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The fiscal stimulus of 2009-10: Trade openness, fiscal space and exchange rate adjustment

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*The Fiscal Stimulus of 2009-10: Trade Openness, Fiscal Space and Exchange Rate Adjustment**

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Abstract

This paper studies the cross-country variation of the fiscal stimulus and the exchange rate adjustment propagated by the global crisis of 2008-9, identifying the role of economic structure in accounting for the heterogeneity of response. We find that greater *de facto* fiscal space prior to the global crisis and lower trade openness were associated with a higher fiscal stimulus/GDP during 2009-2010 (where the d*e facto* fiscal space is the inverse of the average tax-years it would take to repay the public debt). Lowering the 2006 public debt/average tax base from the level of low-income countries (5.94) down to the average level of the Euro minus the Euro-area peripheral countries (1.97), was associated with a larger crisis stimulus in 2009-11 of 2.78 GDP percentage points. Joint estimation of fiscal stimuli and exchange rate depreciations indicates that higher trade openness was associated with a smaller fiscal stimulus *and* a higher depreciation rate during the crisis. Overall, the results are in line with the predictions of the neo-Keynesian open-economy model.

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1. Introduction

The global crisis of 2008-9 focused attention on the role of fiscal policy at times of collapsing aggregate demand. Concerns about experiencing a reincarnation of the great depression induced the OECD (high-income group) and emerging market countries to invoke extraordinary policies for extraordinary times. Countries adopted sizable fiscal stimuli, augmented by unprecedented monetary expansions supported by elastic swap lines between the Federal Reserve and the European Central Bank, and between the Fed and 4 emerging markets. The flight to quality and the shortage of dollar liquidity posed a special challenge for Emerging Markets, inducing them to supplement these policies with both large sales of foreign currencies at the height of the crisis and with sizeable depreciations.

[Table 1]

Yet, there has been a remarkable heterogeneity in the magnitudes of the fiscal stimuli, and of the exchange rate depreciation. The differential patterns of response are traced in Table 1, summarizing the fiscal stimulus/GDP and the depreciation rate in 32 countries, chosen by data availability. The first three columns overview the crisis related fiscal stimulus /GDP, 2009-2011, in OECD countries and emerging markets. The crisis led to a significant fiscal stimulus in the U.S., Japan, and Germany, the magnitude of which increased from 2009 to 2010, reflecting various lags associated with fiscal policy. The fourth and the fifth columns report the massive "bailout" transfers to the banking system in the U.S., Germany and the UK, attempting to stabilize the financial panic. It is noteworthy that the size of the transfers to the financial system exceeded the direct fiscal stimuli in Germany and the UK. Similar trends, though in varying intensity, were observed in other OECD countries.

China, South Korea and Russia provided front loaded fiscal stimulus at rates that were well above that observed in most OECD countries. Notable is the greater agility of the emerging

markets' response relative to that of the OECD countries, reflecting possibly faster policy response capacity of several emerging markets. The deeper safety net of the OECD [unemployment insurance, food stamps, social security, socialized medical care, etc.] provides automatic stabilizers that work to cushion the economy in addition to the crisis related stimulus. Dolls et al. (2010) reported, "We find that automatic stabilizers absorb 38 per cent of a proportional income shock in the EU, compared to 32 per cent in the U.S. In the case of an unemployment shock 47 percent of the shock are absorbed in the EU, compared to 34 per cent in the U.S. This cushioning of disposable income leads to a demand stabilization of up to 30 per cent in the EU and up to 20 per cent in the U.S. There is large heterogeneity within the EU. Automatic stabilizers in Eastern and Southern Europe are much lower than in Central and Northern European countries." In contrast, emerging markets with a more limited safety net but with larger fiscal space tend to benefit by a more aggressive crisis related fiscal stimulus, compensating partially for the absence of deeper social insurance.

In this paper we study the response heterogeneity of countries during the crisis, indentifying the associations of economic structure [trade openness, fiscal capacity, etc.], the size of fiscal stimuli and the exchange rate depreciations during the crisis. A useful theoretical anchor predicting such heterogeneity is the neo-Keynesian open-economy, as predicted by the Meade's (1951a, b) framework. The textbook Meade model implies that at times of collapsing aggregate demand, economies that are more closed [or less open] should opt for a larger fiscal stimulus and should opt for larger fiscal stimuli, and should rely less on exchange rate depreciation [e.g., Blanchard (2008)].[1] Trade openness implies lower fiscal multipliers, as a share of the stimuli would 'leak.' Trade openness may also increase the relative potency of exchange rate depreciation (relative to the fiscal stimulus) in mitigating the drop in demand for

[1] See Meade (1951a, b), Fleming (1962), Mundell (1963), Dornbusch (1980) and Obstfeld and Rogoff (1996) for important steps in the evolving neo-Keynesian open economy model.

exportable goods, acting as a demand switching policy, whereby the improved competitiveness of a country increases the demand for net exports.[2]

Fiscal policy is predicated on fiscal space and fiscal capacities. While the notion of fiscal space is fuzzy, it deals with the degree to which a country has the ability to fund a fiscal stimulus without a sizable increase in the real interest rate.[3] The presumption is that public debt overhang [like higher public debt/GDP] reduces the ability to fund fiscal stimuli. Indeed, public debt/GDP has been frequently used by the literature and by policy makers as an important indicator for the soundness of policies, and as a measure of exposure to confidence crises. Reinhart and Rogoff (2010) warned that debt-to-GDP ratios over 90 percent are associated with lower growth.[4] Similarly, the Maastricht criteria imposed thresholds of public debt/GDP below 60 percent, and fiscal deficit/GDP below 3 percent as criteria for joining the Euro.

While these ratios are easy to track, we question the degree to which the normalization of public debt and fiscal deficit by the GDP is an efficient way of comparing and measuring fiscal capacities across countries and across time. A given ratio of the public debt/GDP, say 60 percent, is consistent with ample fiscal space in countries where the average tax collection is about or above 50 percent of the GDP, as is the case in France, Germany and in most northern European countries. The same public debt ratio is associated with a limited fiscal space in countries where the average tax collection is about or below 25 percent, as has been the case in developing countries, emerging markets, and the South-Western Euro Area Peripheral (SWEAP) countries (Greece, Ireland, Italy, Portugal, and Spain). Instead of a normalization of public debt and fiscal deficit by the GDP, we contend that the tax revenue as a share of the GDP, averaged

[2] Needless to say, these considerations ignore the externalities imposed by these tradeoffs on other countries, increasing the potential role of global coordination in mitigating *beggar-thy-neighbor* attitudes.

[3] Heller (2005) defined it "as room in a government's budget that allows it to provide resources for a desired purpose without jeopardizing the sustainability of its financial position or the stability of the economy." Ghosh et al. (2011) defined 'fiscal fatigue' as a situation where government's ability to increase primary balances cannot keep pace with the rising debt.

[4] See Irons and Bivens (2010) for a critical review of this result.

across the business cycle, provides a more efficient way of normalizing macro public finance data.

Specifically, we point out that the tax collection/GDP, averaged to smooth for business cycle fluctuations, provides key information on the availability of the tax revenue to support fiscal policy. We define this ratio as the (*de facto*) tax base: short of a drastic change in tax rates and tax enforcement, the tax base provides a concise summary of the tax capability. The (*de facto*) tax base reflects both the ability and the willingness of a country to fund fiscal expenditure and transfers. Across countries, we find that the *de facto* tax base is more stable than public debt/GDP, and public debt/GDP normalized by the *de facto* tax base is more volatile than public debt/GDP [see the coefficient of variations reported at the bottom of Table 3]. The public debt/GDP normalized by the *de facto* tax base is subject to greater cross country variation, and provides a more robust explanation for the scale of fiscal stimuli. Essentially, the public debt/GDP normalized by the *de facto* tax base measures the average tax years that it would take to 'buy' the outstanding public debt, and provides a stock measure of public debt overhang. We view this measure as a more fundamental metric for fiscal space, as it links the public debt to the resources the public sector can mobilize without drastic change of the social contract. Consequently, we define the d*e facto* fiscal space by the inverse of the average tax-years it would take to repay the public debt.

It is noteworthy that if changing government expenditure and taxes are equally costly, our focus on de-facto fiscal space would be questionable. For example, a high level of tax revenue could be interpreted as leaving little room to raise taxes, thus counting negatively toward fiscal space, unlike our interpretation. Our presumption is that the costs of changing the tax rates and their enforcement are high relative to the lower political costs of changing the public debt/GDP and the fiscal deficit/GDP. Thus, the tax base depends on structural factors that are harder to modify in the short run than adjusting government expenditure. This view is consistent with recent empirical literature finding that tax compliance and individual's willingness to pay taxes is affected by perceptions about the fairness of the tax structure. An individual taxpayer is

influenced strongly by his perception of the behavior of other taxpayers [see Alm and Torgler (2006) and the references therein]. If taxpayers perceive that their preferences are adequately represented and they are supplied with public goods, their identification with the state increases, and thus the willingness to pay taxes rises [Frey and Torgler (2007)]. In a follow up work (Aizenman and Jinjarak, 2011), we studied the relationship between the tax base and income inequality. We found that the GINI coefficient is negatively associated with the size of the tax base/GDP. This implies that changing taxes may be difficult in polarized countries. While all these factors are endogenous in the long-run, they are mostly pre-determined in the short run, the time that the policy maker determines in an unanticipated recession the implementation of fiscal stimuli. In a companion paper, we also study the usefulness of the *de facto* fiscal space measures by showing that they account better for sovereign spreads of countries than the more conventional public debt/GDP [Aizenman, Hutchison, and Jinjarak (2011)].[5]

We use the pre-crisis *de facto* fiscal space and structural controls to account for the patterns of fiscal stimuli and exchange rate adjustments during the crisis, validating the predictions of the MF approach. We find that higher public debt/average tax base is associated with lower fiscal stimulus, and greater trade openness is robustly associated with a lower fiscal stimulus and a higher depreciation rate during the crisis. A one standard deviation increase of the public debt/average tax base lowers the size of the fiscal stimulus by about 2 percent of the GDP. A one standard deviation increase of trade openness increases the nominal depreciation during 2007-2009 by about 7 percentage points.

Section 2 reviews the heterogeneity of the fiscal stimulus and of the exchange rate adjustment during the crisis window. We also investigate the patterns of *de-facto* fiscal capacities in 123 countries, a sample chosen by data availability. Section 3 overviews selectively

[5] Note also that a country's fiscal space is not independent of the assumptions about growth and the real rate of interest, themselves possibly endogenous with respect to taxes and spending. These factors should play a more pertinent role in explaining the long-run patterns of government spending and growth, and are overlooked by our study as we focus on the fiscal stimuli in the first two years following the events of 2007-8.

the literature on fiscal multipliers. Section 4 applies the pre-crisis *de facto* fiscal space measures and other controls in a regression framework, accounting for the heterogeneity of the fiscal stimuli and of the exchange rate adjustments during the crisis. We also describe in this section the relevance of the *de facto* fiscal space in explaining sovereign spreads. Section 5 concludes.

2. Assessment of the *de facto* fiscal space prior to the crisis (2006)

Insight regarding fiscal space is provided by tracing the pre-crisis 2006 public debt/GDP, as a fraction of the pre-crisis average tax revenue/GDP during 2000-2005. To recall, the early 2000s were viewed as the continuation of the blissful "Great Moderation" – a period characterized by a drop in macroeconomic volatility and risk premium during the late 1990s and early 2000s.[6] The pre-crisis average tax revenue/GDP measures the *de facto* tax capacity in years of relative tranquility.

[Figure 1]

The top half of Figure 1 reports the average tax-years needed to repay the public debt measure of 123 countries, subject to data availability in 2006. We obtain this measure by dividing the public debt/GDP in 2006 by the average tax revenue/GDP during 2000-2005. It shows the wide variation in the average tax-years needed to repay the public debt, from well below 1 year in Australia (indicating a high fiscal space), to about 5 years in Argentina, and above 8 years in Bhutan (indicating a very low fiscal space). For most of the countries in our sample, the tax-years it would take to repay the public debt in 2006 were below 5 years. The bottom half of Figure 1 reports another measure of fiscal tightness, focusing on flows instead of

[6] See Stock and Watson (2002) for analysis of the Great Moderation hypothesis. Recent observers refer to 1987-2007 as the "Great Moderation" period.

stocks [i.e., on fiscal deficits instead of public debt]: the fiscal deficits/GDP in 2006 relative to the average tax revenue/GDP.

Figure 1 is consistent with the notion that, even without increasing the tax base, a fair share of countries had significant fiscal space in 2006.[7] The presumption is that a *lower* pre-crisis public debt/GDP relative to the pre-crisis tax base (i.e., higher *de-facto* fiscal space) implies *greater* willingness to fund fiscal stimuli using the existing tax capacity. We apply these concepts in order to explain the cross-country variation in the fiscal stimulus during the aftermath of the global crisis.

[Figure 2]

To track the adjustment of fiscal capacity across countries, the top half of Figure 2 also reports our main fiscal space measure, the debt/GDP normalized by the average tax revenue/GDP, by country groups. Lower pre-crisis public debt/GDP, lower public debt/average tax base, and lower fiscal deficits relative to the average tax base imply greater fiscal capacity. The figure shows that fiscal space was weakest (highest levels of public debt/average tax base) in the low and middle-income countries. Although fiscal space measures are stronger in the SWEAP countries than in low- and middle-income countries, its debt/GDP ratio is higher. Generally, the SWEAP countries had more limited fiscal space during the tranquil period than other OECD countries – higher average public debt relative to the tax base, and a higher level of public debt to GDP. The lower panel of Figure 2 provides similar measures of the fiscal deficit/GDP and fiscal deficit/the tax base.

Some developments of the debt/tax base after 2006 are worth mentioning. High-income OECD and non-SWEAP Euro countries experienced an increase in the debt/tax base ratios of about 0.2 between 2006 and 2010. For SWEAP countries, the deterioration in fiscal

[7] This inference is in line with Aizenman and Pasricha (2010), finding that the projected flow cost of public debt is low for about half of the OECD countries.

circumstances was dramatic: the government debt of Ireland climbed from 25 percent of GDP in 2007 to 93 percent of GDP in 2010, while the government debt of Greece went from 95 percent to 130 percent of GDP. As a result, the public debt/average tax base ratio of Ireland jumped from 0.9 to 3.1 and that of Greece from 3.0 to 4.1, sharply diminishing their ability to conduct a discretionary fiscal policy. The large increase of the debt/tax base ratios in both countries captures a high degree of distress in their economic fundamentals, and the socialization of private banks' liabilities in Ireland.

[Figure 3]

Figure 3 provides the histograms of the average tax collection/GDP, public debt/GDP, public debt/GDP moralized by the average tax base, and the fiscal balance/average tax base of countries in the sample, based on public debt and the fiscal balance of 2006, and the average tax base of 2000-05. The top left panel of the figure shows that the distribution of the tax base is tri-modal, approximately at 15, 25, and 35 percent of GDP. The top right panel suggests the average public debt of 50 to 60 percent of GDP. The bottom left panel shows that most of the public debt/average tax base observations are well below five, with the majority around 2. The fiscal balance/the average tax base in the bottom right panel indicates that this variable is approximately centered around zero.

[Table 2]

We conduct first a descriptive analysis of the between-period stability for the key variables in Table 2. Specifically, we are interested in the relative stickiness of the average tax/GDP, public debt/GDP, and the public debt/average tax base between the 1993-99 and the 2000-2006 periods, within each country in the sample. To have a representative comparison, we do this exercise for countries with at least three years of observations in both periods; this leaves

us with 80 countries. We calculate the mean of these variables for each period, perform a t-test for each country, and report the significant (5 percent) results by country groups as well as the total. The total number of countries with a significant change of the average tax base/GDP over the decades is 66, slightly larger than the number of countries with a significant change of public debt/GDP, 58. A majority of countries sees a drop of average tax base/GDP (34 decline versus 29 increase), while the number of increases and decreases of the public debt/GDP are not as markedly different. In total, within country over the decade, the public debt/average tax base is more volatile than the public debt/GDP.

[Table 3]

Table 3 provides the mean, standard deviation, median, and coefficient of variation for the same sample of 80 countries. The mean tax base is 24 percent of GDP, while the mean public debt is 60 percent of GDP. The mean public debt is 300 percent of the average tax base (3 tax years). The cross-country coefficient of variation confirms that the public debt/average tax base is subject to a sizably greater variation than the public debt/GDP (0.74 versus 0.56).

3. Fiscal multipliers in the Open Economy – literature overview

Before turning to the regression analysis, we place the paper in the context of the evolving literature on fiscal policy at times of distress. Textbook analysis of fiscal stimulus in a closed economy suggests that an increase in government expenditure on goods and services in a closed economy would deliver a greater beneficial stimulus if

- It would not crowd out private sector activities,
- It would not increase interest rates, and would not raise concerns about the future fiscal and monetary stability of the country.

- It would target projects with high social marginal product, and would take place before the onset of the recovery, contributing thereby towards shortening the recession.

Fiscal stimulus in an open economy involves further considerations, as the incipient appreciation under a flexible exchange rate with capital mobility may induce crowding out of export demand. Under a fixed exchange rate with capital mobility, fiscal policy tends to involve positive spillover effects, inducing higher demand for imports and incipient monetary expansion. These considerations imply that, at times of global recession, a properly coordinated fiscal expansion would mitigate most exchange rate appreciation concerns, inducing mutually reinforcing positive spillover effects that increase the ultimate stimulus. Similar considerations apply to a fiscal stimulus in the form of transfer income.

Fiscal skeptics worry frequently about crowding out, and the growing costs of a prolonged fiscal stimulus. As there is no way to conduct controlled experiments regarding these key issues, views about the size of fiscal multipliers diverge. Conventional wisdom has been that developing countries have limited fiscal space – their limited tax capacity and possibly sizable debt overhang imply that a fiscal stimulus may backfire by increasing the interest rate and the risk premium facing the country, inducing down the road an Argentinean vintage 2000-2 type funding crisis. The deeper taxation capacity of the OECD countries suggests wider fiscal space. However, the growing debt overhang associated with lucrative safety nets, unfunded liabilities, aging population and demographic transitions may crowd out most of the fiscal space of OECD countries. These considerations suggest that, while a short term fiscal stimulus following a deep crisis would be supported by most OECD countries, a prolonged fiscal stimulus would induce a vigorous debate that probably would constrain policy makers. These dynamics have been played out vividly in the years following the 2008-9 global crisis.

The literature pointed out the difficulty in calculating the net fiscal multipliers, as there is no simple way to control the 'fiscal experiment.' The estimates of the fiscal multipliers vary, depending on the methodology, period, and controls applied [see Barro and Redlick (2009), Eichenbaum, Christiano, and Rebelo (2009)]. More recent work found that the size of the

multiplier varies considerably over the business cycle: between 0 and 0.5 in expansions and between 1 and 1.5 in recessions [see Auerbach and Gorodnichenko (2010)]. Applying the history of the U.S. during the Second War, Gordon and Kerrn (2010) inferred that when capacity constraints are absent across the economy, the fiscal multiplier is about 1.8, higher than most previous estimates. While useful, these studies focused mostly on the experience of the US and the OECD countries. Ilzetzki, Mendoza and Végh (2010) asked related questions applying relatively comprehensive quarterly data, covering 20 high-income and 24 developing countries. Using the variation offered by this rich data, they estimated fiscal multipliers for different groups of countries. They found that the economies operating under predetermined exchange rate regimes have long-run multipliers that are relatively large (higher than one), but economies with flexible exchange rate regimes have essentially zero multipliers. The response of central banks to fiscal shocks is crucial in assessing the size of fiscal multipliers. Economies that are relatively closed to trade have long-run multipliers of exceeding one, but relatively open economies have negative multipliers. A high outstanding debt of the central government (exceeding 60 percent of GDP) was associated with zero short term and negative long term fiscal multipliers. Sovereign debt ratios above 60 percent of GDP were associated with negative long run effects of fiscal stimulus.

The Ilzetzki et al. (2010) results are consistent with the Neo-Keynesian open economy framework, allowing for the complications associated with partial financial integration due to sovereign risk, and the limited substitutability of domestic and foreign assets. The adverse effects of a fiscal stimulus under a flexible exchange rate are consistent with the crowding out of aggregate demand associated with a fiscal stimulus in economies close to full employment, or without the proper accommodation of monetary policy. Similarly, the adverse effects of trade openness on fiscal multiplier are in line with the neo-Keynesian open economy "linkage channel." While Ilzetzki et al. (2010) sample period ends before the crisis, their results suggest that during the global crisis of 2008-9, countries with lower debt overhang, lower inflation, and lower trade openness would have benefited more by a sizable fiscal stimulus. A lower debt

overhang should mitigate the adverse impact of debt financing on the interest rate. Lower inflation would allow greater monetary accommodation to mitigate any crowding out effects. Smaller trade openness would increase the domestic impact of a given fiscal stimulus. While at times of full employment a fiscal stimulus under a flexible exchange rate induces appreciation, during the global crisis of 2008-9, the deleveraging propagated by the US led to depreciation pressures that impacted most countries. The collapsing global demand mitigated most inflationary concerns related to depreciation, tilting the balance towards a greater willingness to depreciate in order to improve competitiveness.

These considerations suggest that during the crisis of 2008-9, closer economies, or countries with greater fiscal space would opt for a larger fiscal stimulus. Opener countries or countries with more limited fiscal space would opt for a smaller fiscal stimulus and larger exchange rate depreciation. We turn now to empirical tests of these and related hypotheses. We test the degree to which the cross country variation in actual fiscal stimuli confirms the predictions of the MF framework.

4. Fiscal space, exchange rate adjustment, and fiscal stimuli

We apply both public debt/GDP and public debt/GDP normalized by the average tax base concepts in order to explain the cross-country variation in the fiscal stimulus during the aftermath of the global crisis. Recall that Figure 2 suggests that in 2006, the middle-income countries' fiscal space was higher than that of the low-income countries. While the pre-crisis debt overhangs [i.e., the 2006 public debt/GDP] of the low and lower middle income countries were slightly above the other groups, their ratios the public debt/GDP to the average tax base were much higher than that of most the OECD countries [5.94, 3.70 and about 1.5, respectively]. This in turn implies that the low and middle-income countries have had smaller fiscal space than most OPEC countries. Consequently, the fiscal stimuli of the richer countries would have the

side benefit of helping the poorer countries in invigorating the demands facing lower income countries.

[Table 4]

Based on data availability of 123 countries, we present in Table 4 the regression analysis, accounting for the cross-country variation in the fiscal stimulus during 2009-11. The explanatory variables are the public debt/GDP and the *de facto* fiscal space. We begin with these two explanatory variables in the simple OLS estimation in columns (1) and (2). The OLS results show that neither public debt/GDP nor public debt normalized by the average tax base can explain the size of fiscal stimuli. Since there are only 30 or so countries that have a non-zero fiscal stimulus, the OLS method may not be appropriate.

Next we conduct the Tobit estimation (left censoring at zero fiscal stimulus). To account for a potential correlation among countries in each income group, the cross-section estimation is done by clustering at an income group levels (according to the World Bank's income classification). The results in columns (3) and (4), Table 4, indicate that a higher public debt/average tax base is negatively and significantly associated with the size of the fiscal stimuli, whereas the public debt/GDP is not. Lowering the 2006 public debt/average tax base from the average level of low-income countries (5.94) down to the average level of the Euro - SWEAP countries (1.97) increases the crisis stimulus in 2009-11 by 2.78 GDP percentage points. However, studying the size of the pledged financial sector bailouts relative to GDP, we find that public debt/GDP (and not public debt/tax base) is positively and significantly associated with the size of financial bailouts. While the sign of the coefficient estimates is sensible for the public debt/tax base, and counter-intuitive for the public debt/GDP, the baseline regression can be improved by dealing with omitted variable biases, and with concerns that the public debt/tax base and the public debt/GDP are endogenous to other variables.

[Table 5]

Table 5 explains the size of fiscal stimuli using a larger set of variables. To account for the political capacity and for the role of fiscal policy in the open economy, columns (9) and (10) report the Tobit estimation with the state fragility variable[8] and trade openness/GDP. The effects of the public debt/average tax base and the public debt/GDP are similar to those in Table 4. In addition, the size of the fiscal stimuli is negatively and significantly associated with the state fragility and trade openness/GDP. That is, stronger states and closer economies have applied a larger fiscal stimulus during 2009-11.

Columns (13) and (15) report regression results where public the debt/average tax base and public debt/GDP are instrumented by lagged economic fundamentals. These fundamentals are trade openness, financial openness, real GDP per capita, growth rate of total real GDP, government share of real GDP per capita, and the legal origins.[9] For example, in equation 15, the public debt/average tax base (Debt %Tax) is the endogenous regressor, instrumented by variables in equation 16. These regressions also have a decent explanatory power, accounting for about 23 percent of the variations across countries in the public debt/GDP, and about 38 percent in the public debt/tax base. The coefficient of the instrumented public debt/GDP in (13) has a negative sign, so does the coefficient of the instrumented public debt/tax base. Both the public debt/tax base and the public debt/GDP are statistically significant at 1 percent level.

The bottom half of Table 5 reports regressions studying jointly the size of fiscal stimuli and the size of financial bailouts. To account for a possible sample selection bias, we first run the probit estimation of the fiscal stimulus on the instrumented public debt/GDP, on state

[8] The variable takes on the value of 0-25; where 25 = extreme fragility. The scores are based on security, political, economic, and social dimension at the end of the year 2009.

[9] See Besley and Persson (2009) for the role of legal origins on fiscal capacities.

fragility, and on trade openness, column (17), and similarly for the financial bailout in column (18). Then we estimate the seemingly unrelated regression of fiscal stimuli and financial bailout as dependent variables [columns (19) and (22)]. The results indicate that, when both variables are explained jointly, the size of fiscal stimuli can be explained by either the public debt/GDP or the public debt/tax base. Yet, the financial bailouts are not explained well by these variables.

[Figure 4]

We can now provide the economic significance of the public debt/GDP and the public debt/tax base in the cross-country estimates, regressions (19) and (22) of Table 5. For each explanatory variable, we multiply its standard deviation with the estimated coefficient in the regression, to approximate the effect of its one standard deviation change on the size of the fiscal stimulus. The calculation suggests that the size of the stimulus in 2009-11 is larger in countries with larger *de facto* fiscal space and lower trade/GDP. A decrease in the public debt/average tax base revenue by one standard deviation (248 percent of GDP) implies, all other things being equal, an increase of the fiscal stimulus during 2009-2011 by .009*248 = 2.232 percent of GDP.

To gauge the role of exchange rate adjustment, Figures 4-5 report the marginal impact of 1 standard deviation change of the public debt/tax base, the public debt/GDP, and the trade/GDP on the size of fiscal stimulus. In both Figures, we provide also the realized depreciation. Figure 4 reports the effects of fiscal space and trade openness on the fiscal stimulus size *by* country groups categorized by the magnitude of exchange rate adjustment during 2007-09, whereas Figure 5 report these effects by income groups. In Figure 4, for the first group (59 countries), their exchange rates appreciated in the range of [-21.8, 0.0]; where negative means appreciation. For the second and third groups (27 and 26 countries in each, respectively), their exchange rates

depreciated in the range of [.03,10.1] and [10.5,94.9], respectively. For the third group (largest depreciation countries), a one standard deviation increase of debt/tax base (debt %tax base) lowers the size of fiscal stimulus by 2.79 percent of the GDP -- the effect that is larger than 2.46 percent of the GDP on the stimulus of the first group (appreciation countries), as well as 1.94 percent of GDP of the second group (moderate depreciation). Consequently, countries displaying higher depreciation during 2007-2009 were also subject to a larger negative economic effect of their debt/tax base on the size of fiscal stimulus. This is consistent with substitutability between fiscal space and depreciations. However, when countries are ordered by their income groups, as shown in Figure 5, it is less clear whether the fiscal stimulus and the realized exchange rate adjustments are substitutes or complements.

[Table 6.A]

Since the fiscal stimuli and the exchange rate adjustments may be determined by some common factors, it is important to study them jointly. Table 6.A estimates these two dependent variables simultaneously. The table reports the cross-country SUR estimation results with the size of stimulus (or bailout) and depreciation as the two dependent variables. Because the explanatory variable set cannot be the same for both dependent variables in the SUR, we adjust some variables accordingly. Positive depreciation (0/1) variable is a dummy variable, equals to 1 if the exchange rate depreciated cumulatively from January 2007-December 2009. Euro countries (0/1) variable is a dummy variable, equals to 1 if a country is a member of the Eurozone. Probability of a positive outcome is estimated from the probit regression of a stimulus incidence (1 if stimulus; 0 if none) on fiscal space, state fragility, and trade openness. Column (25) focuses on the marginal impact of public debt/average tax base and trade openness. As before, we find that the fiscal stimuli is negatively associated with trade openness. The

interaction between trade/GDP and a depreciation dummy (equals to 1 if depreciation in 2007-09) suggests that higher trade/GDP is associated with larger depreciation. The results support the substitutability between fiscal space and depreciations.

[Table 6.B]

[Table 6.C]

We conduct a number of robustness checks in Tables 6.B and 6.C. We run a horserace between our fiscal space measure – debt/tax and the conventional measure – debt/GDP in columns (27) and (28) of Table 6.B. The results show that debt/tax has a stronger effect on the size of fiscal stimulus than debt/GDP. Next, in columns (29) and (30) we run two separate regressions for years 2009 and 2010 and find supportive evidence to our main results. In order to control for the fact that some countries were hit harder than others, we add trade and financial exposure to the US, and terms of trade and unemployment to the estimation. This is done in Table 6.C columns (32) and (34) -- we find that the effect of fiscal space is robust to these controls. To account for the issues of borrowing in foreign currency, we add External Debt/GDP to the estimation of Table 6.C in columns (31)-(34). Controlling for external debt, we continue to find the effect of fiscal space on the size of fiscal stimulus. In addition, we also find that higher trade exposure (as measured by the export to the US/GDP) and terms of trade deterioration are associated with larger depreciation. We also check whether our findings depend on whether we use trade weighted exchange rate depreciations or dollar based ones. This is done in Table 6.C columns (33) and (34) -- using the trade weighted exchange rate depreciations, subject to data availability, we still find consistently the associations between openness, fiscal space, and the size of fiscal stimulus.

[Figure 6]

Figure 6 provides the economic significance of the cross-country estimates in regressions (23, Table 6.A) and (25, Table 6.A). For each explanatory variable, we multiply its standard deviation with the estimated coefficient in the corresponding regression, approximating the effect of its one standard deviation change on the size of the fiscal stimulus. The size of the stimulus in 2009-11 is larger in countries with larger fiscal space and lower trade/GDP, while the extent of nominal depreciation is greater in countries with higher trade/GDP and lower foreign reserves/GDP. The negative effects of public debt/GDP and public debt/tax base on the size of the fiscal stimuli are similar (though the latter performs better in various econometric specifications), shrinking the crisis-related fiscal stimulus by approximately 2 percent GDP. An increase of trade openness by a one standard deviation (0.5) is associated with a higher cumulative depreciation during 2007-09 of 6.8 percentage points. An increase of international reserves by a one standard deviation is associated with lower cumulative depreciation during 2007-09 of 3.1 percentage points.

[Table 7]

Finally, Table 7 illustrates the key importance of the *de facto* fiscal space (i.e., the public debt/GDP normalized by the tax base) in explaining the dynamics of CDS spreads and SWEAP pricing differentials. Aizenman, Hutchison, and Jinjarak (2011) estimates the dynamics and structure of CDS pricing over the 2003-10 sample period, the dependent variables are sovereign CDS spreads of 3-, 5- and 10- year maturities.[10] This is done in a dynamic panel regression:

[10] Our CDS data set contains 1-10 year maturities. We focus on 3-, 5-, and 10-year in this table, and our baseline estimates focus on the 10-year maturity. While there is no precise international account of

$\Delta y_{it} = \alpha \Delta y_{it-1} + \Delta x_{it}^{/} \beta + \Delta \varepsilon_{it}$; where *y* is the CDS spread; *i* stands for country and *t* for year; *x* is a vector of controls. Our objectives are three-fold. We determine whether CDS spreads are related to fiscal space measures in a panel regression setting; whether there is an identifiable dynamic pattern to CDS spreads during the crisis period; and we investigate pricing differentials of CDS spreads in the Euro and the SWEAP countries, compared to other countries. We seek to answer whether SWEAP CDS spreads follow the same pattern as the rest of the world, and the degree to which they were "mispriced," especially during the 2010 European debt crisis.

In order to investigate CDS pricing dynamics during the global and European financial turmoil, we included time dummy variables for three crisis years: 2008 is identified as the year of the global financial crisis, 2009 is identified as a partial recovery period, and 2010 is identified with the SWEAP debt crisis and post-global financial crisis. The top panel of Table 7 reports the differential pricing for Eurozone and the bottom panel for the SWEAP countries. We also include interactions of a dummy for Eurozone and SWEAP countries with the time dummy variables.

The sample covers a panel of 54 countries with CDS spreads from 2003-10. The estimation methodology follows the Arellano-Bond dynamic panel estimator, which accounts for the correlation of a lagged dependent variable and the unobserved error terms. The dependent variable is 100 x ln(sovereign spreads), allowing the coefficients to be interpreted in terms of a percentage change of sovereign default risks (this terminology also aligns with standard practice in the financial sector that discusses the percentage change of CDS spreads). In all of the CDS spread regressions, the *de facto* fiscal space measure (higher value is equivalent to lower fiscal capacity) is positive and statistically significant at the 1 percent level -- higher level of debt/average tax base increases significantly the pricing of the sovereign default risk. Given the mean 10-yr CDS pre 2008 of 96 basis points, a 1 standard deviation increase (2.5) of the debt/tax

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government debt maturity, recent statistics suggest that the average original maturity of central government debts is around 10 years for both emerging markets and industrial countries (BIS, 2010). See Aizenman et al. (2011) for further details.

base ratio increases the 10-year CDS spread by 2.5 x 30% x 96 = 72 basis points. A decline in U.S. interest rates increases CDS spreads across the maturity spectrum—an important factor during our sample period since the U.S. 10-year government bond yield dropped from 4.0 percent point in 2007 to 1.7 percent point at the end of 2010. The test statistics (p-values reported) also indicate that these dynamic panel regressions perform reasonably well on the whole sample.[11]

In addition, all of the coefficients on the 2008-10 year dummy variables are economically large and statistically significant. Controlling for other factors, sovereign spreads in 2008 jumped by 41-47 percent over the maturity spectrum relative to average rates over the 2003-10 period. Spreads were relatively higher in 2009 than pre crisis. Spreads fell sharply in 2010, again across the maturity spectrum, reaching average levels below the conditional period average, once controlling for the deteriorating debt situation and declining U.S. interest rates.

For Euro countries (upper panel), and particularly the SWEAP group (lower panel), sovereign spreads rose substantially more in 2008 compared to the international average. SWEAP CDS spreads climbed 41-68 percent above the average spreads prevailing in 2008, declined modestly in 2009, and jumped to very high levels above the average in 2010. Given the mean of CDS spreads of non-SWEAP countries at pre 2008 level, the SWEAP CDS spreads were 165.1 percent (≡85 basis points) higher than the sample average in 2010 at the 3-year maturity; 126.3 percent (≡90 basis points) higher at the 5-year maturity; and 125.8 percent (≡104 basis points) higher at the 10-year maturity. The Euro area, driven in large part by the CDS spreads in the SWEAP group, experienced a similar, but less extreme pattern. It is evident that the sovereign default risk in the Euro area, and the SWEAP group in particular, were priced

[11] The Sargan test of over-identifying restrictions has a null hypothesis of exogenous instruments; in all cases, corresponding p-values of the Sargan test cannot reject the null. The AR(1) test has a null of no autocorrelation in first differences and the AR(2) test has a null of no autocorrelation in levels; in all cases, the test cannot reject that average autocovariance in residuals of order 1 and 2 [AR(1)] is 0. The Sargan test provides some level of confidence that the residuals are uncorrelated with a group of explanatory variables.

much higher than the average of other countries, and moved in the opposite direction to the international trend in 2010. Risk assessments were falling in 2010 but rose sharply in the Euro area and in the SWEAP group. The public debt/average tax base appears to be the key fundamental in accounting for the sovereign risk dynamics. Aizenman et al. (2011) consider the broader role played by the public debt/tax base and other economic fundamentals in the evolution of CDS spreads as well as structural changes due to the global debt crisis of the 2008-present.

5. Concluding remarks

We show the importance of pre-crisis fiscal space in accounting for the fiscal stimulus during 2009-11. We also find that higher trade openness had been associated with a smaller fiscal stimulus, and with greater exchange rate depreciation. Economically, these effects are large: a one standard deviation increase of the public debt/average tax base lowers the size of the fiscal stimulus by 2 percent of GDP. A one standard deviation increase of trade/GDP increases the extent of nominal depreciation by about 7 percentage points. A possible interpretation is that a higher public debt/average tax base reduces the supply elasticity of funds facing the treasury, thereby reducing the viability of a counter-cyclical fiscal policy. As fiscal multipliers tend to be lower in more open countries, these countries opted for a smaller fiscal stimulus, putting greater weight on adjustment via exchange rate depreciation ('exporting their way to prosperity'). Overall, these results are consistent with the Neo-Keynesian open economy framework, and with the importance of fiscal space in measuring the viability of countercyclical policies.

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Data Appendix A.

Variable	Description	Source
Crisis fiscal stimulus %GDP Financial sector bailout %GDP	The estimates are discretionary crisis related government expenditures for the years 2009-11. In the regression, both the fiscal stimuli and financial bailouts are the total sum of their estimates of the years 2009-10.	IMF publications and Fiscal Monitor, various issues
Exchange rate depreciation	The exchange rate adjustment is the cumulative depreciation during 2009-10. The change is calculated from (annual average) exchange rate per US dollar.	PWT 7.0
Public debt %GDP	Gross government debt/GDP	Historical Public Debt database Fiscal Affairs Department, IMF
Tax %GDP	Lagged five-year moving average tax/GDP. The moving average is to account for business cycle fluctuations. The tax base is at the level of central government. For regression analysis, average 2000-05 tax %GDP is used.	WDI
Fiscal balance %GDP	Cash surplus (deficit)/GDP	WDI
State fragility	0-25; where 25 = extreme fragility. The scores are based on security, political, economic, and social dimension at the end of the year 2009.	ICRG
Trade openness %GDP	[exports + imports]/GDP in constant prices	PWT 7.0
Financial openness	de jure capital account openness based on the IMF classification	Chinn-Ito index
Real GDP per capita	Real GDP per capita (Constant Prices: Laspeyres; log), derived from growth rates of c, g, i	PWT 7.0
Growth rate of total real GDP	Growth rate of Total Real GDP Laspeyres	PWT 7.0
Government share of real GDP per capita	The values are in constant prices.	PWT 7.0
Legal origins	English, French, or German origins, with Scandinavian as an omitted category in the regressions.	La Porta et al. (2008)
Sovereign spreads on CDS	The sovereign credit default swap pricing is based on quotes collected from a consortium of over thirty independent swap market participants.	CMA Datavision
US interest rate	Yields of the 10-Year US Treasury bonds (%)	Datastream
Trade Exposure with USA	Export to the USA/GDP	International Trade Commission
Financial Exposure with USA	Country holding of US assets and US holding of country assets to GDP	US Bureau of Economic Analysis
Terms of Trade Improvement	Percentage ratio of the export unit value indexes to the import unit value indexes	WDI
Unemployment	Share of the labor force that is without work but available for and seeking employment	WDI

Data Appendix B.

This table reports the measures of fiscal space based on 2000 to 2006 data. The denominator, Tax Base, is average tax revenue/GDP from 2000-05. Public Debt is public debt/GDP as of 2006. Fiscal Balance is average fiscal balance/GDP from 2000-06 [positive is surplus]. * denotes countries included in regression analysis.

Income Group	Country	iso		Tax base avg. 2000-05 (I) %	Public debt 2006 (II) %	Fiscal space 1 (II)/(I)	Fiscal balance avg. 2000-06 (III) %	Fiscal space 2 (III)/(I)
A. Low Income	Bangladesh	BGD	*	7.8	49.5	6.3	-0.7	-0.09
	Benin	BEN	*	15.6	50.2	2.8	-0.1	-0.02
	Burkina Faso	BFA	*	11.7	44.5	2.8	-4.9	-0.43
	Burundi	BDI	*	13.6	129.9	10.6		
	Cambodia	KHM	*	8.0	38.1	4.9	-2.3	-0.26
	Ghana	GHA	*	18.0	113.3	5.3	-4.1	-0.20
	Kenya	KEN	*	16.7	53.1	3.2	0.2	0.01
	Kyrgyz Republic	KGZ	*	12.6	87.7	7.0	-1.4	-0.11
	Madagascar	MDG	*	10.1	96.8	9.0	-3.4	-0.35
	Nepal	NPL	*	8.8	59.3	6.8	-1.2	-0.13
	Tajikistan	TJK	*	8.3	60.4	7.4	-3.0	-0.37
	Togo	TGO	*	14.3	94.5	5.7	-3.2	-0.32
	Uganda	UGA	*	10.8	76.7	7.1	-1.9	-0.18
	Zambia	ZMB	*	17.8	154.0	8.6	0.1	0.01
B. Middle Income	Albania	ALB	*	14.2	62.7	4.6	-4.2	-0.31
	Algeria	DZA	*	9.7	46.2	3.2	5.0	0.69
	Argentina	ARG	*	11.3	99.1	9.7	-3.0	-0.16
	Armenia	ARM	*	14.0	30.3	1.6	-0.7	-0.05
	Azerbaijan	AZE	*	12.3	19.8	1.9		
	Belarus	BLR	*	17.1	9.6	0.6	0.1	0.01
	Bhutan	BTN	*	8.6	68.6	7.9	-3.3	-0.40
	Bolivia	BOL	*	13.6	63.6	5.0	-2.6	-0.10
	Bosnia and Herzegovina	BIH	*	19.6	28.9	1.2	1.8	0.11
	Botswana	BWA	*	15.5	8.6	0.6		
	Brazil	BRA	*	29.9	71.5	2.4	-4.5	-0.16
	Bulgaria	BGR	*	18.3	45.0	2.5	1.1	0.06
	Cameroon	CMR	*	10.3	76.5	6.1	2.3	0.37
	Chile	CHL	*	19.5	11.5	0.6	1.6	0.08
	China	CHN	*	8.7	17.9	1.9	-1.3	-0.14
	Costa Rica	CRI	*	13.3	40.8	3.1	1.0	0.07
	Côte d'Ivoire	CIV	*	14.4	87.7	5.9	-3.0	-0.21
	Dominican Republic	DOM	*	13.3	30.3	2.7	-0.9	-0.05
	Ecuador	ECU	*	10.5	50.6	3.3	0.6	0.08
	Egypt, Arab Rep.	EGY	*	14.8	96.7	6.8	-6.4	-0.46
	El Salvador	SLV	*	11.0	37.3	3.6	-3.6	-0.30
	Fiji	FJI	*	21.7	46.2	2.1	-2.1	-0.14
	Georgia	GEO	*	7.9	44.9	5.8	-0.1	-0.01
	Guatemala	GTM	*	10.3	21.7	2.1	-1.7	-0.17
	Honduras	HND	*	14.0	56.6	3.4	-0.9	-0.02
	India	IND	*	8.8	80.2	9.1	-3.6	-0.41
	Indonesia	IDN	*	13.7	63.7	4.6	-1.2	-0.09
	Iran, Islamic Rep.	IRN	*	7.5	22.9	3.1	2.6	0.39
	Jamaica	JAM	*	24.8	100.3	3.9	-2.0	-0.08
	Kazakhstan	KAZ	*	9.8	14.7	1.7	0.6	0.05
	Lebanon	LBN	*	13.1	164.8	12.9	-12.4	-0.89
	Lesotho	LSO	*	39.0	87.2	2.2	3.2	0.08
	Lithuania	LTU	*	15.5	20.8	1.3	-1.3	-0.07
	Macedonia, FYR	MKD	*	19.8	41.0	2.0	1.2	-0.01
	Malaysia	MYS	*	16.7	42.6	2.6	-4.0	-0.24
	Mauritius	MUS	*	16.2	53.5	3.3	-2.8	-0.17
	Mexico	MEX	*	16.4	43.0	2.6	-0.1	-0.01
	Moldova	MDA	*	15.0	59.4	3.9	0.6	0.04
	Mongolia	MNG	*	13.9	74.3	5.6	0.5	0.03
	Morocco	MAR	*	20.0	65.6	3.1	-2.0	-0.08

Data Appendix B (continued).

Income Group	Country	iso		Tax base avg. 2000-05 (I) %	Public debt 2006 (II) %	Fiscal space 1 (II)/(I)	Fiscal balance avg. 2000-06 (III) %	Fiscal space 2 (III)/(I)
	Namibia	NAM	*	27.7	24.5	0.9	-1.8	-0.06
	Pakistan	PAK	*	11.4	73.6	6.4	-3.3	-0.29
	Panama	PAN	*	10.4	65.2	6.3	0.0	0.01
	Papua New Guinea	PNG	*	21.8	50.6	2.3	-1.8	-0.08
	Paraguay	PRY	*	11.9	46.9	2.3	1.2	0.10
	Peru	PER	*	12.9	38.6	3.0	-1.1	-0.08
	Philippines	PHL	*	14.2	64.4	4.5	-3.4	-0.24
	Romania	ROM	*	12.0	21.5	1.7	-1.5	-0.11
	Russian Federation	RUS	*	13.5	32.0	1.4	5.6	0.38
	Senegal	SEN	*	15.6	51.8	3.3	-1.5	-0.10
	South Africa	ZAF	*	24.4	36.7	1.5	-1.2	-0.04
	Sri Lanka	LKA	*	14.6	97.1	6.7	-7.6	-0.52
	Thailand	THA	*	15.8	50.5	2.9	1.8	0.12
	Tunisia	TUN	*	21.0	57.1	2.7	-2.6	-0.12
	Turkey	TUR	*	23.3	61.1	2.6	1.9	0.08
	Ukraine	UKR	*	13.3	28.8	2.2	-1.0	-0.07
	Uruguay	URY	*	16.1	73.9	4.6	-2.9	-0.18
	Venezuela, RB	VEN	*	13.0	38.2	2.9	-2.0	-0.14
	Vietnam	VNM	*	12.6	41.7	3.4	-4.2	-0.33
C. Other High Income	Croatia	HRV	*	22.4	44.2	2.0	-3.4	-0.15
	Estonia	EST	*	16.9	5.0	0.3	1.1	0.07
	Hong Kong SAR, China	HKG	*	11.1	17.6	1.6	-1.3	0.23
	Latvia	LVA	*	14.8	14.5	1.0	-1.3	-0.08
	Oman	OMN	*	7.3	17.0	2.3	-3.6	-0.48
	Qatar	QAT	*	24.5	37.6	0.7	11.7	0.38
	Saudi Arabia	SAU	*	34.0	70.1	1.9	6.8	0.25
	Singapore	SGP	*	14.7	94.1	6.4	6.0	0.41
	Trinidad and Tobago	TTO	*	22.0	46.8	2.1	2.3	0.11
D. SWEAP	Greece	GRC	*	32.7	100.3	3.1	-6.9	-0.21
	Ireland	IRL	*	30.4	31.2	1.0	1.4	0.05
	Italy	ITA	*	41.9	106.3	2.5	-2.9	-0.07
	Portugal	PRT	*	32.6	57.9	1.8	-3.5	-0.11
	Spain	ESP	*	33.8	49.3	1.5	-0.5	-0.01
E. OECD - EURO	Australia	AUS	*	29.4	13.7	0.5	1.0	0.03
	Canada	CAN	*	35.3	76.5	2.2	0.8	0.02
	Czech Republic	CZE	*	36.1	27.2	0.8	-4.2	-0.12
	Denmark	DNK	*	49.0	53.4	1.1	2.0	0.04
	Hungary	HUN	*	38.1	58.2	1.5	-6.3	-0.17
	Iceland	ISL	*	35.6	37.1	1.0	1.3	0.03
	Israel	ISR	*	36.3	92.0	2.5	-3.8	-0.11
	Japan	JPN	*	26.7	169.0	6.3	-5.5	-0.20
	Korea, Rep.	KOR	*	22.0	22.0	1.0	0.3	0.02
	New Zealand	NZL	*	33.7	25.7	0.8	3.8	0.11
	Norway	NOR	*	42.5	45.8	1.1	13.2	0.31
	Poland	POL	*	34.0	43.4	1.3	-4.2	-0.12
	Sweden	SWE	*	49.7	55.8	1.1	1.2	0.02
	Switzerland	CHE	*	29.0	52.4	1.8	-0.9	-0.03
	United Kingdom	GBR	*	35.3	40.0	1.1	-1.6	-0.05
	United States	USA	*	28.0	58.7	2.1	-1.8	-0.06
F. EURO - SWEAP	Austria	AUT	*	43.9	65.3	1.5	-2.0	-0.05
	Belgium	BEL	*	44.7	98.6	2.2	-0.6	-0.01
	Cyprus	CYP	*	22.3	62.6	2.8	-3.2	-0.14
	Finland	FIN	*	45.6	42.6	0.9	0.7	0.02
	France	FRA	*	44.1	61.5	1.4	-2.6	-0.06
	Germany	DEU	*	36.3	63.5	1.8	-1.3	-0.04
	Netherlands	NLD	*	39.0	50.8	1.3	-0.7	-0.02
	Slovak Republic	SVK	*	34.32	35.80	1.05	-5.93	-0.17
	Slovenia	SVN	*	37.88	27.23	0.72	-2.45	-0.06

Table 1: Discretionary Fiscal Stimulus in 2009-11.
IMF Public Information Notice, *Fiscal Monitor (2010-Nov., 2011-Jan., Apr.).

Country		Crisis Fiscal Stimulus/GDP (%)			Financial Sector Bailout (2009-11, %GDP)		Depreciation 2009-10 (%)
		2009	2010 (expected)	2011	pledged	net cost	cumulative
Industrial Countries	Australia*	2.7	1.7	1.3	.0	-0.1	-8.6
	Canada*	1.8	1.7	.0	9.1	4.4	-15.6
	France*	1.2	1.1	.6	1.5	0.3	2.4
	Germany*	1.7	2.2	1.7	10.8	10.7	2.4
	Japan*	2.8	2.2	1.1	6.6	0.1	-15.1
	Norway	1.2	.	.	.	.	7.1
	Sweden	1.4	.	.	.	.	9.4
	Switzerland	.6	.	.	.	.	-3.7
	United Kingdom*	1.6	.0	.0	11.9	6.1	19.0
	United States*	1.8	3.8	.	7.4	3.4	-2.3
Euro Area	Austria	1.5	.3	.	.	.	2.4
	Belgium	1.0	.	.	4.3	4.1	2.4
	Denmark	1.9	3.1	.	.	.	10.3
	Finland	3.3	.	.	.	.	2.4
	Greece*	.	-2.2	.	5.1	5.0	2.4
	Ireland*	.	-3.5	.	30.0	28.7	2.4
	Italy*	.0	.0	.	1.3	0.3	2.4
	Netherlands	1.4	.	.	14.4	6.0	2.4
	Portugal*	1.3	-3.0	.	.	.	2.4
	Spain*	3.7	.	.	2.9	2.0	2.4
Emerging Markets	Argentina*	4.7	1.4	.	.0	.	23.9
	Brazil*	.7	.6	.0	.8	.	-4.1
	China*	3.1	2.7	.	.0	.	-2.6
	Czech Republic	1.6	.	.	.0	.	11.9
	India*	.5	.3	.0	.0	.	-5.6
	Indonesia*	1.4	.0	.2	.0	.	-6.2
	Mexico*	1.5	1.0	.0	.0	.	13.5
	Russia*	4.5	5.3	4.7	7.7	.	22.2
	Saudi Arabia*	5.4	4.2	1.6	.0	.	-2.3
	South Africa*	3.0	2.1	.0	.0	.	-11.4
	South Korea*	3.6	1.1	.0	2.7	0.1	4.9
	Turkey*	1.2	0.5	.0	.0	.	15.5

Table 2: Stability Test of Fiscal Space.
The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP.
The South-Western Euro Area Peripheral (SWEAP) includes Greece, Ireland, Italy, Portugal, and Spain.

variable	lagged 5-yr moving avg. Tax/GDP (%) change: 1993-1999 vs.. 2000-2006				Public Debt/GDP (%) change: 1993-1999 vs.. 2000-2006				Public Debt/Tax (%) change: 1993-1999 vs.. 2000-2006			
country group	mean change	#countries t-tested	#sig. increase	#sig. decrease	mean change	#countries t-tested	#sig. increase	#sig. decrease	mean change	#countries t-tested	#sig. increase	#sig. decrease
A. Low Income	0.1	7	2	2	-9.2	7	1	2	-62.7	7	2	3
B. Middle Income	0.0	36	11	20	-1.8	36	13	11	-9.2	36	18	9
C. Other High Income	-0.3	7	0	4	-1.1	7	3	3	-6.3	7	3	2
D. SWEAP	0.0	5	4	1	-1.3	5	0	3	-4.5	5	0	5
E. OECD - EURO	0.0	16	9	6	0.1	16	4	10	1.0	16	3	9
F. EURO - SWEAP	0.1	9	6	1	-0.2	9	4	4	-0.9	9	3	6
All Countries	0.1	80	32	34	-0.9	80	25	33	-6.0	80	29	34
total #sig.			66				58				63	

Table 3: Mean and Dispersion of Fiscal Space Components.
The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP.

Tax/GDP (%)

period	countries	mean	standard deviation	median	coefficient of variation
1993-1999	80	23.98	11.11	20.05	0.46
2000-2006	80	23.94	11.48	21.37	0.48
1993-2006	80	23.96	11.26	20.33	0.47

Public Debt/GDP (%)

period	countries	mean	standard deviation	median	coefficient of variation
1993-1999	80	60.79	34.19	55.38	0.56
2000-2006	80	58.18	32.85	53.45	0.56
1993-2006	80	59.49	33.45	55.16	0.56

Public Debt/Tax (%)

period	countries	mean	standard deviation	median	coefficient of variation
1993-1999	80	314.87	234.05	246.75	0.74
2000-2006	80	302.76	226.83	233.37	0.75
1993-2006	80	308.82	229.83	239.69	0.74

Table 4: Fiscal Stimulus & Financial Bailouts of 2009-10 and Fiscal Space of 2006.
The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP.
*** (**,*) denotes significant level at 1 (5,10) percent. Standard errors are in parentheses.

	Crisis Fiscal Stimulus %GDP				Pledged Financial Sector Bailout %GDP			
	OLS		Tobit, censoring at 0 stimulus		OLS		Tobit, censoring at 0 stimulus	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)
Debt %GDP	-.000		.002		.001		.067	
	(.005)		(.021)		(.008)		(.067)	
Debt %Tax		-.001		-.006**		-.002**		-.030**
		(.001)		(.003)		(.001)		(.015)
_sigma			5.647***	5.498***			16.094***	15.051***
			(.900)	(.872)			(3.567)	(3.289)
constant	.725**	1.046***	-4.265**	-2.138*	.906	1.731**	-22.889***	-9.391*
	(.358)	(.336)	(1.631)	(1.240)	(.677)	(.672)	(7.364)	(4.878)
R^2	.0000	.0158	.0000	.0186	.00005	.0266	.0058	.0343
countries	123	123	123	123	123	123	123	123

Lowering 2000-06 Debt/Tax ratio from the average level of low-income countries (5.94) down to the average level of the Euro (- SWEAP) countries (1.97) ≡ increasing approximately a size of stimulus %GDP in 2009-11 by 2.78

Table 5.A: Robustness Check - Fiscal Stimulus & Financial Bailouts of 2009-10 and Fiscal Space of 2006.
The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP. In eq.15, Debt %Tax is the endogenous regressor, instrumented by eq.16.
*** (**,*) denotes significant level at 1 (5,10) percent. Standard errors are in parentheses.

	Crisis Fiscal Stimulus %GDP Tobit, censoring at 0 stimulus		Pledged Financial Sector Bailout %GDP Tobit, censoring at 0 stimulus		Crisis Fiscal Stimulus %GDP Endogenous regressor Tobit, censoring at 0 stimulus			
	(9) coeff (s.e.)	(10) coeff (s.e.)	(11) coeff (s.e.)	(12) coeff (s.e.)	(13) coeff (s.e.)	(14) coeff (s.e.)	(15) coeff (s.e.)	(16) coeff (s.e.)
Debt %GDP	.002		.069		-.032	Y=Debt %GDP		Y=Debt %Tax
	(.019)		(.069)		(.045)			
Debt %Tax		-.004		-.009			-.026**	
		(.003)		(.015)			(.011)	
State Fragility	-.560***	-.474***	-2.332**	-2.206**	-.312**		.151	
	(.145)	(.152)	(.960)	(1.014)	(.128)		(.297)	
Trade Openness %GDP	-.082***	-.088***	-.067	-.091	-.060***	-.048	-.071***	-.119
	(.023)	(.023)	(.056)	(.064)	(.019)	(.082)	(.023)	(.633)
Financial Openness			1.598	2.068		4.987*		30.863*
			(2.280)	(2.290)		(2.817)		(15.826)
Real GDP per Capita						-9.595***		-137.220***
						(3.582)		(21.297)
Growth Rate of Total Real GDP						-3.569***		-9.827
						(1.266)		(7.395)
Government Share of Real GDP per Capita						1.028		4.106
						(.665)		(5.996)
English Legal Origin						13.317*		88.458**
						(7.435)		(43.800)
French Legal Origin						7.395		77.441
						(7.845)		(47.242)
German Legal Origin						1.337		9.774
						(10.129)		(51.360)
R^2	.13303	.13969	.15148	.14848		.22583		.37958
countries	112	112	112	112	112		112	

Table 5.B: Robustness Check (continued) - Fiscal Stimulus & Financial Bailouts of 2009-10 and Fiscal Space of 2006.

This table reports estimation of two stages: first, the incidence of stimulus and bailout via Probit; second, their size across countries via SUR. The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP. Probability of a positive outcome included in SUR is estimated from the probit regression of a stimulus incidence (1 if stimulus; 0 if none) on fiscal space, state fragility, and trade openness. *** (**,*) denotes significant level at 1 (5,10) percent. Standard errors are in parentheses.

	Endogenous regressor Probit		Seemingly Unrelated Regression (SUR)		Endogenous regressor Probit		Seemingly Unrelated Regression (SUR)	
	Stimulus	Bailout	Stimulus	Bailout	Stimulus	Bailout	Stimulus	Bailout
	(17)	(18)	(19)		(20)	(21)	(22)	
	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)
instrumented Debt %GDP	-.015	.031***	-.066***	.019				
	(.013)	(.007)	(.022)	(.033)				
instrumented Debt %Tax					-.004***	-.005***	-.007***	.011
					(.001)	(.000)	(.002)	(.011)
State Fragility	-.126**	-.182***	.049		.008	.046	.088	
	(.064)	(.064)	(.070)		(.047)	(.055)	(.057)	
Trade Openness %GDP	-.015**	-.007	-.010*		-.009**	-.003	-.012***	
	(.006)	(.006)	(.005)		(.004)	(.003)	(.004)	
Financial Openness				.056				-.128
				(.335)				(.455)
Real GDP per Capita				1.223**				2.578*
				(.528)				(1.510)
Growth Rate of Total Real GDP			-.278***				-.102	
			(.107)				(.068)	
Government Share of Real GDP per Capita			.093*				.047	
			(.056)				(.050)	
English Legal Origin				4.014**				3.366*
				(1.711)				(1.847)
French Legal Origin				3.107*				2.539
				(1.662)				(1.766)
German Legal Origin				2.600				2.557
				(1.735)				(1.736)
Probability of a positive outcome (from probit)			1.469	1.244			.237	.063
			(1.449)	(1.601)			(.946)	(1.641)
R^2			.19370	.18223			.22515	.17821
countries	112	112	112		112	112	112	

Table 6.A: Fiscal Stimuli of 2009-10 and Depreciation of 2009-10.

This table reports the cross-country SUR estimation results with the size of stimulus (or bailout) and depreciation as two dependent variables. The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP. Positive depreciation (0/1) is a dummy variable, equals to 1 if exchange rate depreciated cumulatively from January 2009-December 2010. Euro countries (0/1) is a dummy variable, equals to 1 if a country is a member of the eurozone. Probability of a positive outcome is estimated from the probit regression of a stimulus incidence (1 if stimulus; 0 if none) on fiscal space, state fragility, and trade openness. *** (**,*) denotes significant level at 1 (5,10) percent. Standard errors are in parentheses.

	SUR		SUR		SUR		SUR	
	Stimulus	Depreciation	Bailout	Depreciation	Stimulus	Depreciation	Bailout	Depreciation
	(23)		(24)		(25)		(26)	
	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)
instrumented Debt %GDP	-.066***		.018					
	(.022)		(.043)					
instrumented Debt %Tax					-.007***		-.004	
					(.002)		(.004)	
State Fragility	.048		-.199*		.087		-.144	
	(.070)		(.102)		(.057)		(.114)	
Trade Openness %GDP	-.010**		-.001		-.012***		-.006	
	(.005)		(.008)		(.004)		(.007)	
Trade Openness %GDP x positive depreciation (0/1)		.135***		.137***		.136***		.137***
		(.020)		(.019)		(.020)		(.019)
Financial Openness		.165		.150		.158		.183
		(.629)		(.626)		(.629)		(.625)
Growth Rate of Total Real GDP	-.279***		.077		-.102		-.072	
	(.107)		(.209)		(.068)		(.136)	
Government Share of Real GDP per Capita	.092*		-.006		.046		.037	
	(.056)		(.108)		(.050)		(.099)	
Probability of a positive outcome (from probit)	1.476		1.923		.229		-.755	
	(1.449)		(1.744)		(.946)		(1.748)	
Inflation		3.608***		3.572***		3.618***		3.564***
		(1.025)		(1.017)		(1.025)		(1.017)
Foreign reserves %GDP		-.142		-.164*		-.143		-.166*
		(.093)		(.092)		(.093)		(.092)
Euro countries (0/1)		-8.613***		-7.697***		-8.577***		-7.703***
		(2.872)		(2.853)		(2.873)		(2.851)
R^2	.19366	.44544	.09974	.44442	.22514	.44547	.09441	.44433
countries	112		112		112		112	

Table 6.B: Fiscal Stimuli of 2009-10 and Depreciation of 2009-10 (continued).

This table reports the cross-country SUR estimation results with the size of stimulus (or bailout) and depreciation as two dependent variables. The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP. Positive depreciation (0/1) is a dummy variable, equals to 1 if exchange rate depreciated cumulatively from January 2009-December 2010. Euro countries (0/1) is a dummy variable, equals to 1 if a country is a member of the eurozone. *** (**,*) denotes significant level at 1 (5,10) percent. Standard errors are in parentheses.

	SUR: Year = 2009+2010		SUR: Year = 2009+2010		SUR: Year = 2009		SUR: Year = 2010	
	Stimulus	Bailout	Stimulus	Depreciation	Stimulus	Depreciation	Stimulus	Depreciation
	(27)		(28)		(29)		(30)	
	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)
instrumented Debt %GDP	.012	-.075	.011					
	(.039)	(.227)	(.039)					
instrumented Debt %Tax	-.009**	.033	-.008**		-.004***		-.003***	
	(.004)	(.078)	(.004)		(.001)		(.001)	
State Fragility	.161*		.093		.021		.068**	
	(.087)		(.060)		(.032)		(.032)	
Trade Openness %GDP	-.008		-.011***		-.007***		-.004*	
	(.005)		(.004)		(.002)		(.002)	
Trade Openness %GDP x positive depreciation (0/1)				.136***		.089***		.046***
				(.020)		(.022)		(.013)
Financial Openness		-.459		.158		1.028		-.771*
		(1.350)		(.629)		(.692)		(.409)
Growth Rate of Total Real GDP	-.084		-.070		-.063*		-.042	
	(.134)		(.134)		(.038)		(.038)	
Government Share of Real GDP per Capita	.048		.038		.015		.029	
	(.058)		(.058)		(.027)		(.027)	
Real GDP per Capita		4.675						
		(8.626)						
Inflation				3.619***		1.506		2.170***
				(1.025)		(1.127)		(.666)
Foreign reserves %GDP				-.143		-.077		-.058
				(.093)		(.102)		(.060)
Euro countries (0/1)				-8.569***		-13.961***		4.813***
				(2.873)		(3.160)		(1.866)
R^2	.23345	.18488	.22570	.44547	.26973	.22938	.13800	.35035
countries	112		112		112		112	

Table 6.C: Fiscal Stimuli of 2009-10 and Depreciation of 2009-10 (continued).

This table reports the cross-country SUR estimation results with the size of stimulus (or bailout) and depreciation as two dependent variables. The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP Trade exposure with USA is export to the USA/GDP. Effective depreciation is calculated from real effective exchange rate index (2005=100). Terms of trade improvement is calculated from the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000. Positive depreciation (0/1) is a dummy variable, equals to 1 if exchange rate depreciated cumulatively from January 2009-December 2010. Euro countries (0/1) is a dummy variable, equals to 1 if a country is a member of the eurozone. Unemployment is the share of the labor force that is without work but available for and seeking employment. Financial exposure with USA is the country holding of US assets and US holding of country assets to GDP. *** (**,*) denotes significant level at 1 (5,10) percent. Standard errors are in parentheses.

	SUR: Year = 2009+2010		SUR: Year = 2009		SUR: Year = 2009		SUR: Year = 2009	
	Stimulus	$Depreciation	Stimulus	$Depreciation	Stimulus	Eff. Depre.	Stimulus	Eff. Depre.
	(31)		(32)		(33)		(34)	
	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)	coeff (s.e.)
Debt %GDP	.019							
	(.027)							
Debt %Tax	-.006**		-.004***		-.003*		-.004**	
	(.003)		(.001)		(.002)		(.002)	
Trade Exposure w/ USA	.230***		.124***		.158***		.181***	
	(.062)		(.033)		(.044)		(.046)	
Trade Openness %GDP		.146***		.141***		.016		.017
x positive depreciation (0/1)		(.024)		(.026)		(.031)		(.033)
Terms of Trade Improvement		-.361***		-.094		-.354***		-.370***
		(.110)		(.114)		(.133)		(.132)
Unemployment	.060		.047		.037		.059	
	(.056)		(.032)		(.038)		(.040)	
Euro countries (0/1)		-12.099***		-11.523***		-4.537		-4.972
		(3.342)		(3.444)		(3.593)		(3.587)
External Debt/GDP		10.935***		8.892**		16.798**		16.434**
		(4.038)		(4.315)		(7.780)		(8.083)
Financial Exposure w/ USA		-.149		-.161		-.646		
		(.289)		(.309)		(.393)		
…country holding of US assets								-.931
								(1.220)
…US holding of country assets								.291
								(1.295)
R^2	.29090	.48638	.35781	.40342	.42865	.28452	.44978	.32016
countries	62		63		38		35	

Table 7: Dynamics of CDS Spreads. The dependent variable (y) is sovereign CDS 5-year tenor in basis points.
South-West Euro Area Periphery (SWEAP) includes Greece, Ireland, Italy, Portugal, and Spain.
Tax Base is an average Tax/GDP over a period of previous 5 years. TED Spread (3-month US$ LIBOR - 3-month US Treasury) and Inflation are in percent.
All variables are in realtime (t), except the lagged CDS, y(t-1). Standard errors are in parentheses, with *** (**,*) denoting statistical significance at 1 (5,10) level.

	Balanced Sample: 2005-10																	
	(1)			(2)			(3)			(4)			(5)			(6)		
	coeff.	(s.e.)		coeff.	(s.e.)		coeff.	(s.e.)		coeff.	(s.e.)		coeff.	(s.e.)		coeff.	(s.e.)	
t2008	323.6	(76.3)	***	354.8	(79.7)	***	322.6	(88.4)	***	282.8	(77.2)	***	348.7	(85.7)	***	353.0	(90.3)	***
t2009	-39.6	(33.1)		-4.9	(45.1)		80.6	(31.4)	**	21.8	(27.0)		121.4	(46.8)	***	131.5	(24.1)	***
t2010	0.3	(32.9)		-27.1	(41.9)		53.9	(21.6)	**	82.1	(29.3)	***	78.4	(39.8)	**	89.3	(19.0)	***
t2008 x Euro dummy	-223.8	(81.0)	***	-245.5	(86.7)	***	-200.7	(66.1)	***	-191.7	(79.2)	**	-236.6	(85.8)	***	-215.9	(71.8)	***
t2009 x Euro dummy	15.0	(29.8)		-35.0	(33.4)		-27.7	(26.1)		-7.4	(30.3)		-104.8	(43.0)	**	-25.4	(29.3)	
t2010 x Euro dummy	5.8	(26.8)		1.9	(33.9)		16.9	(31.5)		-19.4	(28.9)		-31.8	(42.4)		32.0	(30.2)	
t2008 x SWEAP	-251.6	(97.5)	***	-305.7	(99.6)	***	-220.9	(68.7)	***	-141.0	(81.2)	*	-186.2	(88.1)	**	-214.2	(83.0)	***
t2009 x SWEAP	12.4	(59.3)		-70.2	(64.7)		-12.9	(38.3)		83.9	(35.4)	**	-3.5	(46.9)		20.5	(37.2)	
t2010 x SWEAP	178.9	(108.1)	*	124.7	(132.8)		236.7	(52.0)	***	274.9	(63.9)	***	250.5	(84.6)	***	290.5	(56.1)	***
TED Spread	6.0	(27.1)		-0.4	(33.2)		-17.0	(10.4)		-1.6	(29.6)		-28.8	(34.0)		-13.1	(13.2)	
y(t-1)	0.2	(0.1)	**							0.3	(0.1)	***						
Trade/GDP	-61.3	(151.7)		-13.2	(192.3)		-59.0	(33.8)	*	-121.9	(132.1)		-155.3	(150.5)		-59.2	(43.8)	
Inflation	22.9	(11.5)	**	26.2	(12.3)	**	29.5	(6.9)	***	20.2	(10.5)	*	24.7	(11.4)	**	29.3	(7.1)	***
External Debt/GDP	-37.2	(29.4)		-57.6	(37.9)		6.7	(2.4)	***	4.5	(18.7)		9.4	(26.7)		13.6	(2.1)	***
Fiscal Balance/Tax Base	-859.7	(299.9)	***	-1222.6	(336.4)	***	-333.0	(88.2)	***									
Public Debt/Tax Base										64.7	(28.9)	**	104.0	(59.4)	*	24.8	(7.3)	***
constant term	253.0	(260.8)		309.0	(305.6)		-15.9	(30.4)		-531.5	(342.1)		-874.0	(689.7)		-73.7	(44.1)	*
R^2	0.52			0.51			0.41			0.45			0.50			0.41		
Observations	300			300			300			300			300			300		
Countries (i)	50			50			50			50			50			50		
Fixed Effects	Yes			Yes			No			Yes			Yes			No		
Serial Correlation	y(t-1)			No			clustered s.e. (i)			y(t-1)			No			clustered s.e. (i)		

Figure 1: Fiscal Space by Country in 2006.
The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP.

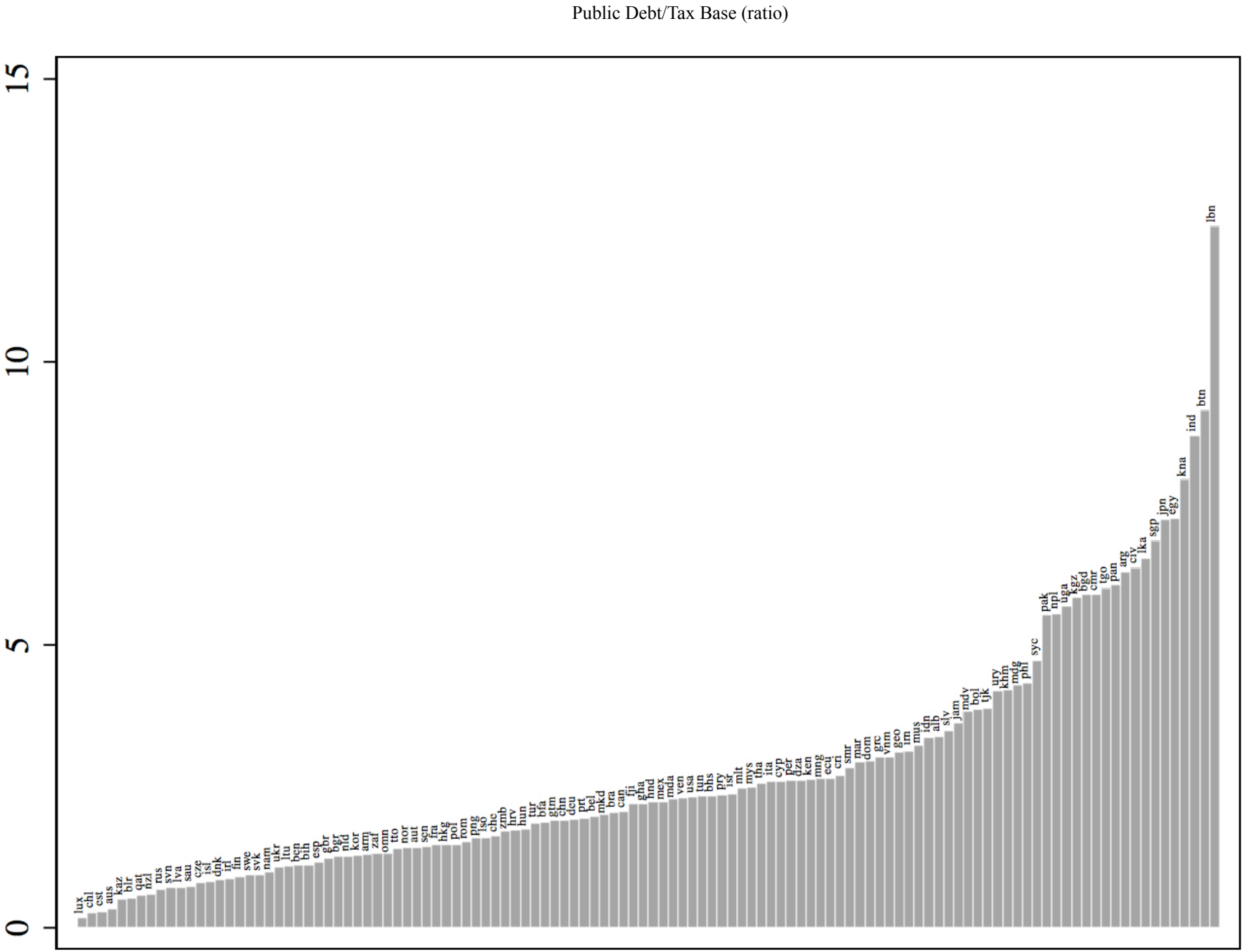


Figure 1 (continued)
The fiscal space is calculated from fiscal balance as of 2006 and 2000-05 average tax/GDP.

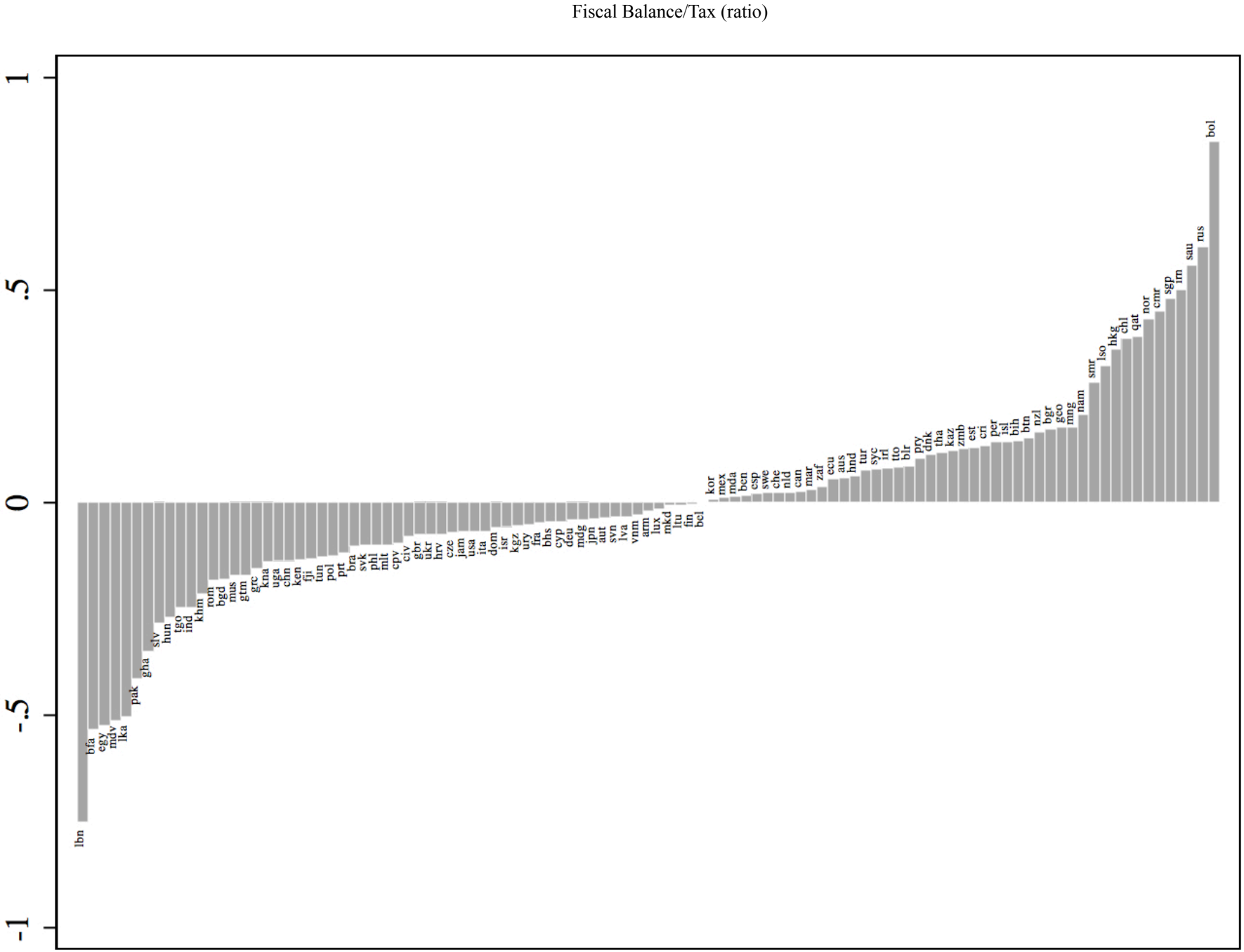


Figure 2: Average 2000-06 Fiscal Space by Region.
The fiscal space is calculated from public debt as of 2006 and 2000-05 average tax/GDP.
The South-Western Euro Area Peripheral (SWEAP) includes Greece, Ireland, Italy, Portugal, and Spain.

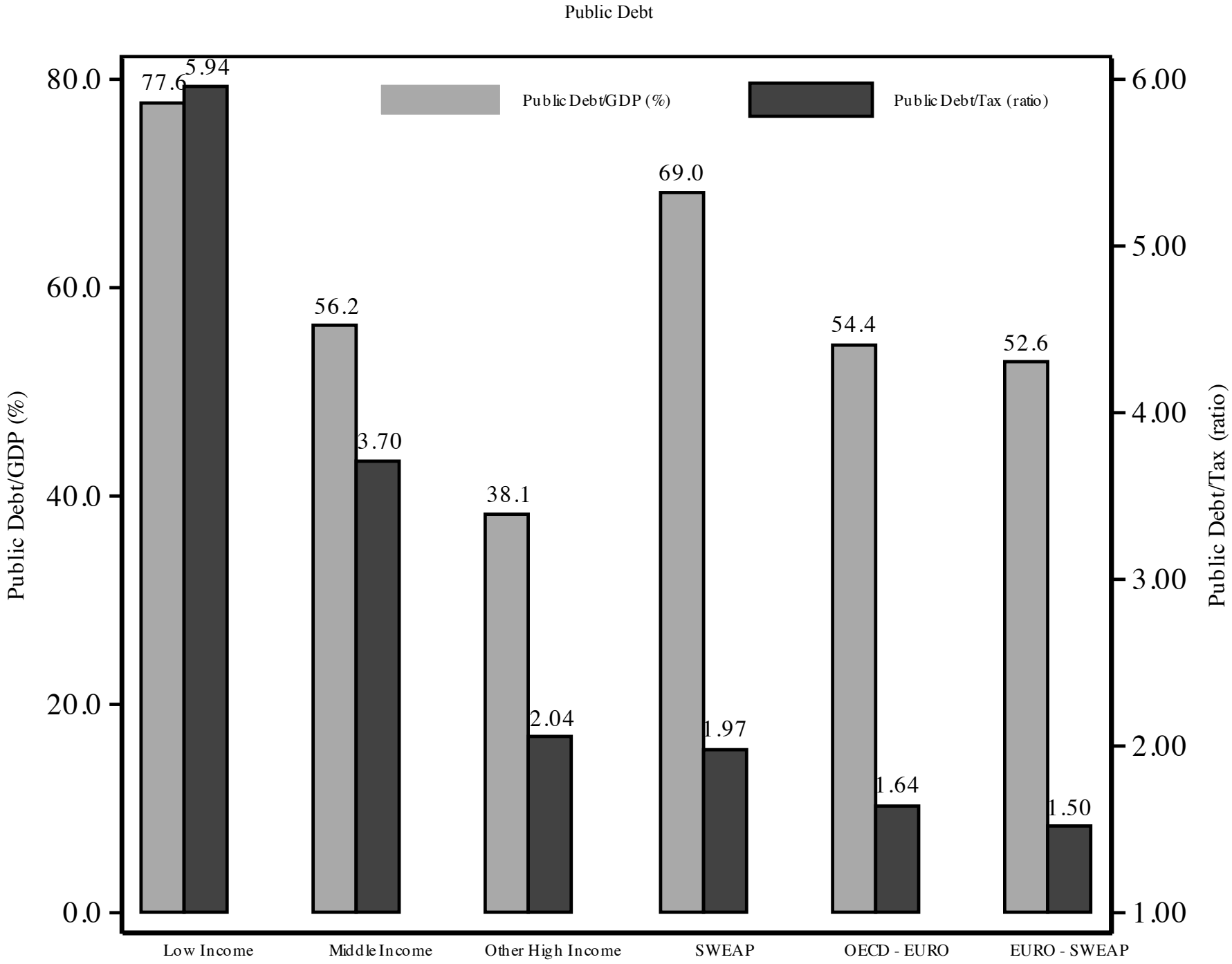


Figure 2 (continued)
The fiscal space is calculated from fiscal balance as of 2006 and 2000-05 average tax/GDP.

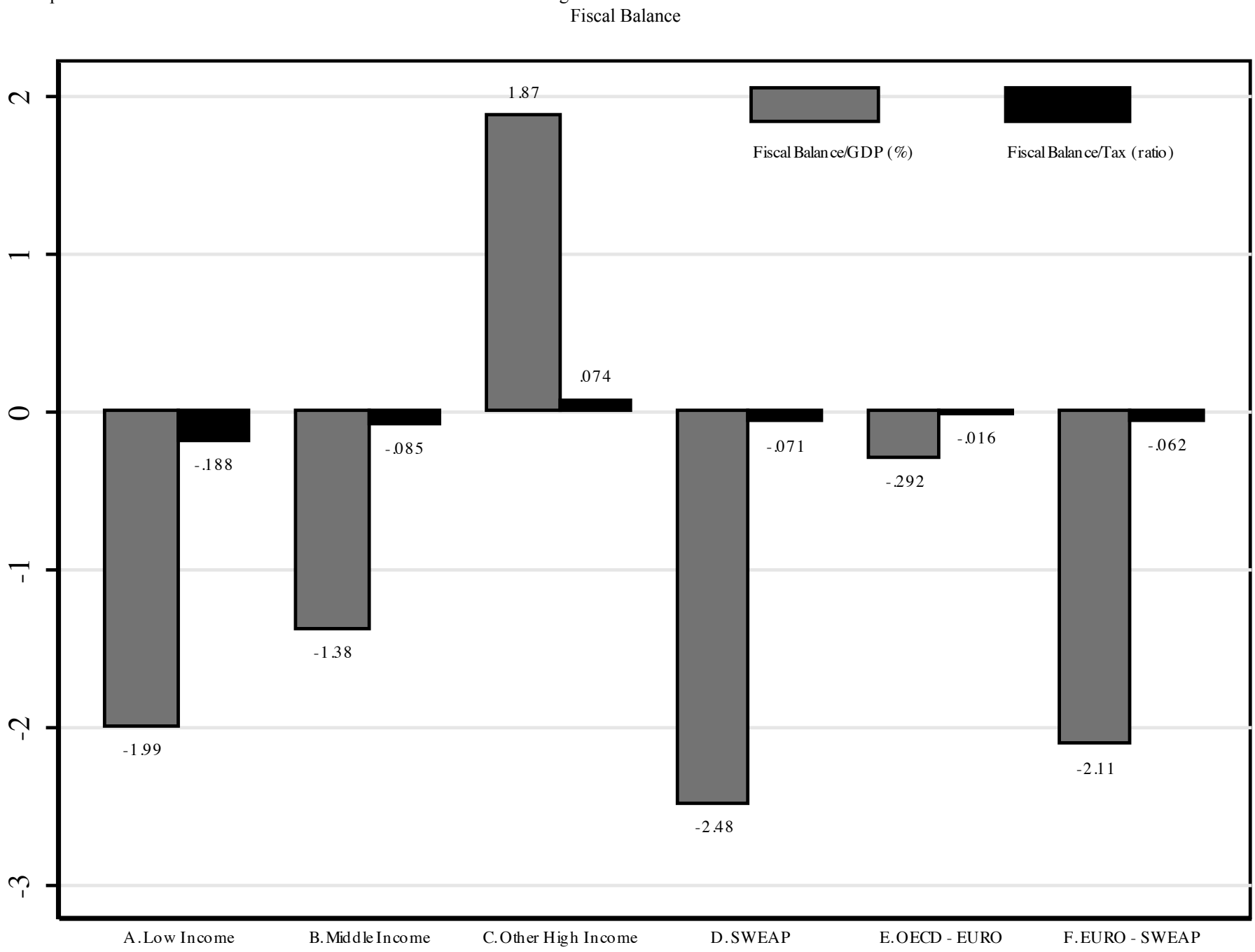


Figure 3: Histograms of Fiscal Space 2006.
The fiscal space is calculated from public debt and fiscal balance as of 2006 and 2000-05 average tax/GDP.

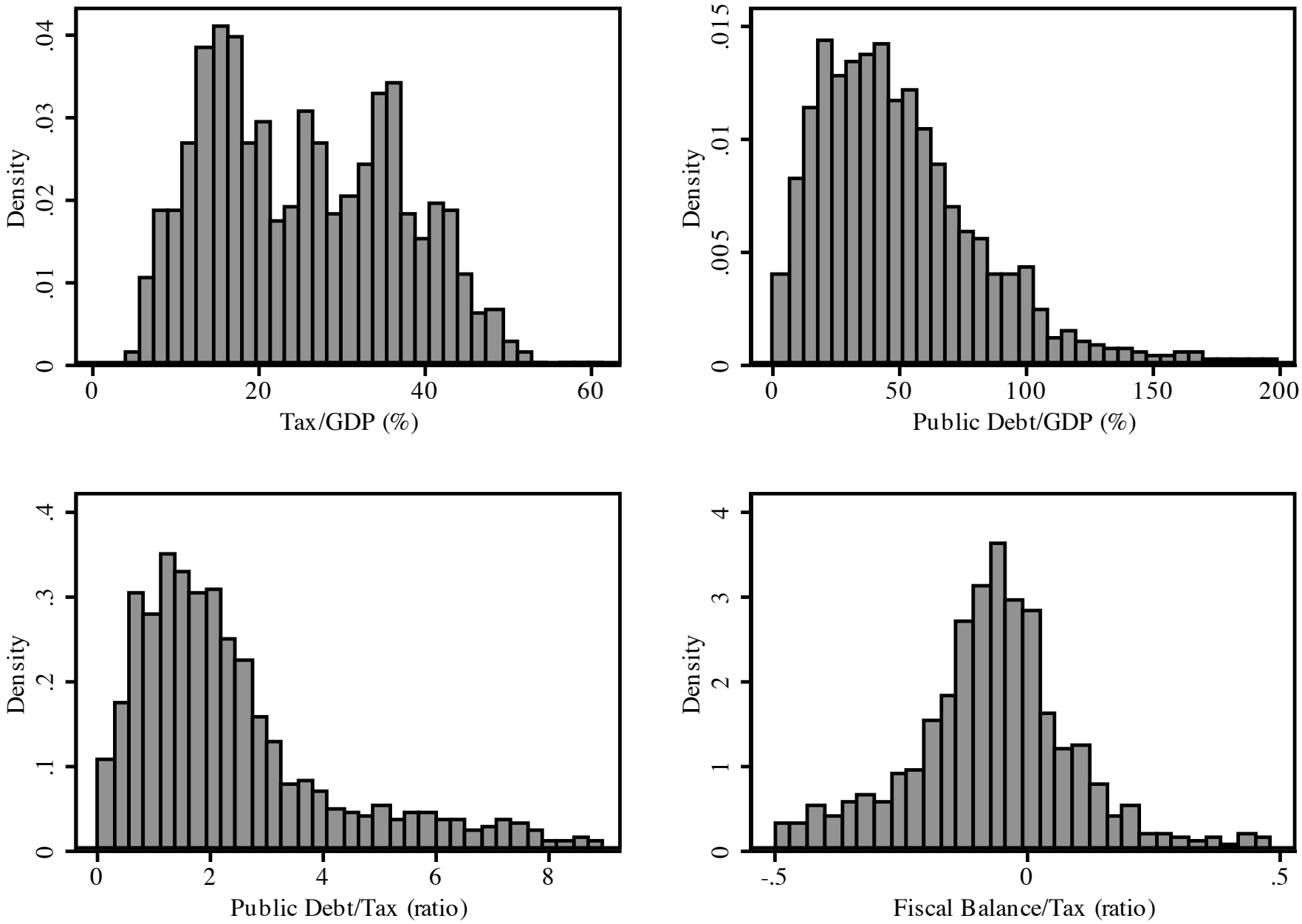


Figure 4: Economic Significance on the Size of Crisis Fiscal Stimulus %GDP, Whole Sample.
We categorize countries into 3 groups. For the first group (59 countries), their exchange rates did appreciate from Jan. 2009-Dec. 2010 in the range of [-21.4,0.0] percent. For the second and third groups (27 and 26 countries), the exchange rates depreciated cumulatively in the range of [.3,6.7] percent and [7.2,50.7] percent, respectively. This figure reports the economic effects of a one standard deviation increase in debt/GDP (eq.19), debt/tax base (eq.22), and trade/GDP (average of eqs.19,22) on the size of fiscal stimulus of 2009-10. For the third group (largest realized depreciation countries), a one standard deviation increase of debt %tax base lowers the stimulus by 1.67 %GDP.

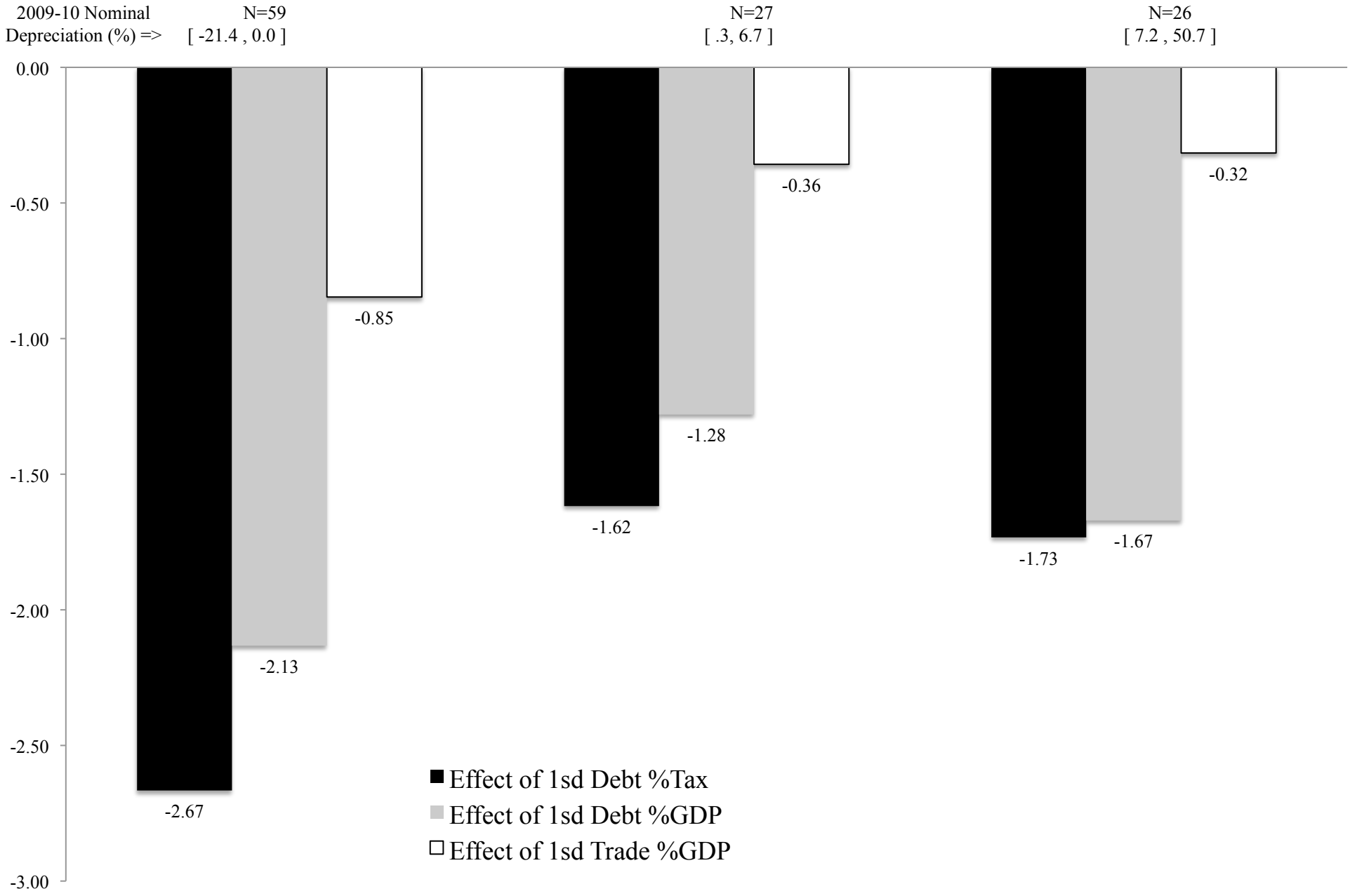


Figure 5: Cumulative 2009-10 Nominal Depreciation (%) and Economic Significance on the Size of Crisis Fiscal Stimulus %GDP, by Income Group
This figure reports the economic effects due to a one standard deviation increase of debt/GDP (eq.19), debt/tax base (eq.22) and trade openness/GDP (average of eqs.19,22). The depreciation are actual (realized), while the rest are estimated effects. South-Western Euro Area Peripheral (SWEAP) includes Greece, Ireland, Italy, Portugal, and Spain.

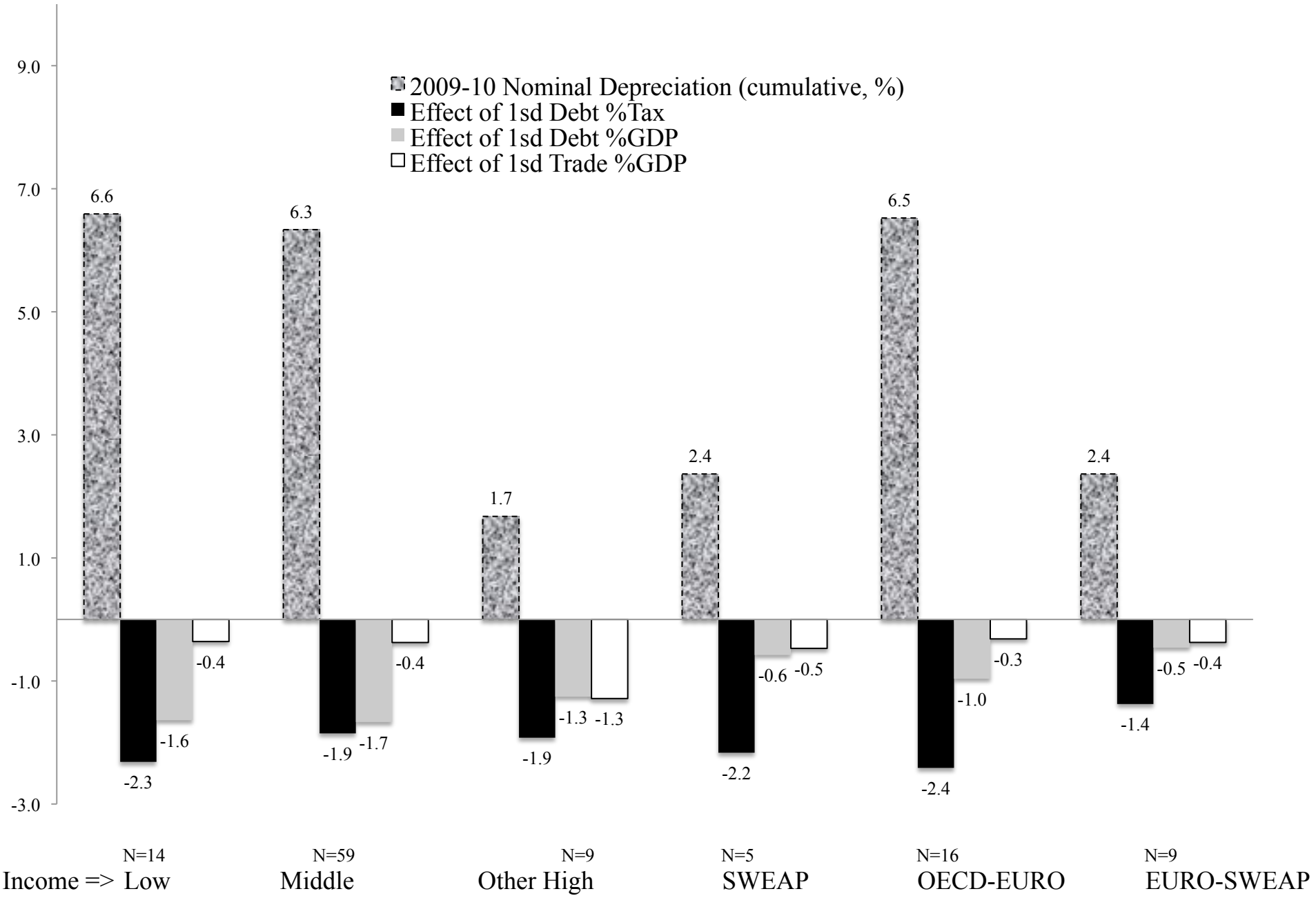
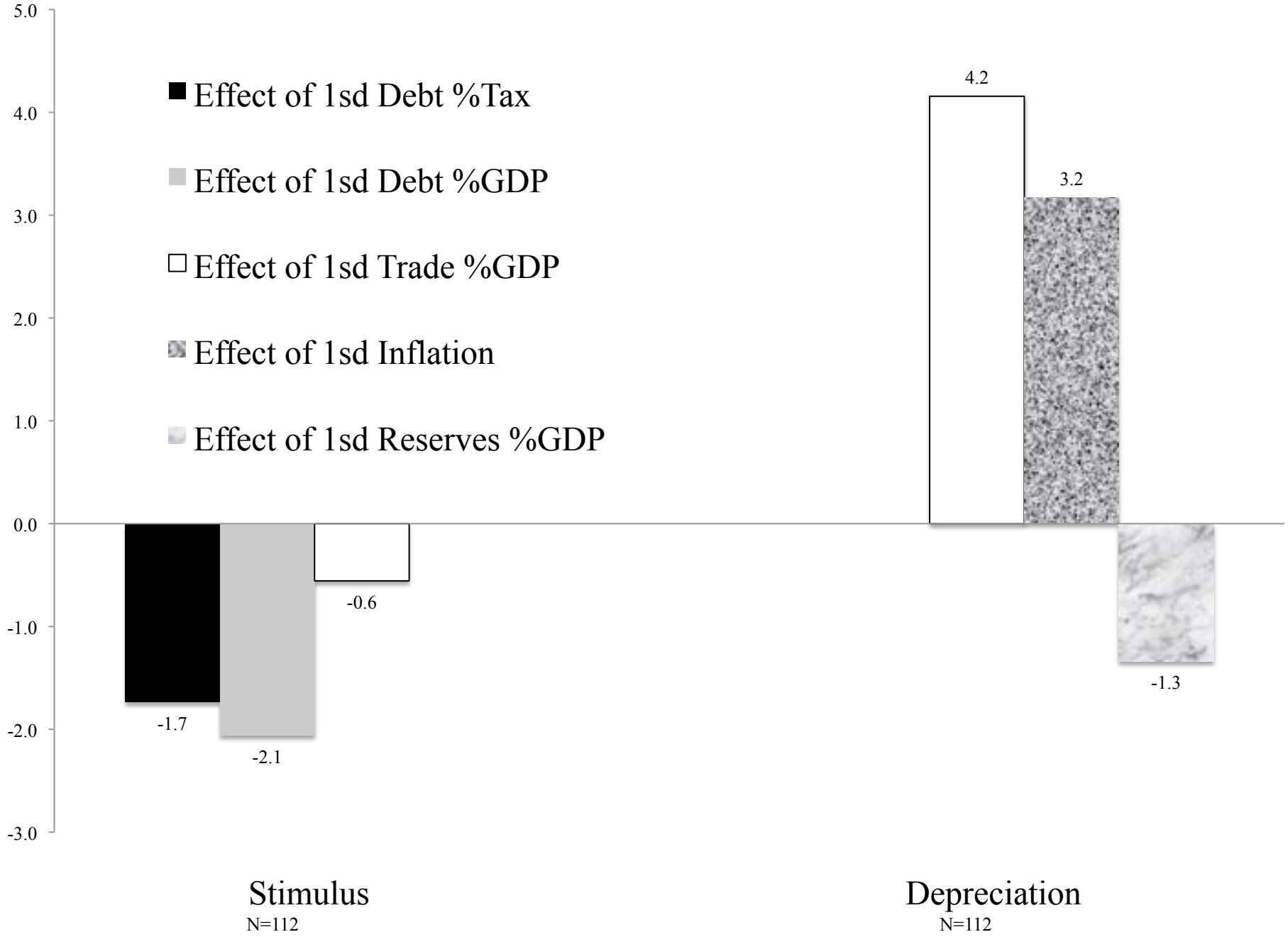


Figure 6: Economic Significance on the Size of Crisis Fiscal Stimulus %GDP of 2009-10 and the Size of 2009-10 Nominal Depreciation (cumulative, %).

This figure reports the economic effects due to a one standard deviation increase of debt/GDP (eq.23), debt/tax base (eq.25), trade openness/GDP (average of eqs.23,25), inflation (average of eqs.23,25), and foreign reserves/GDP (average of eqs.23,25).