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DEFINITION AND ASSESSMENT

Joshua Aizenman
Yothin Jinjarak

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De facto Fiscal Space and Fiscal Stimulus: Definition and Assessment
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ABSTRACT

We define the notion of a ‘de facto fiscal space’ of a country as the inverse of the tax-years it would take to repay the public debt. Specifically, we measure the outstanding public debt relative to the de facto tax base, where the latter measures the realized tax collection, averaged across several years to smooth for business cycle fluctuations. We apply this concept to account for the cross-country variation in the fiscal stimulus associated with the global crisis of 2009-2010. We find that greater de facto fiscal space prior to the global crisis, higher GDP/capita, higher financial exposure to the US, and lower trade openness were associated with a higher fiscal stimulus/GDP during 2009-2010. Joint estimation indicates that higher trade openness was associated with lower fiscal stimulus and higher depreciation rate during 2009-2010.

Joshua Aizenman
Department of Economics; E2
1156 High St.
University of California, Santa Cruz
Santa Cruz, CA 95064
and NBER
jaizen@ucsc.edu

Yothin Jinjara
NTU
Division of Economics
S3-B2A-06 Nanyang Avenue
Singapore 637698
yothin.jinjarak@gmail.com

1. Introduction

The dire outlook of the global economy in the second half of 2008 propagated unprecedented fiscal expansions of most OECDs and emerging-market countries. The resultant fiscal stimulus focused attention on the degree to which countries possess ‘fiscal space’ and on ways to apply it in a counter-cyclical manner. A frequent concern about ‘fiscal space’ is the lack of clarity about it. In attempts to clarify this fuzzy concept, 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.*” Our paper aims at defining a measurable ‘fiscal space’ variable, and applies this concept in the context of the global crisis.

To proceed, we define concept of a *de facto* fiscal space as being inversely related to the tax-years it would take to repay the public debt. A useful notion is the *de facto* tax base, measuring the realized tax collection, averaged across several years to smooth for business cycle fluctuations. The ratio of the outstanding public debt to the *de facto* tax base, or the tax-years needed to repay the public debt, provides information about the relative fiscal tightness of countries. We apply these concepts in order to explain the cross-country variation in the fiscal stimulus during the aftermath of the global crisis.

2. Assessment of the *de facto* fiscal space prior to the crisis (2000-2006), and the cross country variation in the fiscal stimulus, 2009-10

Insight regarding fiscal space may be provided by tracing the pre-crisis, 2006 public debt as a fraction of the pre-crisis average tax revenue during 2000-2006. To recall, the early 2000s were viewed as the continuation of the blissful “Great Moderation” – a period characterized by the drop in macroeconomic volatility and risk premium during the late 1990s and early 2000s.¹ The pre-crisis tax revenue measures the *de facto* tax capacity in years of relative tranquility. The presumption is that a *lower* pre-crisis public debt relative to the pre-crisis tax base implies

¹ See Stock and Waston (2002) for analysis of the Great Moderation hypothesis. Recent observers refer to 1987- 2007 as the “Great Moderation” period.

greater fiscal capacity to fund stimuli using the existing tax capacity. Similarly, lower average fiscal deficits relative to the average tax revenue during 2000-2006 may suggest greater fiscal space at the on-set of the crisis.

Figure 1 reports this measure of 81 countries, subject to data availability in 2006. It shows the wide variation in the 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 Brazil, and above 10 years in Madagascar (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 4 years. Figure 2 reports another measure of fiscal tightness, focusing on flows instead of stocks [i.e., on fiscal deficits instead of public debt]: the average fiscal deficits relative to the average tax revenue. Both figures are consistent with the notion that, even without increasing the tax base, a fair share of countries had significant fiscal space in 2006.²

3. Assessment of the *de facto* fiscal space prior to the crisis (2000-2006), and the cross country variation in the fiscal stimulus, 2009-10

We apply these concepts in order to explain the cross-country variation in the fiscal stimulus during the aftermath of the global crisis. To recall, the early 2000s were viewed as the continuation of the blissful “Great Moderation” – a period characterized by the drop in macroeconomic volatility and risk premium during the late 1990s and early 2000s. The pre-crisis tax revenue measures the *de facto* tax capacity in years of relative tranquility. The presumption is that a *lower* pre-crisis public debt and lower average fiscal deficits relative to the pre-crisis tax base imply *greater* fiscal capacity to fund stimuli using the existing tax capacity. Figure 3 summarizes the averages of these measures for the low, lower-middle, upper middle, and high-income countries. The figure suggests that in 2006, the middle income countries’ fiscal space was higher than the low income countries. While the debt overhangs [2006 public debt/GDP] of the low and lower middle income countries are slightly above the other groups,

² See Aizenman and Jinjarak (2009) for a study accounting for the cross country variation in the *de facto* tax base.

their ratio to the tax base is much higher than that of the upper middle income and the OECD countries. This in turn implies that the low and lower middle income countries may have more limited fiscal space than the upper middle income and the 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 1 overviews the crisis related fiscal stimulus/GDP, 2009-2010, subject to data availability and latest releases. The crisis propagated a significant fiscal stimulus in the USA, Japan, and Germany, the magnitude of which increased from 2009 to 2010, reflecting various lags associated with fiscal policy. It also induced massive “bailout” transfers to the banking systems in the USA, Germany and the UK, attempting to stabilize the financial panic. It is noteworthy that in Germany and the UK the size of the transfers to the financial systems exceeded the fiscal stimulus to the non-financial sector. Similar trends, though in varying intensity, were observed in emerging markets. China, South Korea and Russia provided front loaded fiscal stimulus at rates that were well above the one observed in the OECD countries. Notable is the greater agility of the emerging markets’ response relative to that of the OECD countries, reflecting possibly a faster policy response capacity of several emerging markets.³ This observation is remarkable considering the earlier evidence of the fiscal pro-cyclicality observed in emerging markets and developing countries during the 1980s-90s [see Kaminsky, Reinhart and (2005)].

Based on data availability reported in Table 2, we present in Table 3 the regression analysis, accounting for the cross-country variation in the fiscal stimulus during 2009-10, in 75 (out of 81) countries. The explanatory variables are the *de facto* fiscal space, GDP per capita, trade openness, inflation, and measures of the financial exposure to the US. GDP per capita (PPP, thousands), Trade/GDP (percentage), and Inflation (GDP deflator, percentage) are 2000-06 averages. The financial exposure to USA is the position of each country as of 2006, obtained from the US Treasury International Capital System (TIC): ‘assets’ is foreign portfolio holdings

³ 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.

of USA securities, and ‘total’ is ‘assets’ plus USA portfolio holdings of foreign securities. To account for potential correlation among countries in each geographic region, the cross-section estimation is done with clustering at a regional level (according to the World Bank’s geographic classification). As shown, the regression analysis explains about a third of the variations across countries in crisis-related fiscal stimulus, and in the stimulus plus net cost of financial sector support. The coefficient estimates of key determinants are all statistically significant (t-statistics in parentheses), indicating that a greater *de facto* fiscal space, higher GDP/capita, higher financial exposure to the US, and lower trade openness were positively associated with fiscal stimulus/GDP during 2009-2010.⁴

We provide in Figure 4 the economic significance of the cross-country estimates in regressions (2) and (5) of Table 3. 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 fiscal stimulus. The calculation suggests that the size of the stimulus in 2009-10 is larger in countries with higher income, smaller trade openness, larger *de facto* fiscal space, and greater financial exposure to the USA. For the *de facto* fiscal space measure, a decrease in the public debt/tax revenue by 1.84 [from that of the lower middle income group (3.70) to that of the high income OECD group (1.86)] implies, all other things being equal, an increase of the fiscal stimulus during 2009-2010 by $14.0 * 1.84 = 26$ basis points, or 0.26 percent of GDP.

Table 4 provides results of alternative dependent and explanatory variables. As the fiscal stimulus/GDP is bounded between 0 and 1, we explore the log-odds ratio as the dependent variable in equation (7). As only a third of countries carry out fiscal stimulus from 2009-2010, equation (8) provides the results from a Tobit estimation. Equation (9) was estimated for the sub-sample of countries that engaged in fiscal stimulus. Regressions (7), (8) and (9) support the positive association between fiscal space and the size of stimulus. We also run a regression using the flow fiscal space variable (fiscal deficit/tax revenue in Table 4). The coefficient

⁴ The interaction term in regression (3) implies that the positive association of *de facto* fiscal space with the fiscal stimulus is stronger in higher GDP/Capita countries.

estimates of this second measure are statistically significant in the fiscal stimulus equation, and in the stimulus plus net cost of financial sector support equation. For the flow measure of the *de facto* fiscal space, a decrease in the fiscal deficit/tax revenue by 0.18 [a one standard deviation] implies, other things being equal, an increase in the fiscal stimulus during 2009-10 by 0.55 percent of GDP. The fiscal deficit/tax revenue provides therefore an alternative measure of fiscal space.

4. **Concluding remarks**

Our analysis shows the usefulness of the *de facto* fiscal space concept in accounting for the size of fiscal stimulus. Intriguingly, we found that higher trade openness had been associated with a lower fiscal stimulus. A possible interpretation is that, as fiscal multipliers may be lower in more open economies, these countries opted for a smaller fiscal stimulus, putting greater weight on adjustment via exchange rate depreciation ('exporting their way to prosperity'). This interpretation is validated in Table 5, reporting the SUR regression analysis of fiscal stimulus and exchange rate depreciation. We found that greater trade openness is robustly associated with a lower fiscal stimulus **and** higher depreciation rate during 2009:Q1-2010:Q2. These results validate the presence of gains associated with greater fiscal coordination among countries. A coordinated fiscal stimulus may generate positive spillover effects, mitigating the reliance on competitive depreciations.

References

- Aizenman, J. and Y. Jinjark. (2009) "Globalisation and Developing Countries - a Shrinking Tax Base?" *Journal of Development Studies*, 45 (5), pp. 653-671.
- Fiscal Monitor. (2010) "Navigating the Fiscal Challenges Ahead," Fiscal Affairs Department, IMF, May.
- Heller, S. P. (2005) "Back to Basics -- Fiscal Space: What It Is and How to Get It," *Finance and Development*, 42 (2), June.
- Kaminsky, G. L., C. M. Reinhart and C. A. Végh. (2005) "When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies," *NBER Macroeconomics Annual*, 19 (2004), pp. 11-53.
- Stock J. H. and M. W. Watson. (2003) "Has the Business Cycle Changed and Why?" *NBER Macroeconomics Annual*, 17 (2002), pp. 159-218.

Table 1: Fiscal stimulus, financial sector support, and government expenditures.

This table reports crisis-related fiscal stimulus/GDP, net cost of financial sector support/GDP, and government expenditures/GDP [G/Y] from 2000-09 (all in annual percentage). The reported G is inclusive of transfers and bailouts to banks, and does not match the G in GDP accounts [which is the base of Y]. Hence, in understanding the aggregate demand equation where $G + C + I + NX = Y$, 'G' in the equation is not the G reported below; the bailout, beyond a transfer, does not increase aggregate demand directly.

Sources: Authors' calculation from IMF Fiscal Monitor (2010, May) and WEO (2010, April).

Country	Crisis-Related Fiscal Stimulus/GDP		Net Cost of Financial Sector Support/GDP 2009	Government Expenditures/GDP				
	2009	2010		Total 2000-2007	2008-09	Transfers 2000-2007	2008-09	
Industrial Countries	Australia	2.7	1.7	-0.1	34.3	35.9	3.1	3.1
	Canada	1.8	1.7	4.4	40.1	42.0	7.6	7.9
	France	1.2	1.1	0.3	52.6	54.7	23.9	25.0
	Germany	1.7	2.2	4.6	46.5	46.5	18.8	18.1
	Japan	2.8	2.2	0.1	35.6	38.3	15.3	18.0
	Norway	1.2	..	..	42.8	43.4	13.7	12.8
	Sweden	1.4	..	..	52.5	53.0	17.7	17.1
	Switzerland	.6	..	..	35.8	36.2	10.4	9.9
	United Kingdom	1.6	.2	6.1	39.1	45.8	11.2	11.5
	United States	1.8	2.9	3.7	34.4	40.9	8.7	10.6
Euro Area	Austria	1.5	.3	..	51.1	51.0	24.1	24.9
	Belgium	1.0	..	..	49.7	52.6	18.6	20.8
	Denmark	1.9	3.1	..	53.6	54.6	2.8	1.8
	Finland	3.3	..	..	44.1	48.3	12.5	14.5
	Greece	..	..	..	44.7	50.2	15.9	20.4
	Ireland	..	..	5.3	32.9	44.4	6.6	9.4
	Italy	.0	.1	0.3	47.8	50.6	19.4	21.5
	Netherlands	1.4	..	..	45.6	48.6	14.9	16.6
	Portugal	1.3	..	..	45.4	48.2	12.6	15.5
	Spain	3.7	..	..	38.7	44.4	10.4	12.1
Emerging Markets	Argentina	4.7	1.4	..	27.2	34.9	5.5	6.9
	Brazil	.7	.6	..	38.9	38.5	6.4	7.0
	China	3.1	2.7	..	18.5	22.3	..	..
	Czech Republic	1.6	..	..	44.5	44.3	12.4	13.4
	India	.5	.3	..	27.3	29.7	..	..
	Indonesia	1.4	.0	..	19.5	18.6	..	..
	Mexico	1.5	1.0	..	22.5	25.5	..	..
	Russia	4.5	5.3	..	33.3	37.9	8.9	10.6
	Saudi Arabia	5.4	4.2	..	..	..	..	..
	South Africa	3.0	2.1	..	26.4	31.4	4.1	4.6
South Korea	3.6	1.1	0.1	20.0	23.1	..	..
Turkey	1.5	0.5	..	36.2	35.7	5.9	6.6	

Table 2: De facto Fiscal Space.

This table reports the measures of fiscal space based on 2000 to 2006 data. The denominator, Tax, is average tax revenue/GDP from 2000-06. Public Debt is public debt/GDP as of 2006. Fiscal Deficit is average fiscal deficit/GDP from 2000-06 [negative is surplus]. All variables are deflated by 2006 CPI. * denotes countries included in regression analysis.

Source: Authors' calculation from the World Development Indicators.

Income Group	Country	iso	Tax revenue avg. 2000-06	Publid debt 2006	Fiscal space 1 (II)/(I)	Fiscal deficit avg. 2000-06	Fiscal space 2 (III)/(I)	Income Group	Country	iso	Tax revenue avg. 2000-06	Publid debt 2006	Fiscal space 1 (II)/(I)	Fiscal deficit avg. 2000-06	Fiscal space 2 (III)/(I)	
			(I) %	(II) %		(III) %					(I) %	(II) %		(III) %		
A. Low Income	Afghanistan	AFG *	5.95	9.56	1.61	1.75	.29	D. High Income Non OECD	Bahamas, The	BHS	14.71	34.71	2.36	1.49	.10	
	Bangladesh	BGD *	7.90	35.20	4.46	.70	.09		Bahrain	BHR	3.43	23.64	6.89	-4.48	-1.30	
	Kyrgyz Republic	KGZ *	13.37	115.13	8.61	1.57	.12		Croatia	HRV *	21.02	35.50	1.69	1.88	.09	
	Madagascar	MDG *	10.07	103.08	10.24	3.39	.34		Cyprus	CYP *	30.75	64.60	2.10	-.02	.00	
	Nepal	NPL *	8.63	49.69	5.76	1.13	.13		Estonia	EST *	19.91	4.50	.23	-1.08	-.05	
	Tajikistan	TJK *	10.14	102.61	10.12	3.83	.38		Latvia	LVA *	14.00	10.70	.76	-.77	.05	
	Uganda	UGA *	10.88	58.05	5.33	1.87	.17		Malta	MLT *	26.09	63.70	2.44	1.87	.07	
	Bhutan	BTN *	9.17	63.31	6.91	4.67	.51		Oman	OMN	7.09	19.07	2.69	2.69	.38	
	China	CHN *	8.30	16.20	1.95	2.02	.24		San Marino	SMR	21.61	62.04	2.87	-4.66	-.22	
	Congo, Rep.	COG *	7.69	.20	.03	-1.19	-.16		Singapore	SGP *	13.41	88.46	6.60	-6.04	-.45	
B. Lower Middle Income	Côte d'Ivoire	CIV *	13.75	94.97	6.91	3.01	.22	E. High Income OECD	Australia	AUS *	23.13	20.48	.89	-.97	-.04	
	El Salvador	SLV *	11.70	43.33	3.70	3.60	.31		Austria	AUT *	28.51	62.20	2.18	2.04	.07	
	Georgia	GEO *	9.34	27.96	2.99	.05	.01		Belgium	BEL *	30.34	88.10	2.90	.62	.02	
	Guatemala	GTM *	11.37	21.88	1.92	1.72	.15		Canada	CAN *	29.17	53.22	1.82	-.84	-.03	
	India	IND *	9.37	80.80	8.62	3.57	.38		Czech Republic	CZE *	20.28	29.40	1.45	4.21	.21	
	Indonesia	IDN *	11.53	39.00	3.38	1.16	.10		Denmark	DNK *	47.76	32.10	.67	-2.03	-.04	
	Maldives	MDV *	19.94	50.12	2.51	7.67	.38		Finland	FIN *	32.36	39.70	1.23	-.71	-.02	
	Moldova	MDA *	15.70	29.18	1.86	-.56	-.04		France	FRA *	27.17	63.70	2.34	2.60	.10	
	Mongolia	MNG *	19.18	54.74	2.85	-.74	-.04		Germany	DEU *	22.71	67.60	2.98	1.35	.06	
	Morocco	MAR *	20.49	56.19	2.74	1.94	.09		Greece	GRC *	21.14	97.80	4.63	6.89	.33	
	Papua New Guinea	PNG *	23.63	71.56	3.03	1.99	.08		Hungary	HUN *	25.70	65.60	2.55	6.40	.25	
	Philippines	PHL *	13.04	64.59	4.95	3.35	.26		Iceland	ISL *	34.01	27.90	.82	-1.27	-.04	
	Senegal	SEN *	16.09	71.11	4.42	1.47	.09		Ireland	IRL *	25.38	24.90	.98	-1.40	-.06	
	Sri Lanka	LKA *	13.80	88.70	6.43	7.55	.55		Italy	ITA *	28.68	106.50	3.71	2.90	.10	
	Thailand	THA *	16.15	41.10	2.54	-1.74	-.11		Korea, Rep.	KOR *	19.47	34.10	1.75	-.31	-.02	
	Tunisia	TUN *	20.71	53.92	2.60	2.58	.12		Luxembourg	LUX *	27.23	6.50	.24	.06	.00	
	Ukraine	UKR *	14.75	53.96	3.66	1.01	.07		Netherlands	NLD *	24.05	47.40	1.97	.68	.03	
	C. Upper Middle Income	Algeria	DZA	32.37	54.91	1.70	-13.98		-.43	New Zealand	NZL *	32.65	44.53	1.36	-3.77	-.12
		Belarus	BLR *	24.56	6.64	.27	-.10		.00	Norway	NOR *	33.73	55.30	1.64	-13.19	-.39
		Brazil	BRA *	9.40	46.96	5.00	1.44		.15	Poland	POL *	20.54	47.70	2.32	4.27	.21
Bulgaria		BGR *	19.78	22.70	1.15	-3.17	-.16	Portugal	PRT *	21.39	64.70	3.03	.97	.05		
Colombia		COL *	13.00	56.97	4.38	5.12	.39	Slovak Republic	SVK *	19.00	30.50	1.61	6.11	.32		
Jamaica		JAM	26.58	117.12	4.41	1.93	.07	Slovenia	SVN *	24.48	26.70	1.09	2.54	.10		
Kazakhstan		KAZ *	12.92	5.94	.46	-.61	-.05	Spain	ESP *	22.50	39.60	1.76	.49	.02		
Lithuania		LTU *	16.08	18.00	1.12	.57	.04	Sweden	SWE *	35.52	45.70	1.29	-1.21	-.03		
Mauritius		MUS *	16.06	41.08	2.56	2.69	.17	Switzerland	CHE *	22.16	25.38	1.15	.94	.04		
Mexico		MEX *	12.34	38.30	3.10	1.24	.10	United Kingdom	GBR *	28.85	43.50	1.51	1.64	.06		
Peru		PER *	13.06	31.25	2.39	1.06	.08	United States	USA *	20.31	47.13	2.32	1.75	.09		
Russian Federation		RUS *	14.56	9.10	.63	-5.78	-.40									
South Africa		ZAF *	25.83	46.24	1.79	1.23	.05									
St. Kitts and Nevis		KNA *	22.32	95.82	4.29	1.08	.05									
Turkey		TUR *	19.70	46.10	2.34	-4.38	-.22									
Uruguay		URY *	17.19	67.50	3.93	3.04	.18									

Table 3: Fiscal stimulus and fiscal space.

This table reports regression analysis of fiscal stimulus (dependent variable; Table 1) as explained by economic determinants and the (inverse) of the *de facto* fiscal space: Public debt/tax base. All variables are deflated using 2006 CPI and rescaled (see Figure 4 for their economic significance and interpretation). A constant term included but not reported. Absolute values of t-statistics are in parentheses, with standard errors obtained by clustering on geographic region as explained in the paper.

*** (**, *) denote a statistical significance at 1 (5, 10) percent, respectively.

Dependent (% of GDP): <u>Explanatory variable</u>	(1)		(2)		(3)		(4)		(5)		(6)	
	Fiscal stimulus of 2009-2010 total		Fiscal stimulus of 2009-2010 total		Fiscal stimulus of 2009-2010 total		Fiscal stimulus and financial sector support		Fiscal stimulus and financial sector support		Fiscal stimulus and financial sector support	
	coeff.	(t-stat)	coeff.	(t-stat)	coeff.	(t-stat)	coeff.	(t-stat)	coeff.	(t-stat)	coeff.	(t-stat)
GDP capita (PPP)	4.0 ***	(3.7)	4.0 **	(3.6)	3.3 **	(2.5)	6.1 ***	(5.3)	6.2 ***	(5.2)	4.6 **	(3.3)
Trade/GDP	-1.0 ***	(-7.8)	-1.0 ***	(-8.5)	-1.1 ***	(-10.9)	-1.3 ***	(-11.2)	-1.4 ***	(-11.0)	-1.5 ***	(-7.9)
Public debt/tax	-9.6 *	(-2.3)	-9.6 *	(-2.3)	-12.5 **	(-2.5)	-7.9	(-1.6)	-7.7	(-1.6)	-13.8 **	(-2.5)
Inflation (GDP deflator)	0.9	(0.8)	0.9	(0.8)	1.1	(1.0)	0.7	(0.5)	0.7	(0.5)	1.0	(0.9)
Financial exposure to USA Total (Assets+Liabilities)	1.9 ***	(4.9)					4.4 ***	(9.4)				
Assets			3.5 **	(3.3)	3.3 **	(3.0)			7.4 ***	(6.4)	7.1 ***	(5.4)
GDP capita*Public debt/tax					0.4 *	(2.0)					0.9 *	(2.3)
Countries	75		75		75		75		75		75	
R-sq.	0.3		0.3		0.3		0.4		0.4		0.4	

Table 4: Robustness

This table provides robustness check on regression analysis of fiscal stimulus (dependent variable; Table 1) as explained by economic determinants and the *de facto* fiscal space: Public debt/tax base in equations (7) – (9) and Fiscal deficit/tax in equations (10) – (12). All variables are deflated using 2006 CPI and rescaled. As Fiscal stimulus/GDP is bounded between 0 and 1, equation (7) explores the log-odds ratio of fiscal space as the dependent variable. As only a third of countries carry out fiscal stimulus from 2009-2010, equation (8) provides the results from Tobit estimation [the inverse Mills’ ratio included]. Equation (9) estimates over only a sample of countries implementing fiscal stimulus. A constant term included but not reported. p-values are in parentheses.

*** (**, *) denote a statistical significance at 1 (5, 10) percent, respectively.

(Y) Dependent (% of GDP):	(7)	(8)	(9)	(10)	(11)	(12)
	Fiscal stimulus of 2009-2010			Total stimulus & financial bailout		
Explanatory variable (X)	coeff. (p-val.)	coeff. (p-val.)	coeff. (p-val.)	coeff. (p-val.)	coeff. (p-val.)	coeff. (p-val.)
	<u>log[Y/(1-Y)]=dependent</u>	<u>Tobit estimation</u>	<u>Stimulus>0 only</u>	<u>Fiscal space = deficit/tax (2nd measure)</u>		
GDP capita (PPP)	-0.040 *** (0.002)	13.054 *** (0.008)	-9.526 ** (0.024)	5.970 *** (0.000)	5.849 *** (0.000)	5.895 *** (0.000)
Trade/GDP	-0.005 *** (0.001)	-5.834 *** (0.000)	-1.590 (0.207)	-1.629 *** (0.001)	-1.587 *** (0.001)	-1.581 *** (0.002)
Fiscal space	-0.043 *** (0.007)	-5.887 * (0.073)	-9.972 *** (0.001)	-2.987 * (0.083)	-2.985 * (0.085)	-3.445 * (0.095)
Inflation (GDP deflator)	-0.017 *** (0.006)	5.403 (0.414)	-2.341 (0.738)	1.159 (0.309)	1.148 (0.311)	1.090 (0.378)
Financial exposure to USA Assets	0.017 *** (0.000)	0.242 (0.955)	3.561 (0.172)	7.438 *** (0.000)		7.346 *** (0.001)
Total (Assets+Liabilities)					4.365 *** (0.000)	
GDP capita*Fiscal Space						3.655 (0.604)
Countries	25	75	26	75	75	75
R-sq.	0.443	0.085	0.513	0.398	0.402	0.399

Table 5: Fiscal stimulus and exchange rate depreciation

This table reports SUR regression analysis of fiscal stimulus (dependent variable; Table 1) and exchange rate depreciation (LCU/SDR) from 2009:Q1-2010:Q2 as explained by economic determinants and the *de facto* fiscal space. All variables are deflated using 2006 CPI and rescaled. A constant term included but not reported. Standard errors are in parentheses.

*** (**, *) denote a statistical significance at 1 (5, 10) percent, respectively.

Dependent variable: (SUR estimation)	(13)				(14)				(15)				(16)				
	Whole sample								Excluding Euro countries								
	Stimulus coeff. (s.e.)		Depreciation coeff. (s.e.)		Stimulus coeff. (s.e.)		Depreciation coeff. (s.e.)		Stimulus coeff. (s.e.)		Depreciation coeff. (s.e.)		Stimulus coeff. (s.e.)		Depreciation coeff. (s.e.)		
Explanatory variable	Fiscal space – Deficit/tax				Fiscal space – Debt/tax				Fiscal space – Deficit/tax				Fiscal space – Debt/tax				
Trade/GDP	-1.5 (0.4)	***	0.1 (0.0)	***	-1.4 (0.4)	***	0.1 (0.0)	***	-1.4 (0.5)	***	0.1 (0.0)	**	-1.2 (0.5)	**	0.1 (0.0)	**	
Fiscal space	-3.1 (1.4)	**			-14.5 (11.4)				-2.8 (1.5)	*			-13.5 (11.5)				
GDP capita (PPP)	5.2 (2.0)	***			5.8 (2.1)	***			4.9 (2.6)	*			6.0 (2.5)	**			
Financial exposure to USA Total (Assets+Liabilities)	4.5 (1.5)	***			4.4 (1.5)	***			4.5 (1.5)	***			4.2 (1.6)	***			
Assets			-2.8 (11.8)				-2.7 (11.8)					2.0 (12.5)				2.2 (12.5)	
Inflation (GDP deflator)			0.1 (14.8)				0.7 (14.8)					5.8 (16.2)				6.5 (16.3)	
Reserves/GDP			-2.2 (0.9)	**			-2.1 (0.9)	**				-2.3 (1.3)	*			-2.2 (1.3)	*
Commodity/export			-1.0 (0.6)	*			-1.0 (0.6)	*				-0.7 (0.6)				-0.6 (0.6)	
Countries	73		73		73		73		57		57		57		57		
R-sq.	0.4		0.2		0.4		0.2		0.4		0.1		0.4		0.1		

Figure 1: De facto fiscal space measure based on public debt and tax revenue.

This figure plots country's fiscal space as measured by inverse of the tax-years needed to repay the public debt. The variable *Fiscal space 1* is defined by $[2006 \text{ Debt/GDP}] \div [2000-06 \text{ Average Tax Revenue/GDP}]$, where all variables are deflated by 2006 CPI.

Source: Authors' calculation from the World Development Indicators.

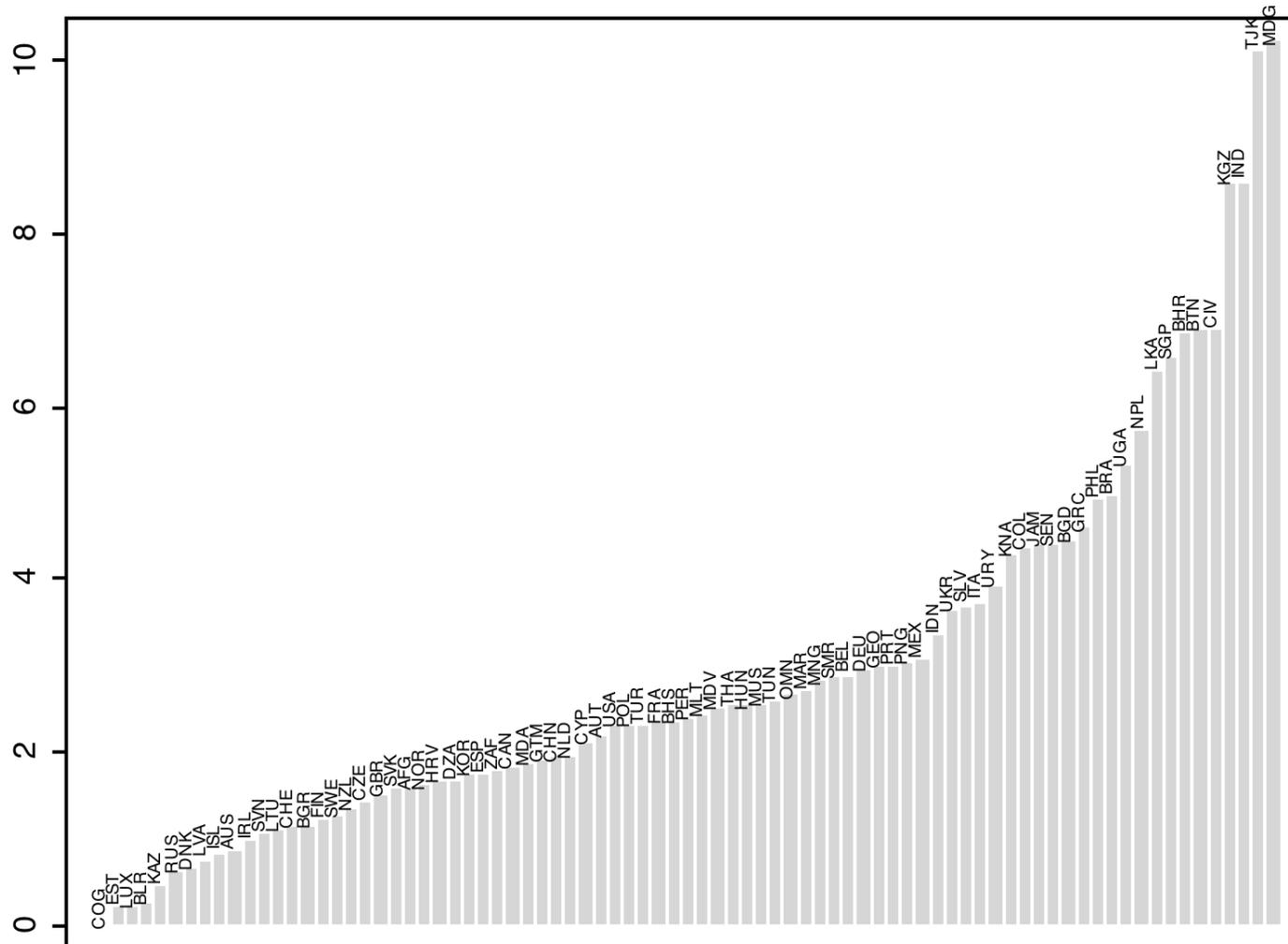


Figure 2: De facto fiscal Space based on fiscal deficit and tax revenue.

This figure plots country's fiscal space as measured by inverse of average fiscal deficits/public debt. The variable *Fiscal space 2* is defined by $[2000-06 \text{ Average Fiscal Deficit/GDP}] \div [2000-06 \text{ Average Tax Revenue/GDP}]$, where all variables are deflated by 2006 CPI.

Source: Authors' calculation from the World Development Indicators.

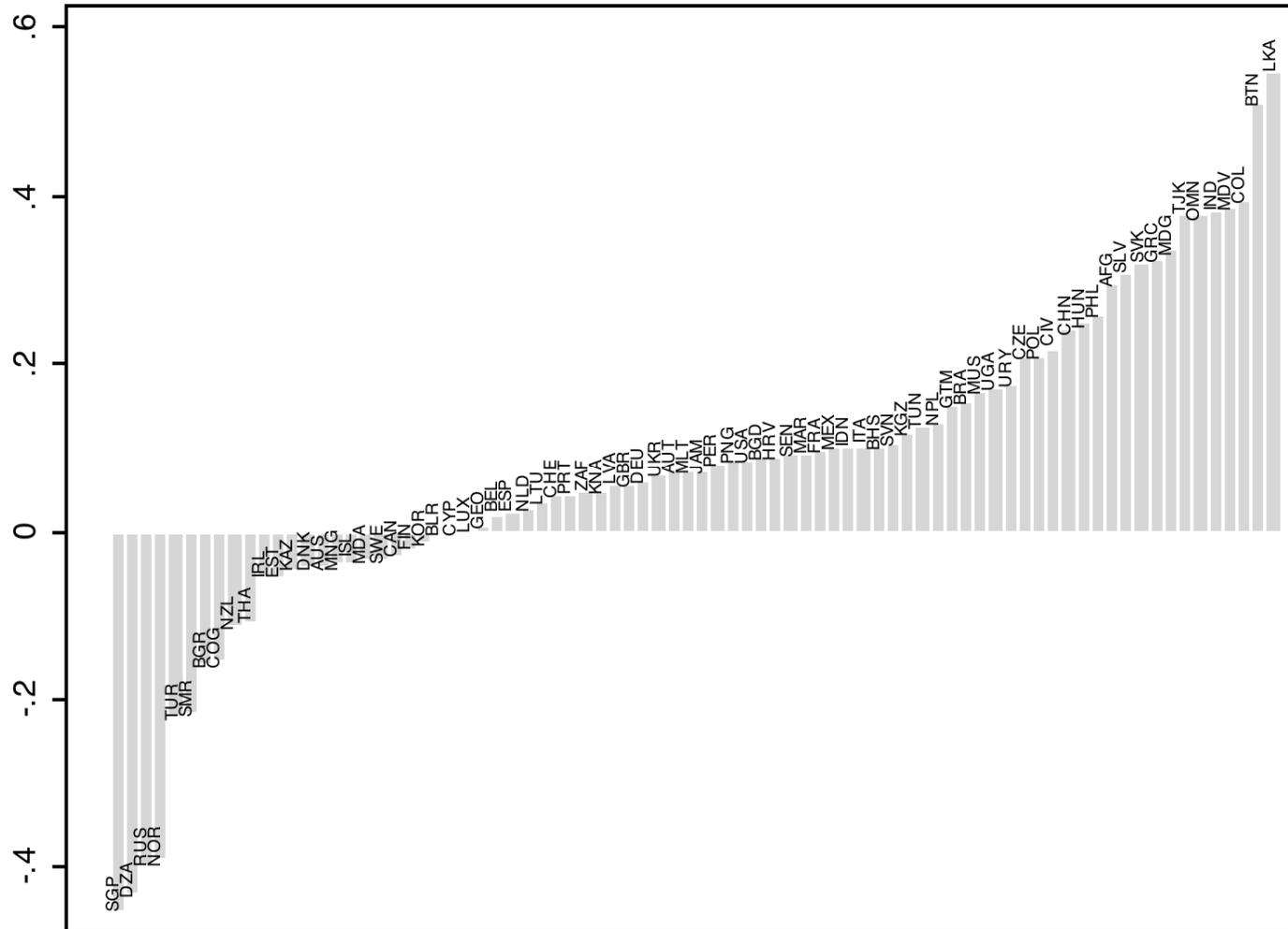


Figure 3: De facto fiscal space by income classification.

This figure presents the level of public debt/GDP in 2006 and two measures of fiscal space: Public Debt/Tax Revenue (fiscal space 1) and Fiscal Deficit/Tax Revenue (fiscal space 2). All variables are deflated by 2006 CPI. See Table 2 for country-level data. Source: Authors' calculation from the World Development Indicators.

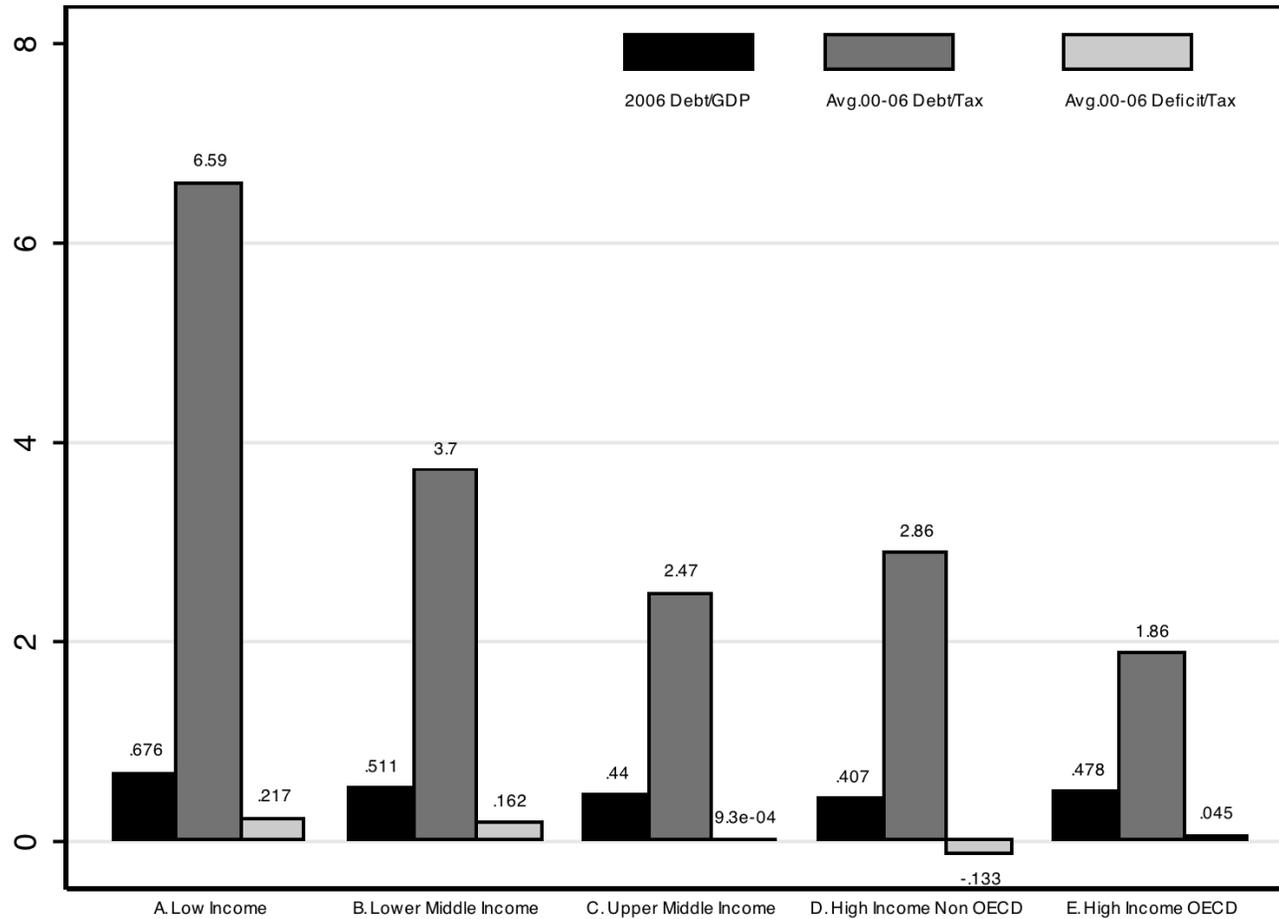


Figure 4: Significance of *de facto* fiscal space and other economic determinants of the size of fiscal stimulus.

Based on Table 3, regression (2) estimates, this figure calculates for each economic determinant its one standard deviation effect on the size of fiscal stimulus (% GDP), 2009-10. All variables are deflated by 2006 CPI. A decrease in the public debt/tax revenue by 1.84 [from that of the lower middle income group (3.70) to that of the high income OECD group (1.86)] implies, other things being equal, an increase of the fiscal stimulus during 2009-2010 by $14.0 \times 1.84 = 26$ basis points, or 0.26 percent of GDP.

