

Trade Growth Accounting in Goods and Services: An Empirical Exercise

*Somesh K. Mathur, Sarbjit Singh, Gaurav Doshi,
and Abhishek Srivastava*

5.1 INTRODUCTION

The second half of the twentieth century and the beginning of the twenty-first century have seen an enormous surge in trade across nations in various sectors. Almost every country in the world engages in trade with multiple other countries based on various factors, and this trade is of interest to academicians, politicians, bureaucratic officials, corporate firms, and even activists. Trade in the modern world is not just limited to fulfilling a nation's need for the resources it lacks, but it is also crucial from a strategic point of view. The types of trading partners a nation has also determines its stance in international politics.

Another major reason why trade has become so important is the lowering of trade costs through the years. Technological advancements and better trade policies have played a major role in easing trade and lowering trade barriers across nations. In this chapter, we describe the reasons behind trade growth in goods and services over the years for selected countries by using

S.K. Mathur (✉) • G. Doshi • A. Srivastava
Indian Institute of Technology Kanpur, Kanpur, India

S. Singh
Consumer Unity & Trust Society (CUTS) International, Jaipur, India

Novy's measure given in Chap. 2. We also calculate trade costs in terms of tariff equivalents by using the indirect trade cost measure given by Novy. The calculation of trade costs and trade growth accounting for both goods and services is shown in two separate sections as follows.

5.2 TRADE GROWTH ACCOUNTING IN GOODS TRADE

The present study focuses on the calculation of trade costs of APEC¹ (Asia Pacific Economic Cooperation) nations and the growth of goods trade between APEC nations and India over the period of 25 years between 1990 and 2014. The data for this study has been extracted from OECD, UN (United Nations), and IMF (International Monetary Fund) databases. Because this study focuses in particular on aggregate trade in merchandise goods between India and the 21 APEC nations, it is essential that the services part of trade be excluded.

The IMF's Direction of Trade Statistics (DOTS) provides bilateral trade data about merchandise goods. Export data is free on board (FOB) and import data is cost, insurance, and freight (CIF). We have downloaded the annual bilateral data from 1990 to 2014 for India and the APEC nations. The export data of goods is taken from the IMF's International Financial Statistics (IFS). The data on GDP and services produced (value added) of India and the APEC nations is taken from World Development Indicators from the World Bank. Because we use value added data for finding international trade, no further manipulation is performed on these datasets. Missing data from these sources is complemented with data extracted from the OECD, Unstat, and APEC databases. All data is expressed in current US dollars.

In order to construct the tariff equivalent, τ_{ij} India is considered to be country i and the APEC nations as a whole are considered to be country j . The elasticity of substitution σ is assumed to be eight as specified by Anderson and van Wincoop (2003). The tariff equivalents derived from the observable trade flow of merchandise goods following the methodology adopted by Novy (2013) are given in Table 5.1.

The results in Table 5.1 reveal that the decrease in tariff equivalents is found to be at a maximum in the case of China, at about 68.09 percent, whereas the minimum is in case of Canada, only about 14.50 percent from 1990 to 2010.² A fall of more than 50 percent in tariff equivalents is observed in bilateral trade with Chile (-55.19%), Republic of Korea (-54.26%), Mexico (-53.31%), and Peru (-56.1%).

Table 5.1 Percentage change in τ_{ij} for the APEC nations

<i>Trading partner</i>	$t_{initial}$	$\tau_{initial}$	t_{final}	τ_{final}	τ_{mean}	<i>Percentage change</i>
China	1990	2.78	2014	0.89	1.30	-68.09
Peru	1991	3.34	2012	1.47	2.24	-56.14
Chile	1990	2.48	2014	1.11	1.63	-55.19
Korea, Rep. of	1990	1.58	2014	0.72	1.08	-54.26
Mexico	1990	2.23	2014	1.04	1.80	-53.31
Papua New Guinea	1990	3.04	2004	1.53	2.70	-49.77
Philippines	1990	2.64	2014	1.38	1.55	-47.56
Indonesia	1990	1.68	2014	0.92	1.17	-45.42
Malaysia	1990	1.32	2014	0.86	1.07	-35.14
Singapore	1990	1.06	2013	0.69	0.87	-34.94
Australia	1990	1.42	2014	1.01	1.16	-29.14
Japan	1990	1.30	2013	0.98	1.23	-24.96
New Zealand	1990	1.87	2011	1.41	1.61	-24.39
United States	1997	1.11	2013	0.84	0.99	-24.29
Russian Federation	1992	1.61	2013	1.26	1.26	-21.61
Canada	1990	1.71	2010	1.46	1.54	-14.50

Source: Authors' calculations

5.2.1 Trade Growth Accounting

In order to better understand the question of how trade between nations has evolved over time and what factor(s) contribute the most, one needs to look over the various components of growth of trade. The gravity model provides a simple yet powerful framework for analysis. We use the similar logic of decomposition for growth of trade between three main components given by Novy (2013), as derived in the previous chapter. The study further decompose the first component, income growth, into two parts using the work by Baier and Bergstrand (2001). Using the formula of income shares (s), $s_i = y_i / (y_i + y_j)$, $\Delta \ln(y_i y_j)$ becomes: $\Delta \ln(s_i s_j) + 2\Delta \ln(y_i + y_j)$. Hence, the final equation becomes:

$$\Delta \ln(x_{ij} x_{ji}) = 2\Delta \ln(s_i s_j) + 2\Delta \ln\left(\frac{(y_i + y_j)^2}{y^W}\right) + 2(1 - \sigma)\Delta \ln(1 + \tau_{ij}) - 2(1 - \sigma)\Delta \ln(\Phi_i \Phi_j)$$

where $\Delta \ln(s_i s_j)$ can be interpreted as income convergence or the change in income inequality between countries i and j . The second term,

$\Delta \ln \left(\frac{(y_i + y_j)^2}{y^W} \right)$ can be interpreted as growth in the incomes of countries i and j relative to world income.³ Dividing the final equation throughout by the left-hand term, we obtain:

$$100\% = \underbrace{\frac{2\Delta \ln(s_i s_j)}{\Delta \ln(x_{ij} x_{ji})}}_{(a)} + \underbrace{\frac{2\Delta \ln \left(\frac{(y_i + y_j)^2}{y^W} \right)}{\Delta \ln(x_{ij} x_{ji})}}_{(b)} + \underbrace{\frac{2(1 - \sigma)\Delta \ln(1 + \tau_{ij})}{\Delta \ln(x_{ij} x_{ji})}}_{(c)} - \underbrace{\frac{2(1 - \sigma)\Delta \ln(\Phi_i \Phi_j)}{\Delta \ln(x_{ij} x_{ji})}}_{(d)}$$

As per the above equation, the growth of bilateral trade decomposed into four components which are the focus of the current study. The contributions are: (a) income inequality or income convergence; (b) growth of incomes (in an additive sense) relative to world income; (c) a change in relative bilateral trade costs measured using the tariff equivalent τ_{ij} ; and (d) a change in relative multilateral resistance. The contributions of (c) and (d) can be positive or negative depending on various factors which will not be analyzed in this study.⁴ Novy (2013) refers to the negative contribution of (d) as the trade diversion effect, that is, if multilateral resistance of a country falls, its trade with other countries rises, but bilateral trade with country j falls. The decomposition equation takes a similar form if other gravity model formulations such as the Ricardian model by Eaton and Kortum (2002) or the heterogeneous firms model by Chaney (2008) or Melitz and Ottaviano (2008) are used.⁵ Table 5.2 presents results of the decomposition of sampled APEC countries' trade growth with India into four components over the given study period.

Results in Table 5.2 reveal that on average income convergence is found to have the lowest contribution followed by a decrease in the multilateral trade barrier. The negative sign on a value for the multilateral trade barrier (third component) indicates that a decrease in the multilateral trade barriers of country j with nations other than India led to a decline in its bilateral trade with India. Income growth and a decline in the bilateral trade barrier

Table 5.2 Decomposition of bilateral trade growth of APEC countries with India

<i>Trading partner</i>	$t_{initial}$	t_{final}	<i>Growth of trade</i>	<i>Income convergence</i>	<i>Growth of income</i>	<i>Decline in bilateral trade costs</i>	<i>Decline in multilateral resistance</i>	<i>Total</i>
Australia	1990	2014	528.51	-1.03	84.51	49.35	-32.83	100.00
Canada	1990	2010	400.81	4.11	75.63	33.12	-12.86	100.00
Chile	1990	2014	1004.16	3.90	50.36	69.53	-23.79	100.00
China	1990	2014	1411.65	-7.84	63.86	68.86	-24.88	100.00
Indonesia	1990	2014	837.01	2.60	62.40	55.83	-20.82	100.00
Japan	1990	2013	319.64	52.54	10.86	66.88	-30.27	100.00
Korea, Rep. of	1990	2014	712.79	-1.03	62.86	79.44	-41.27	100.00
Mexico	1990	2014	857.76	-1.00	53.20	75.10	-27.31	100.00
Malaysia	1990	2014	656.20	3.74	76.85	47.60	-28.20	100.00
New Zealand	1990	2011	490.70	-11.91	88.15	49.11	-25.36	100.00
Peru	1991	2012	1105.48	-2.53	47.61	71.88	-16.96	100.00
Philippines	1990	2014	875.61	0.61	56.84	67.72	-25.17	100.00
Papua New Guinea	1990	2004	648.68	-17.69	28.55	101.29	-12.16	100.00
Russian Federation	1992	2013	450.94	2.23	99.17	43.76	-45.16	100.00
Singapore	1990	2013	612.72	7.18	77.54	45.38	-30.10	100.00
United States	1997	2013	363.12	39.18	32.09	51.87	-23.14	100.00
Mean			704.74	4.57	60.66	61.04	-26.27	100.00
Mean (excluding JPN, USA)			753.18	-0.94	65.88	61.27	-26.21	-

Source: Authors' calculations

have different contributions across different nations, but on average both have almost the same contribution, that is, approximately 61 percent.

Further, by looking at the countrywide results, the study observed unusually high values of income convergence in the case of Japan (52.54%) and the United States (39.18%). Excluding these two nations, the mean contributions of the four components were -0.94 , 65.88 , 61.27 , and -26.21 percent, respectively, and income convergence/inequality was found to have the least contribution towards the growth of bilateral trade.

The income convergence term measures the contribution of change in incomes of nation i and j with respect to the income shares on bilateral trade. Hence, a fall in incomes of either i or j in some particular period would lead to a negative contribution towards bilateral trade. In other words, a substantive fall in either trading nation in some period could impact bilateral trade in that period. This is what is observed in the cases of nations like Australia, China, Republic of Korea, Mexico, New Zealand, Peru, and Papua New Guinea. The overall trade growth and income convergence is constructed from individual changes between two periods. A fall in income of nation i or j or both, which is enough to lower the value of the income convergence term with respect to the previous period leads to a negative contribution to total bilateral trade. Such a pattern is observed in the above-mentioned nations across a few periods, leading to an overall negative contribution of income convergence.

Moreover, for most nations, the growth of income is the primary factor behind the rise of bilateral trade. Growth in income is the dominant factor in the case of Australia, Canada, Indonesia, Malaysia, New Zealand, the Russia Federation, and Singapore with a contribution of over 75 percent towards bilateral trade (with the exception of Indonesia, where the growth of income contributes 62.40 percent but is still the dominant factor). The other dominant factor is the decline in bilateral trade costs, which is the case of Chile, China, Republic of Korea, Mexico, Peru, and the Philippines. The United States is the largest contributor to the growth of bilateral trade with India. The effect of the decline in bilateral trade costs is offset by the decline in multilateral trade barriers or multilateral resistance, which has a negative impact on the growth of bilateral trade. This is at a maximum in the case of the Russian Federation, where a decline in multilateral resistance has led to a decline in bilateral trade by about 45 percent.

5.2.2 *Concluding Remarks*

The results obtained from income convergence or income inequality in trade growth decomposition raise additional questions that need to be considered, such as why do we observe a positive contribution of income inequality for some nations and a negative contribution in the case of others? What factors come into play that lead to different scales of contributions of income growth and decline in bilateral trade cost terms across different countries? All these questions, and others, require a thorough analysis of the economies in context.

5.3 TRADE GROWTH ACCOUNTING IN TRADE IN SERVICES

The WTO's General Agreement on Trade in Services (GATS) became effective in January 1995 with the objective of increasing bilateral as well as multilateral trade in services. It defines four mode of supply of services. These are (i) cross-border supply; (ii) consumption abroad; (iii) commercial presence; and (iv) the presence of a natural person. In mode 3 and 4, the exporter remains in the territory of the importer country, and it is very difficult to account the information. The data is available mainly in mode 1 and 2, which reflect directly on a country's balance of payment.

In our study, we look at the trade costs associated with India's bilateral trade in services with the 61 countries for which data is available. Very few studies have been done on trade in services due to an unavailability of data. Miroudot et al. (2010) have looked into data on trade in services from 1995 to 2007 and have found that trade costs in services have remained steady or have increased during this period (with the exception of China), whereas the trade costs in goods have fallen substantially. They also found out that Regional Trade Agreements (RTAs) have much less effect on trade costs in services as compared to trade costs in goods.

PrabirDe has applied the three-stage gravity model to panel data for India's bilateral trade in services from 2000 to 2006 with 31 countries for 10 major components of service trade including the following: transportation, travel, communication services, financial services, insurance services, computer services, and information services. He found a coefficient with a similar sign to that in the gravity model of trade by Anderson and Wincoop. He also calculated a services trade facilitation index for these countries' bilateral trade in services with India for the same time period.

5.3.1 Database

There are five major databases for trade in services: (i) Eurostat, covering 32 countries; (ii) the IMF and OECD, covering 35 countries; (iii) the UN, covering 46 countries; and (iv) the WTO, covering 49 countries. Services trade data for many countries is not available. The present study utilizes consolidated data based on these databases by Francois and Pindyuk (2013). The data set contains a large number of missing entries because of the unavailability of data. This is also because many countries started accounting and publishing services trade data after 1995. In the context of India, the data set contains bilateral trade data from 60 countries as well as some country groups. The data is highly unbalanced. Data on the GDP in trade in services is taken from the World Bank. The data on total exports and imports in services have been taken from Francois and Pindyuk (2013).

5.3.2 Empirical Findings

Figure 5.1 shows the tariff equivalents calculated for India's trade with the entire world. The value of x_{ii} has been derived by subtracting net exports to India from the value of services GDP of the rest of the world (excluding India, of course). The tariff equivalents declined until 2005, and there have been some fluctuations thereafter.

Contrary to the conclusions of Miroudot et al. (2010), the tariff equivalents of trade in services have fallen in India during the period 1995–2005. They went back up in 2006–2007, but then fell again in 2008, and then rose again in 2009–2010. The tariff equivalents of India's trade in services has followed a different trend for different countries, but it went up for many countries in the period 2008–2010. This may have been because of the 2008 recession because India's services export was mainly concentrated in richer, developed countries whose economies were affected by those economic troubles.

Figure 5.2 shows the contribution of three components, derived using Novy's method, in India's trade in services from 1995 to 2010. The trend shows that the contribution of growth in income was 61.49 percent, the contribution of a decline in bilateral trade costs (i.e., tariff equivalents) was 48.50 percent, and the contribution of the decline in MTR was –9.99 percent. Here, the value of x_{ii} (world) has been derived by subtracting net

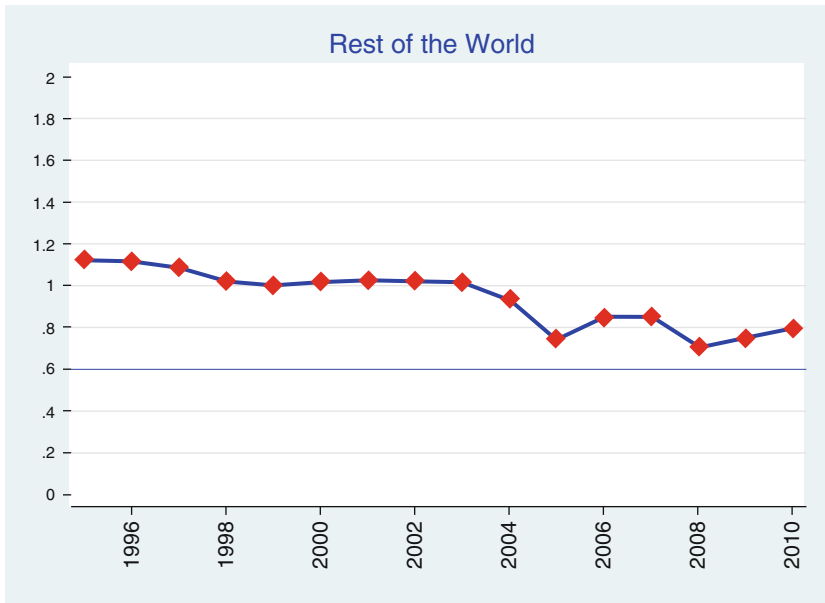


Fig. 5.1 Tariff equivalents for India’s trade with the entire world (Source: Authors’ calculations)

exports to India from the value of services GDP with the rest of the world (excluding India).

Tables 5.3 and 5.4 show the countrywide results of tariff equivalents and decomposition of trade growth in services of India with sampled countries in detail.

5.3.3 Concluding Remarks

Overall, India’s tariff equivalents have gone down since 1995 with some fluctuations over the years. On the trade growth accounting front, our study found that income growth and decline in tariff equivalents contributed to trade growth while the contribution due to the decline in MTR was much less. Hence, from the point of view of policy, there is a need to focus on income growth and a reduction in tariffs. Governments should promote exports, FDI, and use other monitoring tools to improve GDP, which will

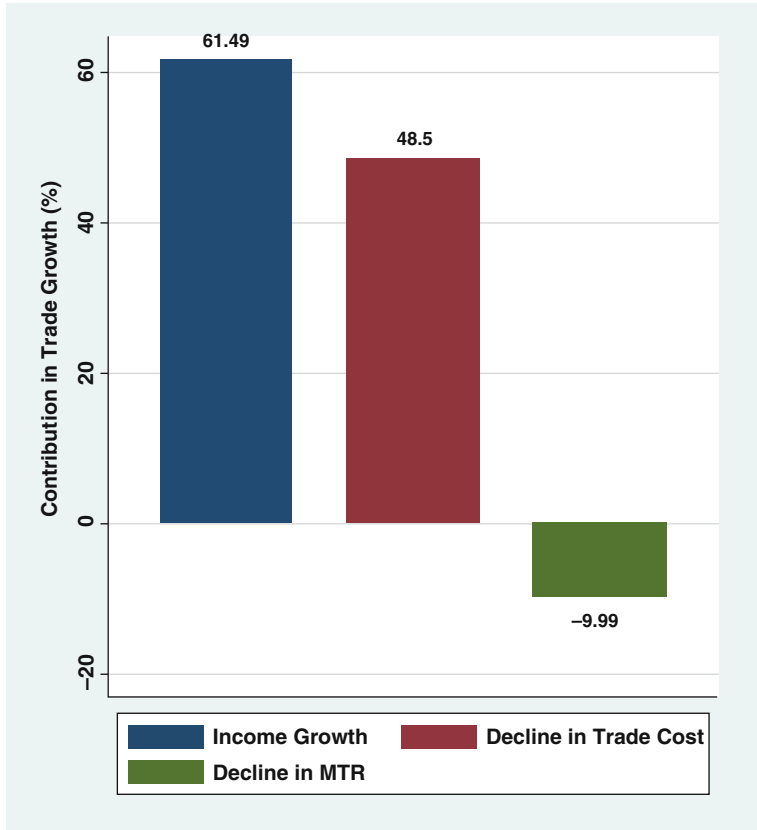


Fig. 5.2 Accounting for services trade growth in India (Source: Authors' calculations)

result in increased welfare of the people as well as an increase in the trade in services. As the decline in trade costs reaches a 48.5 percent contribution in services trade growth, tools such as a free trade agreement for trade in services will result in more trade taking place. So, a free trade agreement for trade in services with the European Union, Hong Kong, the United States, Singapore, and the United Kingdom will result in more trade with these countries.

Table 5.3 Novy's tariff equivalents for India's total trade in services

Year	AUT	DEU	FIN	FRA	GBR	ITA	NLD	JPN	PRT	GRC	DNK	ESP	SWE	CZE	HUN	USA
1995	2.49	1.58	2.89	1.97	1.45	2.17	1.92	-	-	3.41	-	-	-	-	-	-
1996	2.26	1.59	3.00	1.74	1.51	1.96	1.85	1.90	3.36	3.05	-	-	-	-	-	-
1997	2.30	1.68	3.28	1.74	1.44	1.91	1.85	1.89	3.21	-	-	-	-	-	-	-
1998	2.26	1.66	3.20	1.61	1.46	1.85	1.80	1.89	3.19	-	-	-	-	-	-	-
1999	2.23	1.75	3.79	1.76	1.43	1.83	1.80	1.96	3.26	3.25	1.79	3.69	2.39	-	3.93	1.54
2000	2.09	1.72	3.47	1.76	1.40	1.90	1.87	1.95	3.09	3.36	1.69	3.49	2.42	3.15	-	1.48
2001	2.14	1.80	3.86	1.94	1.40	2.00	1.77	2.03	3.19	3.38	1.69	3.40	2.50	2.88	4.14	1.48
2002	2.25	1.72	3.52	2.11	1.46	2.19	2.00	2.09	3.21	2.95	1.75	3.32	2.47	2.95	4.22	1.49
2003	2.13	1.66	1.77	1.77	1.30	2.00	1.64	1.98	3.21	2.63	1.68	3.28	1.93	3.08	3.05	1.40
2004	2.20	1.67	1.86	1.83	1.36	2.07	1.70	1.97	3.30	2.60	1.74	3.38	2.00	3.18	3.02	1.43
2005	1.26	1.35	1.37	1.40	1.10	1.49	1.28	1.69	2.68	2.04	1.31	1.64	1.37	2.31	1.62	1.19
2006	2.03	1.53	1.59	1.63	1.28	1.92	1.70	2.00	3.22	2.38	1.47	2.24	1.92	2.93	2.46	1.28
2007	2.03	1.54	1.47	1.67	1.30	1.94	1.62	1.92	2.73	-	1.49	2.22	1.95	2.79	2.63	1.25
2008	1.27	1.23	1.17	1.36	1.46	1.50	1.44	1.52	1.87	1.79	1.46	1.64	1.27	2.15	1.60	1.08
2009	1.36	1.32	1.18	1.43	1.29	1.70	1.47	1.72	2.05	1.88	1.56	1.77	1.33	2.09	2.17	1.12
2010	2.23	1.49	1.30	1.68	1.32	2.00	1.66	1.86	3.09	3.04	1.59	2.28	1.89	2.45	2.52	1.23

Year	AUS	HKG	SGP	SVK	BEL	CYP	IRL	LUX	BGR	EST	HRV	POL	RUS	SVN	LTU	MLT
1999	1.83	-	-	3.77	-	-	-	-	-	-	-	-	-	-	-	-
2000	1.80	1.73	1.32	-	-	-	-	-	-	-	-	-	-	-	-	-
2001	1.82	1.71	1.27	3.93	-	-	-	-	-	-	-	-	-	-	-	-
2002	1.84	1.74	1.24	-	2.33	3.11	2.58	2.53	-	-	-	-	-	-	-	-
2003	1.77	1.70	1.16	5.41	2.20	2.96	2.05	2.18	3.37	3.60	3.35	2.96	1.79	3.42	-	3.35
2004	1.71	1.54	1.12	5.34	2.27	3.06	2.31	2.25	3.49	3.68	3.40	3.04	1.99	3.52	4.06	3.47
2005	1.39	1.08	0.83	2.64	1.06	2.36	1.41	1.04	1.90	2.63	3.96	1.55	1.74	3.35	3.24	2.20
2006	1.58	1.49	1.08	3.93	2.10	2.88	1.74	2.11	3.52	3.32	3.26	2.68	2.11	3.64	2.70	3.36
2007	1.56	1.49	1.07	3.66	1.91	2.84	1.60	1.85	3.35	3.44	3.24	2.68	2.11	3.65	3.46	3.26
2008	1.61	1.17	0.89	2.45	1.36	2.18	1.11	1.00	2.60	2.48	3.01	1.95	2.24	2.87	2.76	1.92
2009	1.67	1.15	0.87	2.83	1.34	2.20	1.02	1.04	2.52	2.52	3.10	2.23	1.75	3.03	3.27	2.00
2010	1.42	1.04	1.04	4.12	1.70	2.96	1.62	2.39	3.59	3.40	2.71	2.63	2.24	3.22	4.18	3.02

Source: Authors' calculations

Table 5.4 Trade growth accounting for India's total trade in services

<i>Country</i>	<i>ISO code</i>	<i>Start year</i>	<i>End year</i>	<i>Contribution of</i>		
				<i>Income growth (%)</i>	<i>Decline in trade cost (%)</i>	<i>Decline in MTR (%)</i>
Austria	AUT	1995	2010	73.05	31.34	-4.39
Germany	DEU	1995	2010	80.66	18.59	0.74
Finland	FIN	1995	2010	28.25	74.39	-2.64
France	FRA	1995	2010	67.11	37.74	-4.85
United Kingdom	GBR	1995	2010	85.31	22.78	-8.08
Italy	ITA	1995	2010	85.58	23.65	-9.23
Netherlands	NLD	1995	2010	73.89	34.14	-8.03
Japan	JPN	1996	2010	81.46	7.70	10.84
Portugal	PRT	1996	2010	80.28	26.02	-6.30
Greece	GRC	1995	2010	79.92	31.06	-10.98
Denmark	DNK	1999	2010	73.61	33.39	-7.01
Spain	ESP	1999	2010	38.19	67.94	-6.13
Sweden	SWE	1999	2010	54.10	50.97	-5.07
Czech Republic	CZE	2000	2010	69.66	49.58	-19.24
Hungary	HUN	1999	2010	43.36	65.32	-8.69
United States	USA	1999	2010	55.21	47.89	-3.10
Australia	AUS	1999	2009	92.29	28.95	-21.25
Hong Kong	HKG	2000	2010	49.50	46.93	3.57
Singapore	SGP	2000	2010	73.70	43.10	-16.80
Slovak Republic	SVK	1999	2010	215.30	-65.16	-50.15
Belgium	BEL	2002	2010	47.89	60.31	-8.20
Cyprus	CYP	2002	2010	101.82	20.38	-22.20
Ireland	IRL	2002	2010	32.92	66.59	0.49
Luxembourg	LUX	2002	2010	92.79	20.43	-13.22
Bulgaria	BGR	2003	2010	202.08	-52.28	-49.80
Estonia	EST	2003	2010	100.09	25.69	-25.79
Croatia	HRV	2003	2010	54.02	57.71	-11.73
Poland	POL	2003	2010	83.12	39.73	-22.85
Russian Federation	RUS	2003	2010	1411.08	-841.58	-469.50
Slovenia	SVN	2003	2010	85.51	28.02	-13.53
Lithuania	LTU	2004	2010	171.50	-31.65	-39.85
Malta	MLT	2003	2010	66.09	38.49	-4.59

Source: Authors' calculations

NOTES

1. Its member nations include the 21 Pacific Rim nations: Australia, Brunei Darussalam, Canada, Chile, People's Republic of China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Russia, Singapore, Chinese Taipei (Taiwan), Thailand, the United States, and Vietnam. Due to data limitations and errors we have excluded Brunei Darussalam, Hong Kong, Taiwan, Thailand, and Vietnam from the sample.
2. Data for Canada was available only until 2010.
3. Novy (2013) interprets $\Delta \ln\left(\frac{y_i y_j}{y^w}\right)$ as the growth in incomes of country i and j relative to world income. The equation $\Delta \ln\left(\frac{(y_i + y_j)^2}{y^w}\right)$ has been derived from the same term by a small mathematical manipulation, hence it is plausible to assume this as income growth as well. The only difference is that the present study assumed income growth in an additive sense, whereas Novy assumed it in a multiplicative sense.
4. If $\Delta \ln(1 + \tau_{ij}) < 0$, then the contribution of (c) becomes positive and if $\Delta \ln(\Phi_i \Phi_j) < 0$, then the contribution of (d) becomes negative.
5. See Novy (2013) for the decompositions of other models.

REFERENCES

- Anderson, E. J., & Wincoop, V. E. (2003). Gravity with gravitas: A solution to the border puzzle. *The American Economic Review*, 93, 170–192.
- Baier, S. L., & Bergstrand, J. H. (2001). The growth of world trade: Tariffs, transport costs, and income similarity. *Journal of International Economics*, 53(1), 1–27.
- Chaney, T. (2008). Distorted gravity: The intensive and extensive margins of international trade. *The American Economic Review*, 98(4), 1707–1721.
- Eaton, J., & Kortum, S. (2002). Technology, geography, and trade. *Econometrica*, 70(5), 1741–1779.
- Francois J., & Pindyuk O. (2013). *Consolidated data on international trade in services v8.7*. IIDE discussion paper no. 20130101. Retrieved from [www. I4ide.org/content/wpaper/dp20130101](http://www.I4ide.org/content/wpaper/dp20130101).
- Melitz, M. J., & Ottaviano, G. I. (2008). Market size, trade, and productivity. *Review of Economic Studies*, 75, 295–316.
- Miroudot, S., Sauvage, J., & Shepherd, B. (2010). *Measuring the cost of international trade in services* (MPRA paper 27655). University Library of Munich, Germany.
- Novy, D. (2013). Gravity redux: Measuring international trade costs with panel data. *Economic Enquiry*, 51(1), 101–121.