio in large AEs increases the long-term rates in EMEs and that depending on the level of public debt in AEs, this effect could be large.

There is a vast literature analyzing the impact of debt-financed fiscal expansion on domestic long-term real yields. The theoretical foundations for such an effect are well known. Fiscal expansion, even a temporary one, will lead to a permanent

(continued on page 2)

Expansionary Fiscal Contractions: The Empirical Evidence

Rina Bhattacharya and Sanchita Mukherjee



The possibility that fiscal policy may have non-Keynesian effects, and in particular the idea that fiscal consolidation can be expansionary even in the short run, has stimulated interest among academic economists and policymakers since at least the early 1990s. The sovereign debt crises that have been haunting Europe since early 2010 have brought this subject to the fore of the debate on fiscal policy once again. Recent studies have re-examined the empirical evidence for expansionary fiscal contractions.

Policymakers, particularly in Europe, are having to delicately balance the need to reassure the financial markets and credit rating agencies against the danger of jeopardizing the fragile recovery of their economies or of pushing their economies further into recession.

Achieving and maintaining a sustainable level of public debt over the medium term will require a major and sustained fiscal adjustment in most advanced

(continued on page 4)

Public Debt in Advanced Economies and Its Spillover Effects on Long-term Yields

(continued from page 1)

increase in the stock of public debt unless reversed. A higher stock of public debt in the long run replaces other assets in the portfolio of agents and therefore crowds out productive capital. That is, agents do not increase private savings enough to offset the fall in public savings, therefore the long-run real interest rate has to rise and investment goes down. Ricardian equivalence, on the other hand, implies that an increase in the fiscal deficit (and therefore of the debt) has an insignificant impact on yields, because agents anticipate the forthcoming increases in taxes and raise private savings, thus offsetting the reduction in public savings. Overall savings in the economy does not change and therefore there is no reason for the interest rates to increase.

Most of the empirical evidence suggests that an increase in public debt raises long-term yields. We refer the readers to the work by Engen and Hubbard (2004) for a review of the empirical literature (although some recent papers including Ardagna, Caselli, and Lane, 2007; Baldacci and Kumar, 2010 are not covered). This large body of literature finds that the estimated effect of an increase of the debt ratio of 1 percent of GDP on long-term real yields ranges from 3 to 7 basis points.

In a recent article (Alper and Forni, 2011), we incorporate the two issues taken up by the recent empirical literature in our empirical framework: the importance of using real time fiscal data and the importance of non-linearity that characterize the relationship between public debt and long-term real yields. Laubach (2009) argues that establishing an empirical relationship between the current level of debt and the current level of long-term real rates may be distorted by the state of the business cycle. During recessions, while budget deficits increase due to the operation of automatic stabilizers, long-term interest rates may fall, if the central bank implements monetary easing. Therefore, if the cycle is not properly controlled for, the relationship between the two variables can turn out to be the opposite of what the theory would suggest. To address this problem, Laubach suggests using long-horizon expectations of both interest rates and fiscal variables because they should not be affected by current cyclical conditions. Ardagna, Caselli, and Lane (2007), emphasize the importance of non-linearities in the relationship and report that only past a given threshold, an increase in debt levels exerts upward pressure on long-term real rates.

Our paper extends the empirical approach of both Laubach and Ardagna and others to a large set of AEs and EMEs, drawing on vintages of the IMF's World Economic Outlook database rather than *ex-post* data. The dataset starts from 2002, as before real-time forecasts for emerging market economies' debt levels are not available. We make use of

“Most of the empirical evidence suggests that an increase in public debt raises long-term yields.”

expectations, not only on fiscal variables but also on other fundamental variables (inflation and growth rates, among others). Real time expectations should reflect the information set actually available to market participants when interest rates are determined. Finally, since the WEO database is issued twice a year, we are able to use semi-annual data in our estimations.

As for the long-term yields, we use data from the IMF's WEO database for AEs. Given their size, high and increasing deficit levels in large AEs reduce the level of savings at the global level, and therefore increases the risk-free rates prevailing in the international financial markets. For EMEs, we use six-month averages of the Emerging Markets Bond Index Global stripped spreads from JPMorgan (quoted in U.S. dollars). We use spreads as a proxy for long-term borrowing cost in EMEs as they tend to be small open economies that rely on foreign financing and, as such, are not able to affect the risk free rate prevailing in the global market, but only their country-specific risk premium.

In the article, we tackle the following three issues sequentially: 1) the impact of rising public debt on domestic long-term rates, for AEs and EMEs; 2) the spillover from the debt of large AEs to long-term real returns in EMEs (and other AEs); and 3) the magnitude of pass through to EMEs and other AEs, following a surge in long-term real rates in large AEs.

To provide evidence on the first issue, we run fixed effects regression models previously proposed in the literature where the long-term real yield is correlated with variables capturing the state of the cycle (expected growth and inflation), the monetary policy stance (real short-term money market rate), and the expected debt level and its square.

We include the square of the expected level of debt as it has been shown that the relation between the level of debt and long-term bond yields tend to be non-linear and with a U-shaped form. The rationale for this shape is the following: when the stock of public debt is limited, additional public borrowing can increase market liquidity and reduce price volatility, therefore leading to a surge in demand; at higher levels of public debt, liquidity considerations start to play a smaller role, while the crowding out effect and public debt sustainability concerns start becoming more important. In the regression analysis we also include various control variables: a measure of financial openness as a proxy for the level of integration in the global financial market, the ratio of liquid liabilities of the financial system as a share of GDP to control for financial development, the current account balance-to-GDP to capture the effect of capital inflows, foreign reserve-to-GDP ratio to take into account the recent buildup in reserves in many EMEs and the VIX (U.S. Stock Market Volatility Index) to proxy global risk aversion.

We then assess whether long-term real interest rates depend on measures of “global debt.” We include measures of expected global debt in our baseline specification described above. We consider three possible aggregates for global debt: (i) the PPP-GDP weighted average of one-year-ahead expected debt to GDP ratio in G20 AEs (excluding Japan); (ii) the one-year-ahead U.S. public debt to GDP ratio; and (iii) the PPP-GDP weighted average of the four largest euro area economies’ public debt as a share of GDP. We include also some “global” controls, including global short-term real interest rate, global expected growth and inflation. Finally, in order to assess the third point, we replace the “global debt” measure with analogous weighted averages of long-term real yields (we include only the linear term and not the quadratic in this case).

Overall, our main conclusions are the following:

- Our results support previous findings of a positive effect in the rise in public debt on domestic long-term real yields once a certain debt level is reached. Specifically, long-term real rates rise by about 2.5 to 4 basis points for a 1 percentage point increase in one-year-ahead expected debt-to-GDP ratio in EMEs past a threshold for the debt ratio of about 50 percent. On the other hand, for AEs our estimates support a linear effect with impact ranging between 2.5 and 7 basis points.
- EMEs are exposed to increases in funding costs when the public debt ratio in large AEs grows beyond a threshold of about 70–80 percent of GDP. A 1 percent of GDP increase in expected public debt-to-GDP ratio in large AEs (and in particular the United States) has a significant impact (about 10 basis points evaluated at the 2010 debt ratio levels) on long-term real rates of EMEs. We also show that the U.S. debt ratio has a broadly similar impact on the long-term real yields of other AEs.
- The interest rate channel is an important element in explaining the spillover effect from the debt of AEs. We show that long-term real rates in AEs, and in particular in the United States, have significant spillover effects on other countries’ real rates.

These results suggest that the current high debt levels of AEs have significant spillovers to EMEs, but also to other AEs, in terms of higher real long-term rates. This negative externality should be taken into account when the authorities of large AEs weigh the pros and cons of fiscal consolidation.

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Expansionary Fiscal Contractions: The Empirical Evidence

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economies. The precise magnitude of primary balance adjustment required is quite sensitive to assumptions—for example, on interest rates and growth rates. Nevertheless, the scale of the fiscal problem is large for almost all reasonable sets of parameter values. IMF staff carried out baseline simulations to determine the improvement required in the structural primary balance in advanced economies to either achieve a debt-to-GDP ratio of 60 percent by 2030, or to stabilize the debt-to-GDP ratio at the end-2012 level for those countries where the ratio is below 60 percent (Abbas and others, 2010). These simulations suggest that the required adjustment in the structural primary balance amounts to 8 percentage points of GDP over the period 2011 to 2020, implying a fiscal effort of $\frac{3}{4}$ percentage points of GDP per year. Not surprisingly, however, the required fiscal adjustment varies considerably across countries, ranging from just under a $\frac{1}{2}$ percentage point of GDP for Switzerland to over 13 percentage points of GDP for Japan, Ireland, and Greece.

Countries such as Canada and Ireland have managed in the past to significantly reduce their fiscal deficits—by around 10 percent of GDP—over a relatively short period of time. However, countries that are currently undertaking fiscal adjustment are in a unique situation from a historical perspective in at least two ways. First, rarely have so many major economies faced the need to cut their budget deficits at the same time. Second, many countries that undertook fiscal consolidation in the past were able to offset the adverse impact on output through expansionary monetary policy and/or by devaluing their exchange rates. Today most advanced countries have little or no scope to further loosen their monetary policies or, in the case of the euro zone economies, to devalue.

The traditional presumption that short-term fiscal multipliers are always positive has been challenged on both theoretical and empirical grounds. From a theoretical viewpoint it has been noted that, once the impact on risk premiums and expectations are taken into account, the negative demand impact of lower fiscal deficits may be more than offset by an increase in private domestic demand. A growing empirical literature has also critically reassessed the short-term and long-term effects of fiscal policy among different countries and time periods. One of the more striking findings of this literature has been the possibility of negative fis-

cal multipliers connected to strong fiscal consolidations. The famous adjustment episodes in Ireland and Denmark in the 1980s—where consolidation was followed by a sharp upturn in growth—led to several studies that implied negative multipliers may in fact be more widespread than suggested by conventional wisdom (Giavazzi and others, 2000).

“Not surprisingly, however, the required fiscal adjustment varies considerably across countries.”

There are primarily two mutually non-exclusive views to explain why fiscal adjustments can be expansionary. The first one, proposed by Giavazzi and Pagano (1990) and Blanchard (1990) and further explored by Bertola and Drazen (1993) and Sutherland (1997), emphasizes wealth effects on consumption and expectations of future tax liabilities. In addition, private demand reacts to the perceived credibility of the adjustment. The second view, proposed by Alesina and Perotti (1997a, 1997b) and Alesina and Ardagna (1998), emphasizes the supply-side effects of fiscal adjustment measures operating through the labor market.

Fiscal adjustments operate through both the demand side and the supply side. Two mechanisms may be at work on the demand side: (1) wealth effects on consumption, and (2) credibility effects on interest rates. When spending cuts are perceived as permanent, consumers anticipate a reduction in the tax burden and a permanent increase in their lifetime disposable incomes. Thus, in contrast to the Keynesian case, the wealth effect predicts that private consumption increases when government spending is cut. The size of the increase in private consumption depends on the absence of liquidity-constrained consumers and on the efficiency of financial markets. Similarly, while a tax increase should reduce private demand and be contractionary, in some cases it can be expansionary. This may be the case if tax hikes today imply a change of fiscal regime, so that consumers believe that previously anticipated larger tax increases will not be necessary in the future.

The second source of expansionary effects of fiscal consolidations is the credibility argument on interest rates. At high or rapidly increasing levels, public debt may face a significant interest rate premium due to inflation or default risks. A fiscal consolidation, if perceived as permanent and

successful, can bring about a discrete reduction in real interest rates. Here too initial conditions are important. Risk premia are likely to be significant only when the level of the debt/GDP ratio crosses some relatively high threshold (Alesina and others, 1992). Recent research by IMF staff suggests that the frequently cited cases of Ireland and Denmark could be stand-alone cases and that the “credibility” effect of fiscal consolidation on interest rates may not apply more generally (IMF, 2010).

The macroeconomic impact of fiscal adjustment measures will also depend on the stance of monetary policy. In the standard Keynesian model, a fiscal contraction can be expansionary or neutral if it is accompanied by a sufficiently lax monetary policy, which in a small open economy may take the form of devaluation. In particular, a devaluation at the onset of fiscal adjustment can help to maintain (or even increase) aggregate demand by giving a boost to exports, thereby offsetting—at least to some extent—the contractionary impact of any fall in domestic demand arising from the fiscal consolidation measures.

Finally, as Giavazzi, Jappelli, and Pagano (2000) note, a common finding of the empirical studies on non-Keynesian effects of fiscal policy is that the response of private sector demand may be non-linear: both the magnitude and the sign of the response appear to change depending on the conditions under which the impulse occurs and on its characteristics.

Bhattacharya and Mukherjee (2010) explore the hypothesis that the propensity to consume out of income varies in a non-linear fashion with fiscal variables, and in particular with government debt per capita. Using data from 18 OECD countries, the authors first apply a Kalman Filter to derive time-varying estimates of the marginal propensity to consume for each of these countries. They go on to use standard panel data estimation methods to see if there is a non-linear relationship between the estimated marginal propensities to consume and the ratio of government debt to household income. The ratio of government consumption to GDP is included as an additional explanatory variable to empirically examine the evidence that private consumption and government consumption are complements/substitutes in the household utility function. Their empirical results lend strong support to the hypothesis that households move from non-Ricardian to Ricardian behavior as government debt reaches high levels and as uncertainty about future taxes increases.

Recent studies by IMF staff (IMF, 2010 and Guajardo and others, 2011) have forcefully argued that fiscal austerity is unlikely to trigger faster growth, at least in the short term. While this may indeed be the case, the empirical evidence presented in Bhattacharya and Mukherjee (2010) strongly suggest that the contractionary impact of fiscal consolidation in heavily indebted advanced economies may be offset, at least in part, by higher private consumption.

More specifically, in Australia, Belgium, Canada, and Spain, their estimates of the private marginal propensity to consume show a trend rise over the past decade at the same time that the government net debt to gross household income ratio fell. This indicates that the relationship between these two variables can become negative during periods of high government indebtedness once economic agents are convinced about the authorities’ commitment to fiscal consolidation. The policy implication, at least for these countries, is that the direct negative impact of fiscal consolidation measures may be offset, at least in part, by increases in private consumption. The same may be true for other highly indebted countries that have witnessed large increases in public debt in the period since the onset of the global financial crisis in 2008, such as the United Kingdom and the United States. However, in these countries the offsetting impact of higher private consumption is likely to be much more muted due to the current high levels of debt of households relative to their disposable incomes.

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(continued on page 7)



Seven Questions about Income Inequality

Laura Feiveson



A recent flurry of media and academic attention toward rising inequality across the world has generated a tremendous amount of research on inequality trends and their causes and consequences. While some of the hype on the topic is warranted, the large and expanding literature has made it difficult to sift out the main facts. These seven questions attempt to highlight the basic points made by the recent literature.

Question 1: What is the basic measurement of income inequality?

The most common way to measure inequality is the Gini coefficient, which is an index that ranges from zero to one, with a value of zero corresponding to equal incomes across all recipients and a value of one corresponding to a situation in which one household receives all of the income in the economy. As Figure 1 shows, the Gini coefficient varies substantially across countries.

Question 2: How much has income inequality increased over the past few decades?

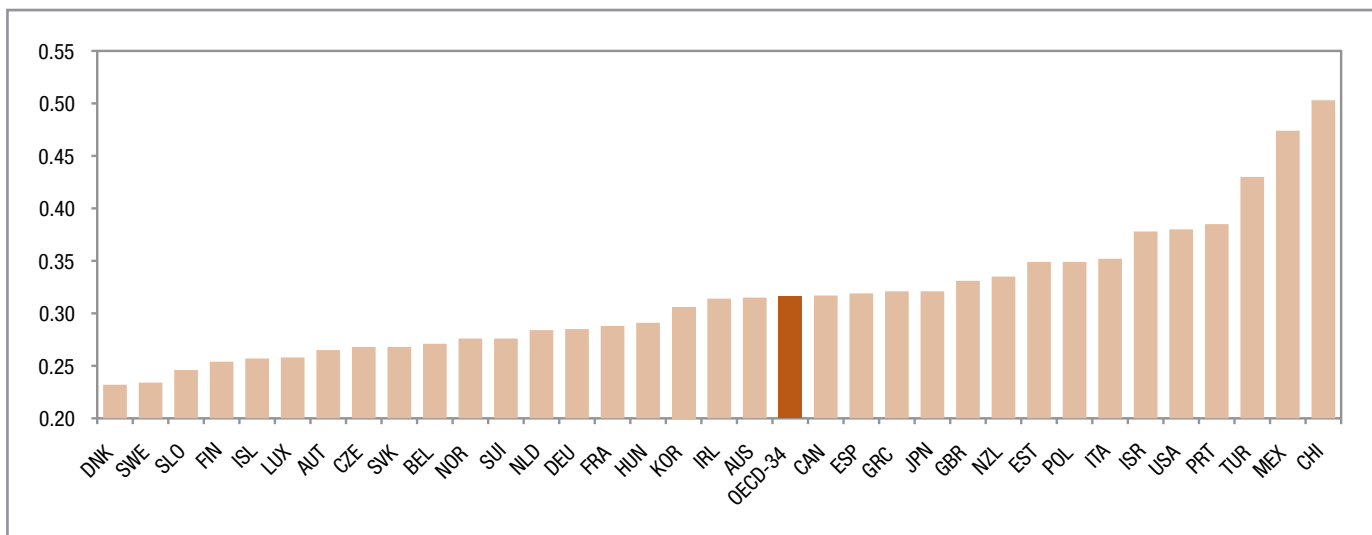
Much of the recent concern about inequality has been centered on the trends over the last few decades. Most

OECD countries saw increases in their Gini coefficients from the mid-1980s to the mid-2000s, as shown in Figure 2. The OECD average increase was only about 0.02 points. This change is about equivalent to the difference in inequality between Austria and Germany—not necessarily a magnitude that, in itself, deserves a high level of scrutiny. However, the consistency of the upwards trend across countries along with large increases in select countries have warranted probing into the causes and consequences of inequality.

Question 3: What has caused this rise in income inequality?

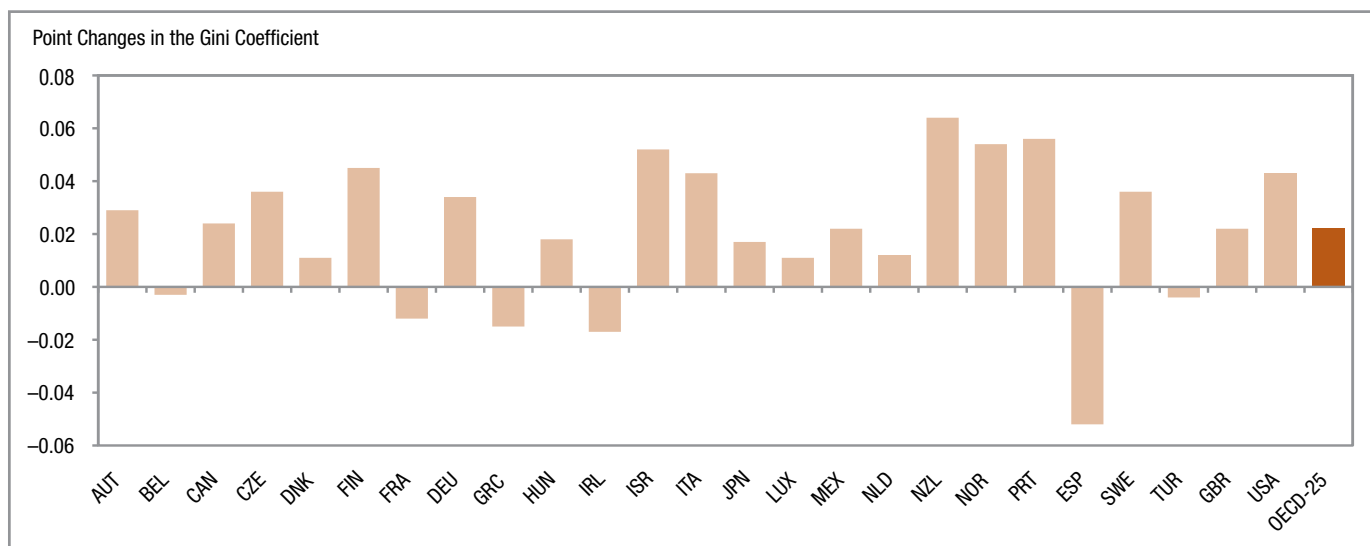
Skilled-based technological change is thought to be one of the leading causes driving the increase in inequality in advanced economies over the past four decades. The middle class has been “hollowed out” as machines have replaced medium-skilled labor (Acemoglu and Autor, 2011). More recently, another economic change that has contributed to the decline of middle-income jobs in developed countries is the increase of globalization. As medium-skilled jobs move off-shore, the replaced workers must face a decision of increasing their education to obtain higher-paying jobs or to move to lower-paying jobs. This effect has become more prominent in the 2000s

Figure 1: Gini Coefficients of Income Inequality in OECD Countries, Mid-2000s



Note: Countries are ranked, from left to right, in increasing order in the Gini coefficient. Income concept is post-tax and post-transfer.
Source: OECD.Stat.

Figure 2: Trends in Income Inequality in OECD Countries, Mid-1980s to Mid-2000s



Note: OECD-25 refers to the simple average of the 25 OECD countries with data spanning the entire period. The change shown is from around-1990 to mid-2000s for the Czech Republic, Hungary, and Portugal.

Source: OECD.Stat.

than it had been in the preceding decades (Autor, Dorn, Hansen, 2011).

Two other possible contributors to the increase in income inequality are the decline of unions and the decline of the real minimum wage in many advanced economies. Historically, unions have affected the wage structure by boosting the wages of lower middle class workers (Card, 2001). In the United States, the percent of private sector workers covered by unions has decreased from more than 20 percent in the

mid-1970s to less than 10 percent in 2010. At the same time, since the nominal minimum wage has not increased in step with inflation, the real minimum wage has decreased in many countries, contributing to the decline of real wages of the lowest income quintile. Furthermore, the increase of immigration and the use of illegal immigrant labor have weakened unions and the application of the minimum wage.

(continued on page 8)

Expansionary Fiscal Contractions: The Empirical Evidence (continued from page 5)

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Seven Questions *(continued from page 7)*

Finally, an important factor in the rise in inequality has been the emergence of a powerful financial sector. A substantial portion of the rise in income inequality has been due to the increase in the share of income accruing to the top 1 percent of the income distribution (Atkinson, Piketty, and Saez, 2011). This rise is at least partially due to a dramatic increase in salaries in the financial sector which, in turn, can be attributed to the structure of the financial system and its associated incentives.

Question 4: What are the possible negative consequences of the rise in income inequality?

Recent research has shown that societies with high inequality tend to adopt policies that hinder long-term growth potential, due to conflicts between the holders of economic power and political power (Berg and Ostry, 2011). In addition, these societies face short-term destabilizing influences. High levels of inequality may increase the competition between income earners. Lower earners feel social pressure to borrow, if possible, in order to maintain a consumption level that approaches that of their wealthier neighbors. The overleveraging that might follow can lead to macroeconomic instability and is thought to be one of the causes of the recent recession (Rajan, 2010).

The welfare considerations of high inequality extend past the effect on growth and macroeconomic stability. One broad negative consequence of a rise in inequality is an increased stratification of society. The emergence of a class society is bad for social and health outcomes as people are faced with the pressures associated with dramatically different living situations (Pickett and Wilkinson, 2009). High inequality tends to be associated with lower intergenerational mobility, implying that these pressures and their negative consequences may have lasting effects on future generations (Corak, 1993).

Question 5: How can governments intervene in order to stem inequality?

The most direct way for governments to intervene is to implement progressive tax and transfer policies. As Figure 3 shows, governments in OECD countries vary substantially in how successful their policies are in reducing inequality.

In addition to the direct monetary redistribution programs, a government's involvement in equalizing the access to services, such as education, health care, and technology, can have medium- to long-run success in narrowing the income

distribution. Furthermore, regulation of the minimum wage and low-income labor policies can help to boost the earnings of the workers on the low end of the distribution. Lastly, the government may have a role in regulating the financial sector, as mentioned in Question 3.

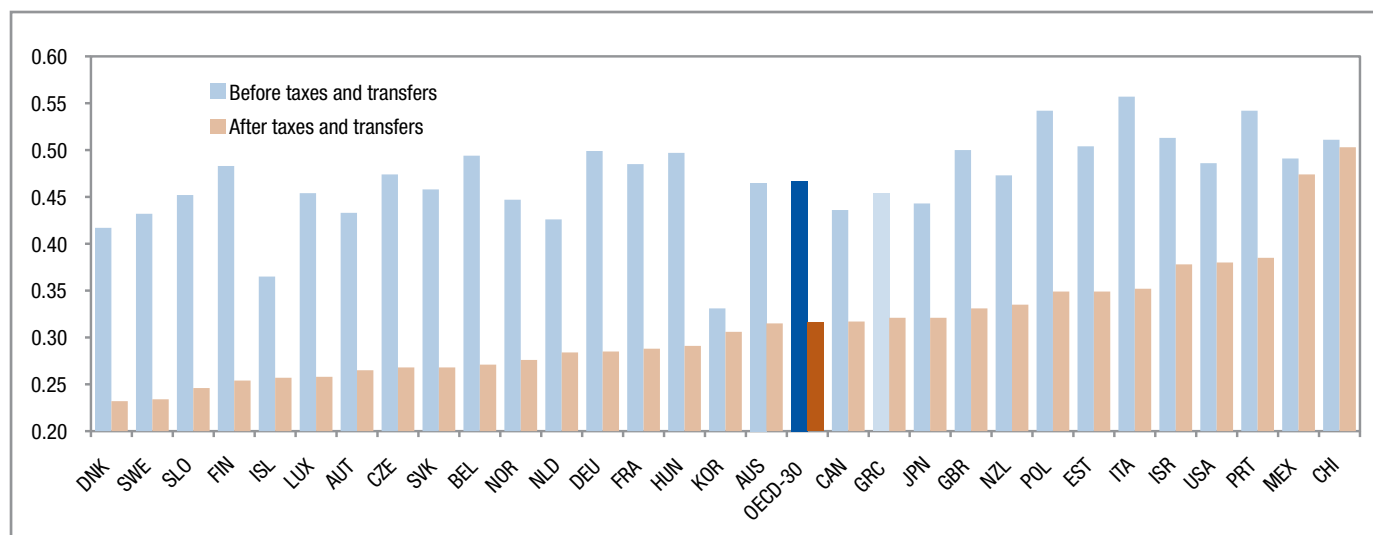
Question 6: Why the focus on income inequality? Are there other measures that are more meaningful?

The focus on *income* inequality largely has to do with the availability of data, even while other measures may better capture welfare concerns. Income inequality may exaggerate the disparities in actual consumption; high income individuals tend to save more and consume less of their income at the same time that public provision of education, health care and other services further narrows the consumption gap between the rich and the poor. Furthermore, higher levels of consumption lead to decreasing rates of marginal utility; with this in mind, happiness inequality may be the closest measure to capturing welfare, yet is also one of the most elusive to measure (Stevenson and Wolfers, 2008). Other types of inequality measures also have their own merits: wealth disparities, differential access to services, and the spread in lifetime earnings. Some economists argue that the percentage of the population in poverty is more relevant than any measure of inequality. Ultimately, the “correct” measure depends on the specific welfare question of interest.

Question 7: Are any of the concerns about the rise in inequality overstated?

There are potentially dramatic welfare implications surrounding the recent increases in inequality in advanced economies. However, some of the concerns highlighted in the media are almost certainly overblown. In a world in which social media makes the emergence of celebrities and mass-marketed products possible, there is more of an opportunity for superstars to amass tremendous amounts of income than there had been earlier in the twentieth century. Furthermore, as economies get richer, more workers choose to curtail their hours in exchange for more leisure; in doing so, an income gap is automatically generated between the average “threshold” worker and those who have a taste for working longer hours for a higher monetary reward (Cowen, 2011). It is questionable whether these contributions to the spread of the income distribution have either negative welfare or growth implications. While it may be difficult to distinguish a destructive rise in income inequality from a positive rise that naturally occurs as a

Figure 3: Gini Coefficients Before and After Taxes and Transfers, Mid-2000s



Note: Countries are ranked, from left to right, in increasing order in the Gini coefficient for post-tax and post-transfer income. OECD-30 refers to the simple average for the 30 OECD countries for which the data are available.

Source: OECD.Stat.

country gets richer, it is important to keep in mind that the goal of reducing inequality is not to hurt the rich at the expense of the poor.

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Working Paper 12/52

Fiscal Policy and the Real Exchange Rate
Chatterjee, Santanu; Mursagulov, Azer

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From Stress to CoStress: Stress Testing Interconnected Banking Systems
Maino, Rodolfo; Tintchev, Kalin

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Pérez, Esther; Yao, Yao

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Coincident Indicators of Capital Flows
Miao, Yanliang; Pant, Malika

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Ding, Ding; Masha, Iyabo

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Shrestha, Manik L.; Mink, Reimund; Fassler, Segismundo

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De Nicoló, Gianni; Lucchetta, Marcella

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Ivanova, Anna

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Working Paper 12/65

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Evans, Martin D. D.

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Kollar, Miroslav

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5/1/12–4/30/13

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Qehaja, Driton

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Khramov, Vadim

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Estevão, Marcello M.; Carvalho Filho, Irineu E.

(continued on page 12)

IMF Working Papers *(continued from page 13)*

Working Paper 12/85

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Mooij, Ruud A. de; Keen, Michael

Working Paper 12/86

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Al-Eyd, A. J.; Amaglobeli, David; Shukurov, Bahrom; Sumlinski, Mariusz A.

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Celasun, Oya; Mihet, Roxana; Ratnovski, Lev

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Karpowicz, Izabela

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Klein, Nir

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Basdevant, Olivier

Working Paper 12/94

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Baldini, Alfredo; Benes, Jaromir; Berg, Andrew; Dao, Mai; Portillo, Rafael

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Singh, Manmohan; Stella, Peter

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Rungcharoenkitkul, Phurichai

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Khramov, Vadim

Working Paper 12/98

Financial Regulation and the Current Account

Lanau, Sergi; Wieladek, Tomasz

Working Paper 12/99

Unemployment and Labor Market Issues in Algeria

Furceri, Davide

Working Paper 12/100

An End To China’s Imbalances?

Ahuja, Ashvin; Chalk, Nigel Andrew; Nabar, Malhar; N’Diaye, Papa; Porter, Nathan

Working Paper 12/101

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Ueda, Kenichi; Valencia, Fabian

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Chen, Jiaqian; Imam, Patrick A.

Working Paper 12/103

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Pouvelle, Cyril

Working Paper 12/104

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Abdih, Yasser; Barajas, Adolfo; Chami, Ralph; Ebeke, Christian

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November 8–9, 2012

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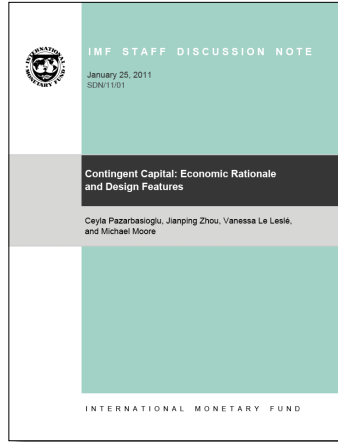
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