

Capital Profitability and Economic Growth

Nan-Ting Chou¹, Alexei Izyumov² & John Vahaly³

Abstract

This paper analyzes the connection between the macroeconomic profitability of capital and potential GDP growth for 109 countries divided into highly developed (HDC), less developed (LDC), and transition economy (TEC) groups. We find that, contrary to some recent studies, the globalization of capital markets and more rapid capital accumulation in LDC and TEC have not led to the convergence of macroeconomic rates of return (ROR) across countries. The existing differences among national ROR imply underinvestment in the majority of developing and transition countries. The counterfactual estimation of potential changes in GDP assuming equalization of ROR reveals major gains that could accrue to developing countries.

Keywords: Return on capital, Capital mobility, Economic growth

Abstract

This paper analyzes the connection between the macroeconomic profitability of capital and potential GDP growth for 109 countries divided into highly developed (HDC), less developed (LDC), and transition economy (TEC) groups. We find that, contrary to some recent studies, the globalization of capital markets and more rapid capital accumulation in LDC and TEC have not led to the convergence of macroeconomic rates of return (ROR) across countries. The existing differences among national ROR imply underinvestment in the majority of developing and transition countries. The counterfactual estimation of potential changes in GDP assuming equalization of ROR reveals major gains that could accrue to developing countries.

1. Introduction

Lucas (1990) called the problem of inadequate investment flows from capital-abundant to capital-poor countries the “central question for economic development.” The main research question of this study concerns the link between capital profitability, as measured by the macroeconomic ROR, and in potential economic growth. Using newly available data from the Penn World Table (PWT) 9.0 (2016), we estimate the returns to the capital stock covering the 1994-2014 period for a sample of 109 countries. We also estimate counterfactual gains in GDP for three groups of countries. In 2014, these countries’ GDP comprised over 95% of global output.

Economic theory predicts that faster accumulation of capital in LDC and TEC, relative to HDC, should lead to gradual convergence of aggregate profitability across countries. According to our data, national ROR converged during the first half of our sample period. This trend was reversed in more recent years leaving substantial gaps in capital profitability among countries.

¹ College of Business, University of Louisville, Louisville, KY40292, Nan-Ting.Chou@louisville.edu, Office: (502) 852-4840, Fax: (502) 852-7672

² College of Business, University of Louisville, Louisville, KY40292, Alexei.Izyumov@louisville.edu, Office: (502) 852-4842, Fax: (502) 852-7672

³ College of Business, University of Louisville, Louisville, KY40292, John.Vahaly@louisville.edu, Office: (502) 852-4863, Fax: (502) 852-7672

Based on the magnitude of these gaps, we compute potential gains or losses in output for each country assuming equalization of ROR across countries. The counterfactual estimation indicates high costs of misallocation of capital for developing countries. During the study period, the unrealized economic growth for this group of countries was between 11% and 20% of their GDP.

The paper consists of five sections. Following this introduction, Section 2 presents the framework of analysis and data. Section 3 discusses estimates of ROR. Section 4 estimates counterfactual GDP gains assuming ROR equalization. Section 5 concludes.

2. Analytical framework and data

Our sample of countries and the study period reflect both data availability and the inclusion of post-communist countries, most of which transitioned to a market economy and opened to foreign investment in the 1990s. For ROR estimates, the sample includes 60 less-developed (LDC), 26 highly-developed (HDC), and 23 post-communist transition economy countries (TEC). The complete list of countries is presented in the Appendix. Macroeconomic ROR for a country is defined as:

$$ROR = \Pi / K_n, \quad (1)$$

where Π is income on capital (profits) and K_n is the fixed capital stock, both measured in local currencies in current prices. This aggregate ROR can be represented as:

$$ROR = (\Pi / Y_n) (Y_n / K_n) = \alpha (Y_n / K_n) \quad (2)$$

where Y_n is nominal GDP, α is capital income share in GDP.

Data for capital income shares in GDP (α) are derived from labor income shares provided by the PWT 9.0 database (2016). The factor income shares of GDP in this database are estimated with adjustments for mixed sector income, which accounts for profits generated by non-incorporated enterprises. Such adjustments are sometimes overlooked in the literature but are important for accurate estimates of factor income distribution, particularly in poorer countries where mixed sector output can reach 50% of GDP. Capital stock data is also from PWT 9.0 (2016) which offers the most recent estimates of this variable.

The capital-weighted average ROR for groups of countries, ROR_t , was computed as:

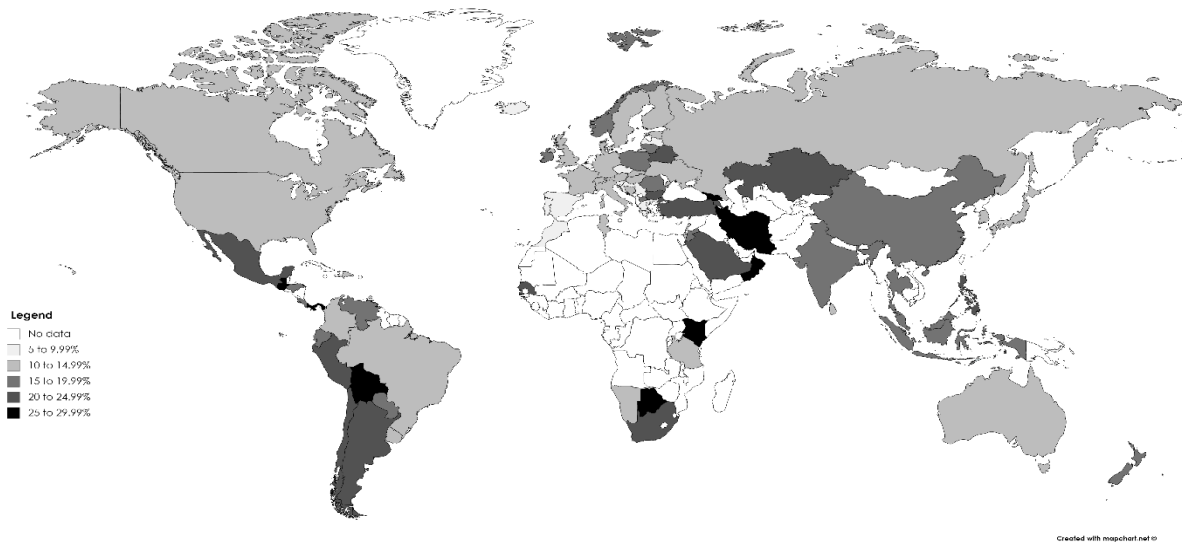
$$ROR_t = \sum_{i=1}^N ROR_{it} * (K_{it} / \sum_{i=1}^N K_{it}) \quad (3)$$

Where ROR_{it} is the ROR for country i in year t , K_{it} is the capital stock of country i in year t , and N is the number of countries included in the group.

3. Estimates of ROR

Estimates of average rates of return over the sample period studied are shown in the global map below as Figure 1. As the map indicates, relatively high rates of return between 1994 and 2014 (darker areas) are clustered in developing countries, in particular in Central and South America, the Middle East, and Asia. In comparison, average rates of return in developed countries in Western Europe and North America are relatively low. For transition economies the picture is mixed with some countries of the former USSR and Eastern Europe demonstrating high rates of return while others, indicate returns comparable to those in HDC. Because the data only includes 109 countries, there are relatively large areas, in particular in Africa, where no data is available.

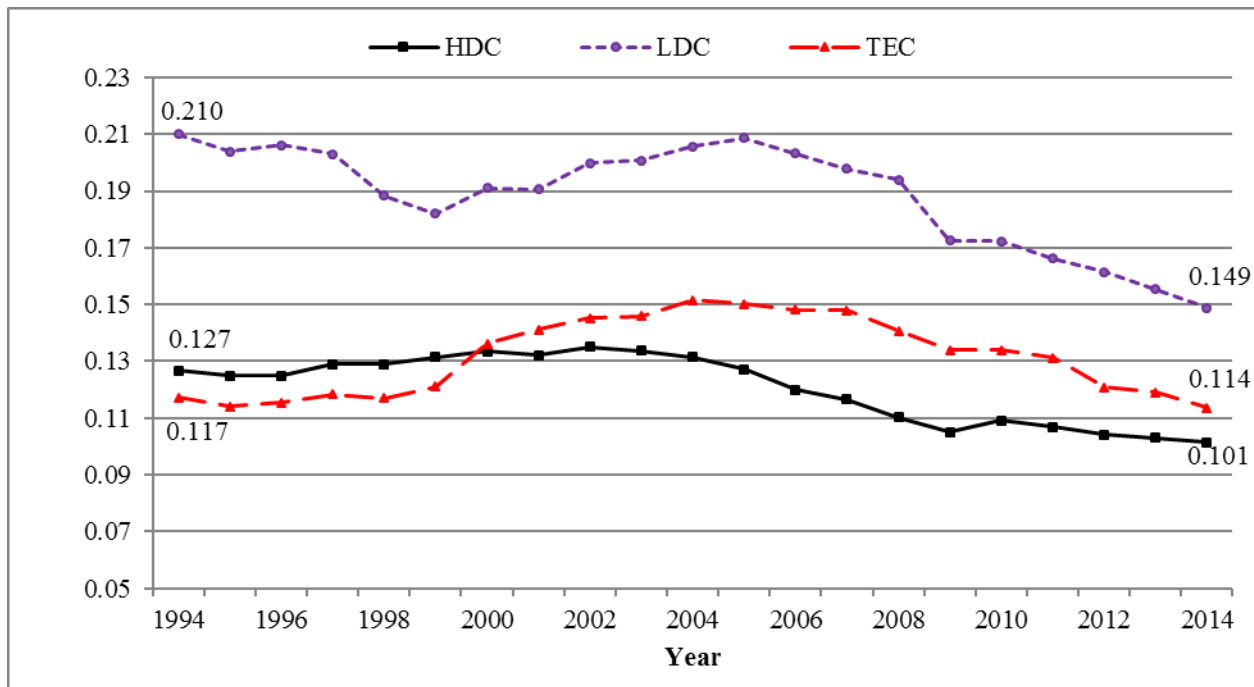
Figure1. Map of average rates of return, 1994 – 2014



Source: Authors' calculations.

The capital-weighted average ROR for groups of countries are presented in Figure 2. The figure indicates a downward trend for LDC and HDC and no discernable trend for TEC. Capital profitability for LDC is higher than for HDC and TEC. For TEC, the profitability was lower than in HDC before 2000 but consistently higher afterwards.

Figure2. Capital-weighted ROR by country type



Source: Authors' calculations.

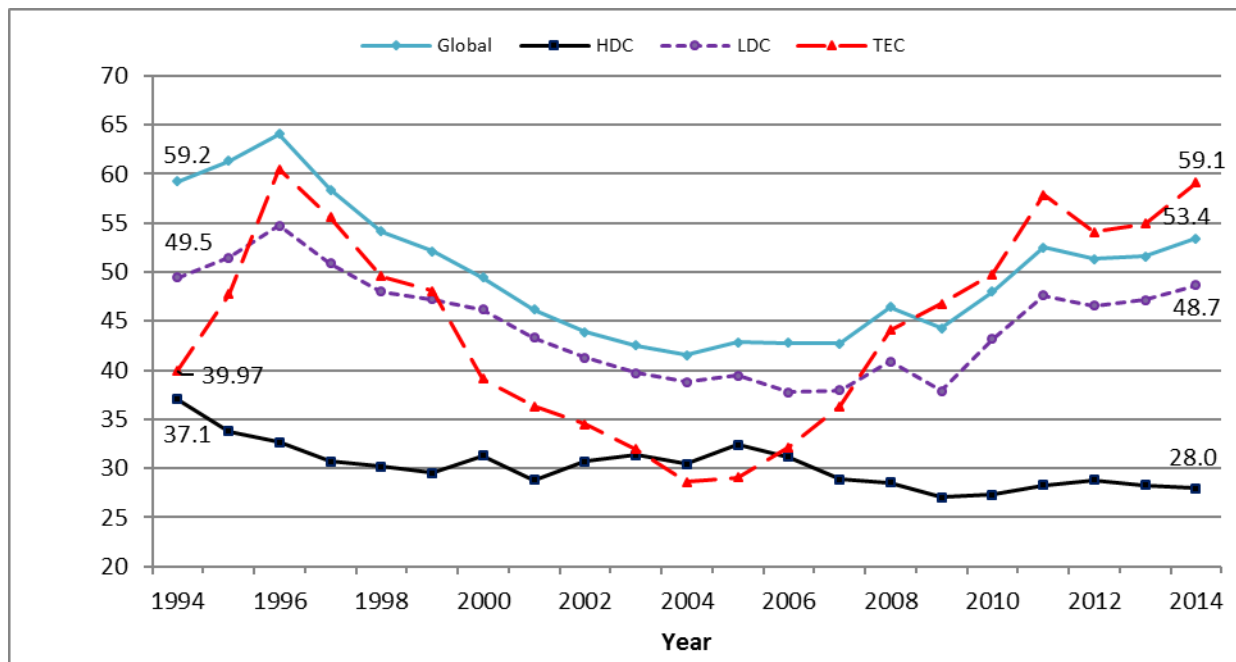
Our estimation of macroeconomic ROR is comparable to these in the literature. The majority of the cross-country studies report highest average ROR to be found in less developed economies (Bigsten, 2000; Banerjee and Duflo, 2005; Izyumov and Alterman, 2005; Bai et al., 2006; Lu and Gao, 2009; Udry and Anagol, 2006; Chou et al., 2016). However our results differ from those reported in Caselli and Feyrer (2007) and some of the follow-up papers including Mello (2009) and Ferriera (2011). Using alternative estimates of capital income and capital stock, these papers claimed that as of mid-1990s, ROR across developed and developing countries were approximately equalized.

4. Implications for economic growth

Furthermore, there is evidence that, after controlling for country-specific characteristics, FDI inflows are positively related to macroeconomic ROR.⁴ If capital mobility is perfect, ROR should equalize across countries. However, differences in ROR across countries remain significant, signaling misallocation of capital. Specifically, higher levels of ROR in poorer countries (LDC and TEC) relative to those of developed economies (HDC) indicate under-investment in the former. The cost of this misallocation in terms of lost GDP depends upon the extent of ROR convergence. Economic theory posits that competition of capital owners should lead to equalization of ROR via intra- and inter-industry capital mobility. Applied to the global economy, this would predict that faster accumulation of capital in developing countries combined with major increases in FDI should contribute to ROR convergence across countries (Chou, et al., 2016). This should reduce GDP losses from capital misallocation.

Figure 3 presents the patterns of convergence for capital profitability, measured by the coefficient of variation, for all countries in the sample and for HDC, LDC, and TEC groups. It indicates that national ROR indeed trended towards convergence between mid-1990s and mid-2000s but diverged in recent years. From 1994 to 2004, the coefficient of variation for all countries declined from 59.2 to 41.5. Between 2004 and 2014, it rose to 53.4 (see Figure 3). These global ROR trends mainly reflect the convergence and subsequent divergence in LDC and TEC groups. For HDC countries, the convergence trend was relatively stable with the coefficient of variation falling from 37.1, in 1994, to 28.0 by 2014.

Figure 3. Coefficient of variation of ROR in countries and groups of countries



Source: Authors' calculations.

⁴See Chou, NT., Izyumov, A., and Vahaly, J. (2018). Return to capital and foreign direct investment: A cross-country perspective.

To estimate potential output gains or losses from misallocation of capital, we computed the counterfactual GDP for 109 countries assuming ROR equalization for each year of the sample period. For this computation, we followed the methodology of Caselli and Feyrer (2007) and Mello (2009). Both studies estimated counterfactual output assuming a Cobb-Douglas production function and equalization of ROR across industries inside each country. In addition, the amount of capital was assumed to be fixed before and after its reallocation across countries. Under these conditions, the counterfactual GDP of country i in year t is given by:

$$Y_{it}^* = \{ [(ROR_{it} / ROR_t^*)]^{\alpha / (1-\alpha)} \} Y_{it} \tag{4}$$

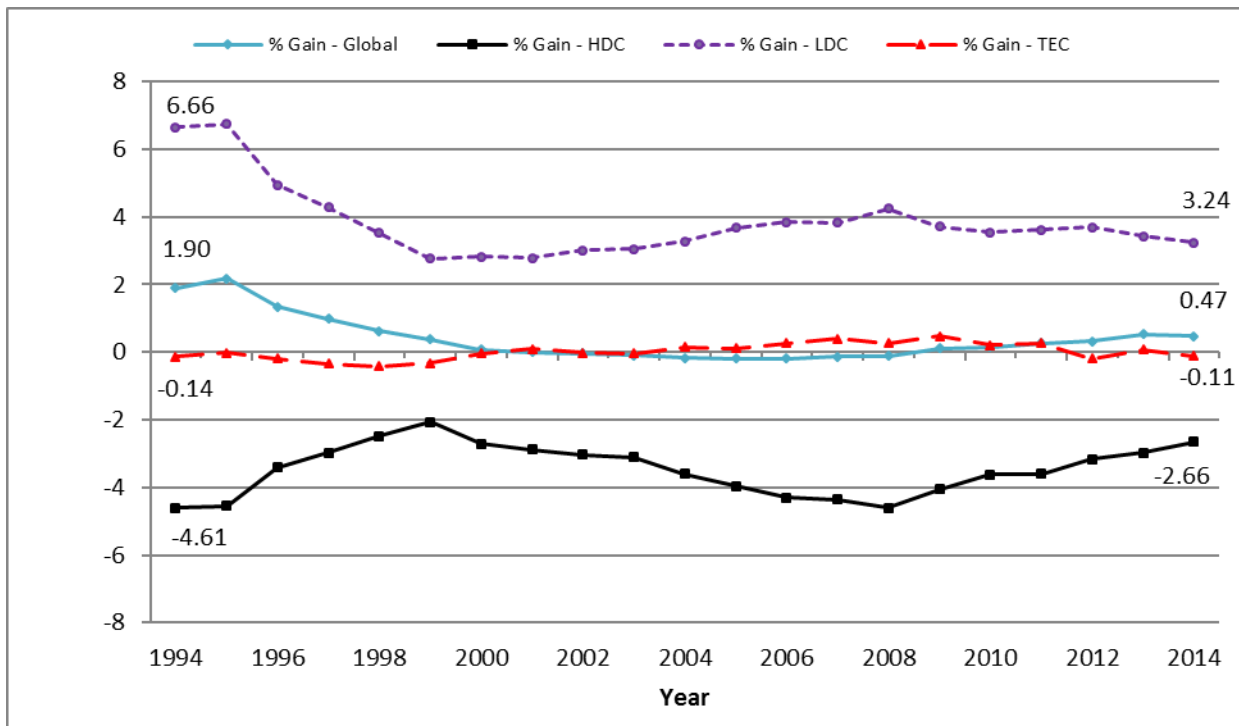
where Y_{it}^* is the counterfactual output in country i in year t ; ROR_{it} is the actual aggregate capital profitability in country i in year t ; ROR_t^* is the global rate of return on capital in year t ; α is the share of capital income in GDP of country i in year t ; Y_{it} is actual output of country i in year t . (For derivation of the formula, see Caselli and Feyrer, 2007, pp. 553-559 and Mello, 2009, pp. 14-16.)

The deadweight loss from capital misallocation (DWL_t) is estimated as the sum of potential GDP gains in countries where ROR_{it} is higher than global ROR_t^* and potential GDP losses in countries where ROR_{it} is lower than global ROR_t^* :

$$DWL_t = \sum_{i=1}^N (Y_{it}^* - Y_{it}) / \sum_{i=1}^N Y_{it} \tag{5}$$

Table 1 and Figure 4 present gains or losses of GDP for each of the three groups of countries and for the whole sample. As expected, the biggest gains in potential GDP from capital reallocation would have accrued to LDC countries. In the 1994-2014 period, potential gains to this group fluctuated between 11.2% and 19.8% of their group GDP or between 2.8% and 6.7% of global GDP. As expected, the HDC would have experienced losses, between 3.0% and 8.6% of their group GDP or between 2.1% and 4.6% of global GDP. The TEC group, in contrast, would experience relatively minor changes: gains or losses between 2.1% and -2.1% of their group GDP or less than 0.5% of global GDP (See Table 1).

Figure 4. Output gain (+) or loss (-) by country type, percent of global output



Source: Authors' calculations

Table 1. Total gain (+) or loss (-) in output under ROR equalization, by country type, as % of global output

<i>Year</i>	<i>Global output</i>	<i>HDC output</i>	<i>LDC output</i>	<i>TEC output</i>
1994	1.90	-4.61	6.66	-0.14
1995	2.17	-4.55	6.74	-0.01
1996	1.34	-3.41	4.94	-0.20
1997	0.98	-2.97	4.29	-0.34
1998	0.62	-2.49	3.52	-0.41
1999	0.38	-2.06	2.76	-0.32
2000	0.08	-2.72	2.83	-0.03
2001	0.00	-2.88	2.78	0.09
2002	-0.04	-3.03	3.01	-0.02
2003	-0.10	-3.12	3.05	-0.04
2004	-0.17	-3.61	3.28	0.15
2005	-0.19	-3.97	3.67	0.11
2006	-0.19	-4.30	3.85	0.26
2007	-0.14	-4.36	3.83	0.40
2008	-0.11	-4.61	4.23	0.26
2009	0.12	-4.06	3.71	0.47
2010	0.14	-3.62	3.55	0.21
2011	0.26	-3.60	3.61	0.26
2012	0.32	-3.17	3.69	-0.20
2013	0.52	-2.98	3.42	0.07
2014	0.47	-2.66	3.24	-0.11

Source: Authors' calculations.

The counterfactual gains from capital reallocation for all countries is positive for 14 out of 21 years and demonstrate a gradual decline during 1994-2004 followed by a relatively small increase in 2004-2014. These trends mirror the convergence-divergence trends of national ROR presented in Figure 3. The reduction of potential gains of GDP reflects convergence of ROR while their increase signals ROR divergence. Our results extend the findings of Caselli and Feyrer (2007) and Mello (2009) who studied the counterfactual gains and losses in output for earlier periods. Similar to these studies, we found global deadweight loss from misallocation of capital after 1997 to be relatively small, within 1% of global GDP. However our results indicate larger potential gains from capital reallocation accruing to LDC.

5. Conclusions

Using recently available data, we estimated the macroeconomic capital profitability for 109 countries divided into developing, developed, and transition economy countries. Levels of profitability were found to be highest in LDC and lowest in HDC with TEC in between. The existing differences among national ROR continue to imply underinvestment in the majority of developing countries and to a lesser extent for transition economies. The counterfactual estimation of potential changes in GDP assuming equalization of ROR demonstrate potential gains that would accrue to developing countries on the order of 11 – 20% of their GDP. Overall, our findings indicate that for the 1994-2014 period, LDC countries would have been the major beneficiaries of additional capital inflow. In the long run, if capital continues to flow to higher ROR countries, capital profitability should converge to the global average. Thus a principal policy goal of economic development should be the reduction of obstacles to international investment.

References

Bai, C., Hsieh, C-T., & Qian, Y. (2006). The return to capital in China. *Brookings Papers on Economic Activity*, 2, 61-100.

- Banerjee, A. & Duflo, E. (2005). Growth theory through the lens of development economics. *Handbook of Development Economics*, Amsterdam: Elsevier, 473-552.
- Bigsten A. (2000). Rates of return on physical and human capital in Africa's manufacturing sector. *Economic Development and Cultural Change*, 48, 801-27.
- Caselli, F. & Feyrer, J. (2007). The marginal product of capital. *Quarterly Journal of Economics*, 122, 535-568.
- Chou, NT., Izyumov, A., & Vahaly, J. (2016). Rates of return on capital around the world: are they converging? *Cambridge Journal of Economics*, 40, 1149–1166.
- _____. (2018). Return to capital and foreign direct investment. *International Journal of Business and Social Science*, 9 (10).
- Izyumov, A. & Alterman, S. (2005). The general rate of profit in a new market economy. *Review of Radical Political Economy*, 37, 476-93.
- Lu, M. & Gao, H. (2009). When globalization meets urbanization: labor market reform, income inequality, and economic growth in the People's Republic of China. *ADB Working Paper 162*, 1-25.
- Lucas, R. (1990). Why does capital flow from rich to poor countries? *American Economic Review*, 80, 92-96.
- Mello, M. (2009). Estimates of marginal product of capital, 1970-2000. *The B.E. Journal of Macroeconomics*, 9, 1-28.
- Penn World Table 9.0. (2016). [Online] Available: <http://www.rug.nl/ggdc/>(2018)
- Udry, C. & Anagol, S. (2006). The return to capital in Ghana. *American Economic Review*, 96, 388-393.

Appendix

Table A1. List of countries

<i>HDC</i>	<i>LDC</i>		<i>TEC</i>
Australia	Argentina	Mexico	Armenia
Austria	Bolivia	Mauritius	Bulgaria
Belgium	Brazil	Malaysia	Bosnia and Herzegovina
Canada	Botswana	Namibia	Belarus
Switzerland	Chile	Oman	China
Germany	Colombia	Panama	Czech Republic
Denmark	Costa Rica	Peru	Estonia
Spain	Dominican Republic	Philippines	Georgia
Finland	Ecuador	Paraguay	Croatia
France	Guatemala	Saudi Arabia	Hungary
United Kingdom	Honduras	Senegal	Kazakhstan
Greece	Indonesia	Thailand	Lithuania
Hong Kong	India	Trinidad	Latvia
Ireland	Iran	Tunisia	Macedonia
Iceland	Jordan	Turkey	Poland
Israel	Kenya	Tanzania	Romania
Italy	Lebanon	Uruguay	Russia
Japan	Sri Lanka	Venezuela	Serbia
Korea, Republic of	Morocco	South Africa	Slovak Republic
Norway			Slovenia
New Zealand			Ukraine
Portugal			
Singapore			
Sweden			