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A Measure of Net Dependency Between the Economies of the USA and Its Major Trading Partners

Demetri Kantarelis
Assumption College, dkantar@assumption.edu

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A MEASURE OF NET DEPENDENCY BETWEEN THE ECONOMIES OF THE USA AND ITS MAJOR TRADING PARTNERS

DEMETRI KANTARELIS
dkantarelis@post.harvard.edu
Assumption College, Worcester, MA

ABSTRACT. How interdependent are the economies of the USA and its trading partners and how does their net dependency evolve trough time? In an attempt to answer these questions, a measure of bilateral net dependency between the USA and a trading partner nation (i) is proposed where net dependency is defined as the difference between USA's dependency on i minus i's dependency on the USA. Dependency between the US and a trading partner is measured as the ratio of trade between them over respective GDP plus imports from the trading partner with imports weighted by a degree of importance. Based on data available in various public sources, ranging from 2002 to 2014, USA's net dependency between it and its top 48 trading partners was found to be negative and close to zero; the finding implies that trading nations are more dependent on the US than the US is on them. Some countries have been moving towards zero – the point of neutrality – (most notably, China, Brazil, and Singapore), while other away from zero (most notably, Mexico, Japan and Hong Kong). In an effort to explain the between and within variation exhibited by the proposed measure, two explanatory variables were considered: the Freedom Gap (FG) and the Competitiveness Gap (CG) between the USA and its trading partners. Through longitudinal analysis it was confirmed, as predicted, that USA's net dependency depends positively and significantly on FG and negatively and significantly on CG. A declining FG and a rising CG cause average net dependency to become more negative implying that the US acquires more power over trading partners which may be used, selectively, for various policy objectives as they relate to bilateral trade policy and agreements, economic development efforts, and, if needed, to trade sanctions.

Keywords: international trade; economic net dependency; international relations; foreign affairs; sanctions

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1. Introduction

As per conventional wisdom, and as outlined in Chapter 7 of the Council of Economic Advisers' (CEA) 2015 Economic Report of the President, USA, international trade contributes to the well-being of nations through enhanced productivity, more innovative activity, higher living standards, higher wages, increased economic growth, better working conditions, stronger environmental protection, broader inclusion and participation. The same report states that (p. 5) "the process of globalization … can also create challenges in areas like income inequality. For this reason, it is critical that globalization is managed." (A portion of the report's introduction may be found in Appendix I.) The report concludes (p. 47) as follows:

> Through trade linkages, the world's economies are more interdependent than at any time in history. This interdependence has been supported not only by steep declines in the costs of international communication and shipping, but also by a reduction in governmental barriers to the cross-border movement of goods, services, and investment. Increasingly, economies are linked by production processes that cross international borders so as to minimize costs by better exploiting local comparative advantages.

Without a doubt international trade improves the wellbeing of nations and, simultaneously, it makes their economies more interdependent. Interdependency may serve as a bridge for the exchange of good fortune (for example, among other, welfare enhancing goods and services, access to resources and markets) and bad fortune (for example, among other, welfare damaging imports, unfair trade sanctions, monopoly or cartel exploitation.) Naturally, one may wonder: when two nations trade, are they equally or unequally interdependent upon each other? Logically, interdependency between nations would be affected by the relative size of the trading economies, proximity, trade treaties, importance of good as capital good (for example, rare earth metals), new technologies (for example, electronic connectivity) and many other factors.

Drawing upon past work (Kantarelis, 1997), the objective in this paper is to propose a measure of bilateral trade interdependency, more specifically, a measure of bilateral net dependency between counties i and j. In brief, I propose to measure dependency between two nations i and j as the ratio of trade between them over the country's respective GDP plus imports from the trading partner or, for country i,

$$D_{ij} = \frac{X_{ij} + \alpha_i M_{ij}}{GDP_i + \alpha_i M_{ij}} \qquad (1)$$

where, D = i's dependency on j, X = exports from i to j, α_i = weight of importance that i attaches on its imports from j ($0 \leq \alpha \leq 1$), M = imports of i

from j, and GDP = Gross Domestic Product of i. Country i may attach more or less importance on the imports from j depending on how significantly all or some imports affect the nation; for example, imports may be vital for the security of the country or the functioning of domestic industries in which case α would be assigned the value of 1 or close to it, or less vital for imports that the nation can do without such as alcohol or tobacco in which case α would be assigned the value of 0 or close to it. Similarly, for country j,

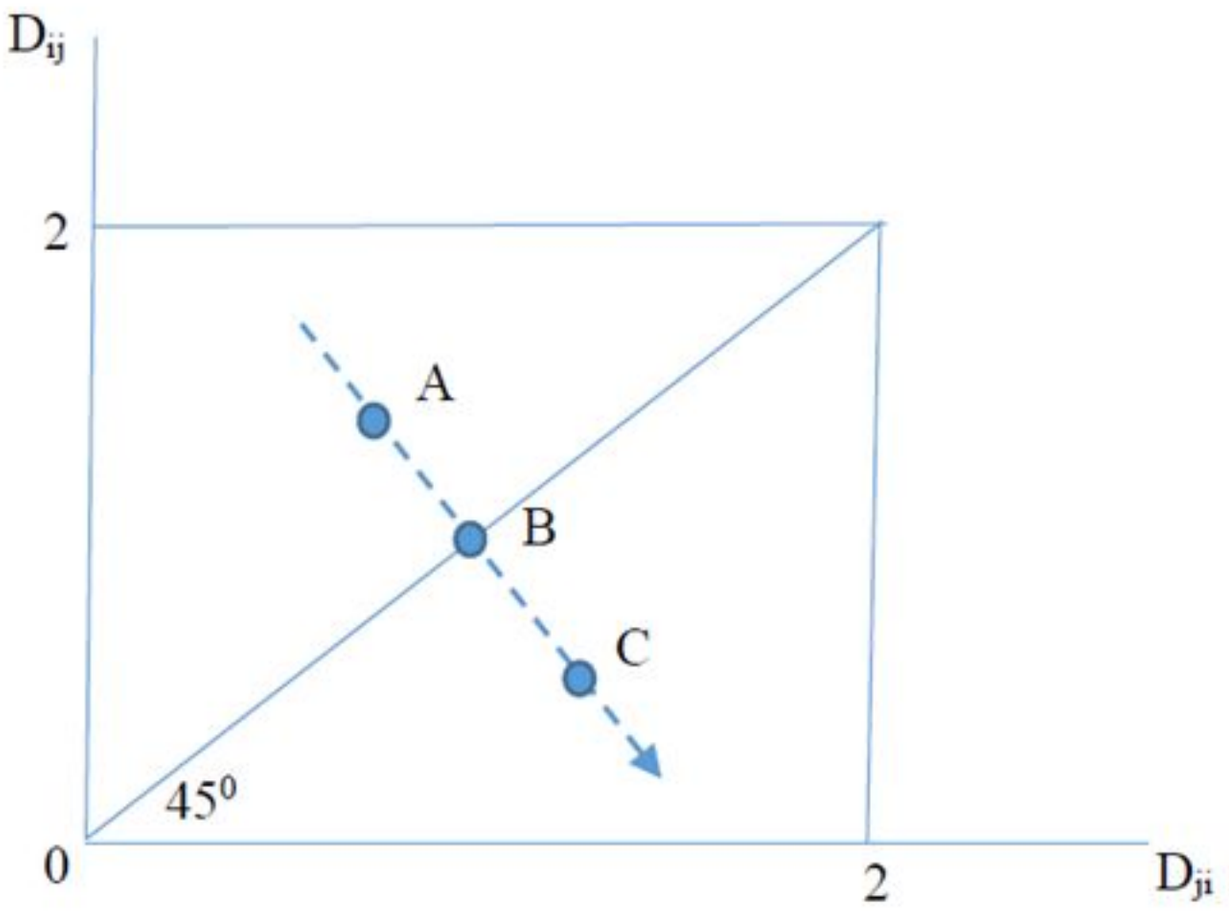
$$D_{ji} = \frac{X_{ji} + \alpha_j M_{ji}}{GDP_j + \alpha_j M_{ji}} \qquad (2)$$

The difference between (1) and (2) may serve as a measure of net dependency (ND) between i and j or,

$$ND_{ij} = D_{ij} - D_{ji} \qquad (3)$$

Obviously, D_{ij} may fluctuate in the interval $0 \leq D_{ij} \leq 2$ and, as a result, ND_{ij} in the interval $-2 \leq ND_{ij} \leq 2$. (Example[1].) When $ND_{ij} = 0$, i and j would be equally interdependent upon each other. When ND_{ij} is in the interval $-2 \leq ND_{ij} \leq 0$, i would depend less on j than j would depend on i; in this case, i would experience a power advantage (for example, if i imposes trade sanctions on j, such sanctions would harm j more than they would harm i.) Figure 1 below summarizes these numerical possibilities: at any point on the 45^0 degree line, such as B, $ND_{ij} = 0$ whereas at any point to the right of it, such as C, i would experience a power advantage over j and at any point to the left of it, such as A, i would experience a power disadvantage. Clearly, moving as the arrow indicates implies that i experiences increasingly more power over j.

Figure 1 Relative Dependency



Although, by and large, nations take advantage of the economic opportunities offered by trade, while guarding against any challenges trade creates, they do not make an attempt to measure bilateral net dependency which may indicate *power advantage*, *power disadvantage* or *power neutrality*. For example, if a foreign nation has a power economic advantage over the US (the US depends economically through trade more on the foreign nation than the other way around) then the US can more effectively formulate its foreign policy towards that nation; such policy may have to be instituted for, among other, the purpose of sanctions, nonproliferation, terrorism, energy-food-cyber security, human rights, women's and youth issues.

Understandably, the bigger the economy of a nation relative to the economy of its trading partner, the lower would be its dependency on the trading partner and the more power advantage it would enjoy: higher denominators in (1) and (2) (that is higher GDPs) cause lower "D" values. This relative differential perhaps explains why trade sanctions, historically speaking, are imposed by a large country (or a consortium of countries) against a smaller one and not the other way around.

2. The USA and Its Trading Partners

How interdependent are the USA and its trading partners and how does their net dependency evolve trough time? Using available data for GDP, exports and imports,[2] and assuming, initially, that $\alpha = 1$, we report net dependency between the USA and its 48 most important trading partners as ranked by the U.S. Department of Commerce, Global Patterns of U.S. Merchandise Trade (see Appendix 2.) USA's net dependency between it and its top trading partners ranges in value from -0.48276 (Honduras) to -0.01233 (Poland). The average (variance) of net dependency between the US and the same countries, for years 2002 to 2014, is -0.110713604 (0.011034261) whereas between it and the World is 0.122372490 (0.000380610). Hence, trading nations are more dependent on the US than the US is on them (the US has a small power advantage over its major trade partners) whereas the opposite is true for the USA vis-à-vis the World as a whole. Because trade volume figures (that appear in the numerator of the proposed measure) are small relative to GDP figures (which appear in the denominator) both averages are close to zero but far from their extreme values.

Table 1 reports net dependency (ND) between the USA and the World as well as its top 48 trade partners alphabetically (first two columns) followed by size of ND from lowest to highest (last two columns.) The numbers reported correspond to averages calculated over the years 2002, 2004, 2006, 2008, 2010, 2012, and 2014[3] and they indicate that the USA has been experiencing small positive net dependency between itself and the world (in other words it depends more on the world than the world depends on it) but,

bilaterally, it experiences negative net dependency (although close to 0 with most countries) between itself and each of its top 48 trading partners in Table 1. Figure 2 graphically portrays the last two columns of Table 1.

Table 1 Net dependency between the USA, the World and its top 48 trading partners

1	2	3	4
Country (alphabetically)	Average ND	Country (rank by ND)	Average ND
Algeria	-0.084588	Honduras	-0.48276
Argentina	-0.030163	Trinidad and Tobago	-0.387347
Australia	-0.028733	Costa Rica	-0.31052
Austria	-0.028091	Canada	-0.299541
Belgium	-0.082244	Mexico	-0.290374
Brazil	-0.034779	Dominican Republic	-0.215723
Canada	-0.299541	Singapore	-0.205726
Chile	-0.090971	Malaysia	-0.202591
China	-0.065037	Venezuela	-0.20106
Colombia	-0.094438	Guatemala	-0.189088
Costa Rica	-0.31052	Ireland	-0.169584
Dominican Republic	-0.215723	Ecuador	-0.169216
Ecuador	-0.169216	Israel	-0.14791
France	-0.022097	Vietnam	-0.143334
Germany	-0.032587	Taiwan	-0.133908
Guatemala	-0.189088	Hong Kong	-0.126793
Honduras	-0.48276	Thailand	-0.118644
Hong Kong	-0.126793	Philippines	-0.113715
India	-0.02966	Saudi Arabia	-0.095202
Indonesia	-0.037736	Colombia	-0.094438
Ireland	-0.169584	Chile	-0.090971
Israel	-0.14791	Algeria	-0.084588
Italy	-0.020559	Belgium	-0.082244
Japan	-0.027305	Peru	-0.080639
Kuwait	-0.073386	S. Korea	-0.076181
Malaysia	-0.202591	Kuwait	-0.073386
Mexico	-0.290374	China	-0.065037
Netherlands	-0.060221	Switzerland	-0.062818
New Zealand	-0.045835	Netherlands	-0.060221
Norway	-0.024969	New Zealand	-0.045835
Peru	-0.080639	South Africa	-0.043543
Philippines	-0.113715	Indonesia	-0.037736
Poland	-0.01233	Brazil	-0.034779
Russian Federation	-0.020742	Sweden	-0.034314
S. Korea	-0.076181	Germany	-0.032587
Saudi Arabia	-0.095202	UK	-0.03246
Singapore	-0.205726	Argentina	-0.030163
South Africa	-0.043543	India	-0.02966
Spain	-0.013361	Australia	-0.028733
Sweden	-0.034314	Austria	-0.028091
Switzerland	-0.062818	Japan	-0.027305
Taiwan	-0.133908	Norway	-0.024969
Thailand	-0.118644	France	-0.022097
Trinidad and Tobago	-0.387347	Turkey	-0.02143
Turkey	-0.02143	Russian Federation	-0.020742
UK	-0.03246	Italy	-0.020559
Venezuela	-0.20106	Spain	-0.013361
Vietnam	-0.143334	Poland	-0.01233
Grand average (of the top 48 averages)	**0.110713604**		
Variance (of the top 48 averages)	**0.011034261**		
World average	**0.122372490**		
World variance	**0.000380610**		

Note: Numbers correspond to averages based on years, 2002, 2004, 2006, 2008, 2010, 2012, and 2014

Figure 2 Top 48 trade partners of the USA ranked by ND

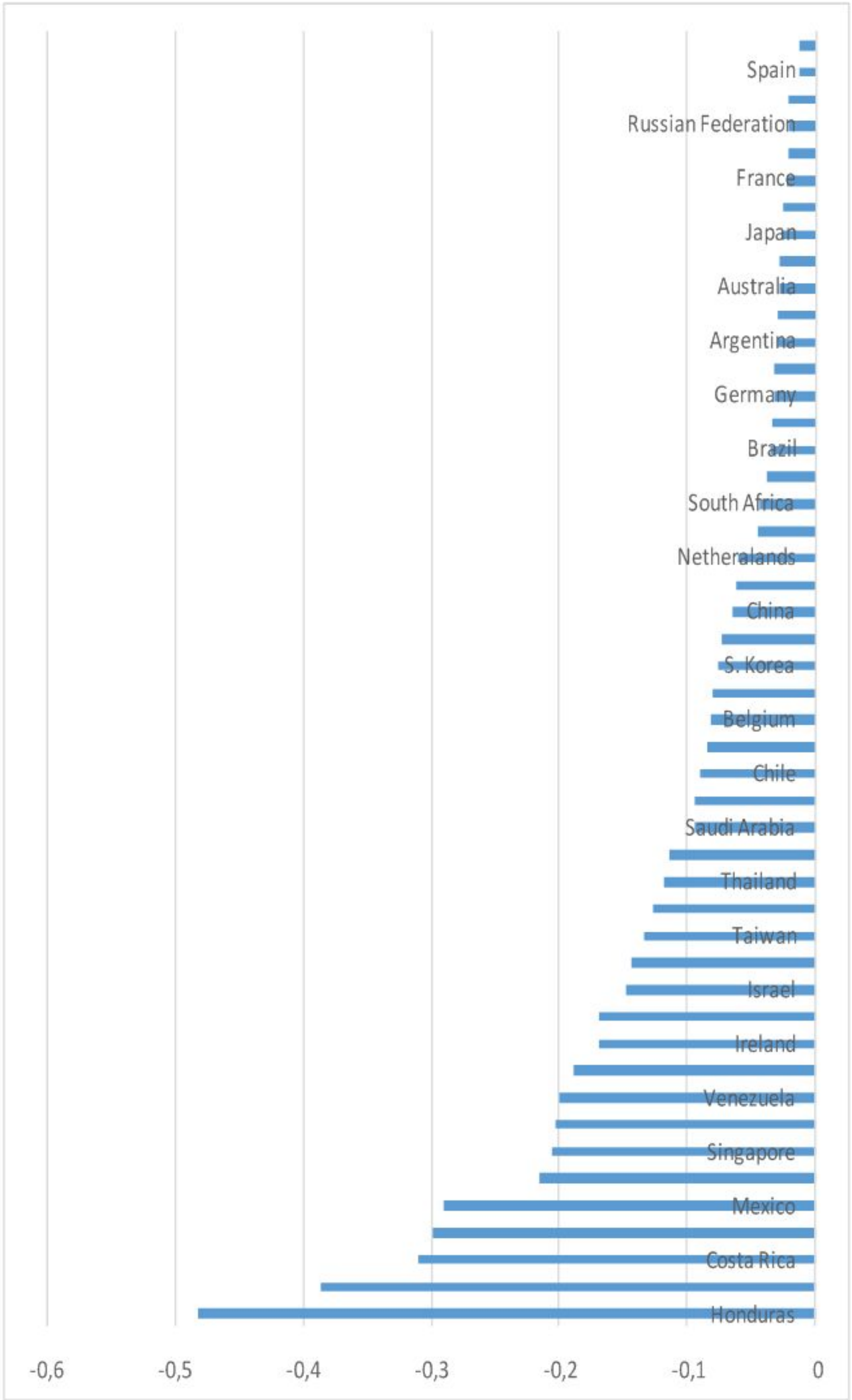


Table 2 reports net dependency (ND) between the USA and its top 20 trade partners ranked by trade volume (first two columns) followed by size of ND from lowest to highest (last two columns.) Figure 3 graphically portrays the last two columns of Table 2.

Table 2 Net dependency between the USA, the World and its top 20 trading partners

1	2	3	4
Country (ranked by volume of trade)	Average ND	Country (ranked by ND)	Average ND
Canada	-0.299541286	Canada	-0.299541286
Mexico	-0.290374143	Mexico	-0.290374143
China	-0.065036857	Singapore	-0.205725714
Japan	-0.027304571	Taiwan	-0.133907857
UK	-0.032460143	Hong Kong	-0.126793286
Germany	-0.032587000	Saudi Arabia	-0.095202000
S. Korea	-0.076180571	Colombia	-0.094438000
Netherlands	-0.060221429	Germany	-0.091033150
Brazil	-0.034779143	Belgium	-0.082244286
Hong Kong	-0.126793286	S. Korea	-0.076180571
Belgium	-0.082244286	China	-0.065036857
France	-0.022096571	Switzerland	-0.062818429
Singapore	-0.205725714	Netherlands	-0.060221429
Taiwan	-0.133907857	Brazil	-0.034779143
Australia	-0.028733143	Germany	-0.032587000
Switzerland	-0.062818429	UK	-0.032460143
India	-0.029659857	India	-0.029659857
Colombia	-0.094438000	Australia	-0.028733143
Saudi Arabia	-0.095202000	Japan	-0.027304571
Italy	-0.020558714	France	-0.022096571
Germany	-0.091033150	Italy	-0.020558714
Grand Average (of the top 20 averages)	**0.091033150**		
Variance (of the top 20 averages)	**0.006683570**		

Note: Numbers correspond to averages based on years, 2002, 2004, 2006, 2008, 2010, 2012, and 2014

Figure 3 Top 20 trade partners of the USA ranked by ND

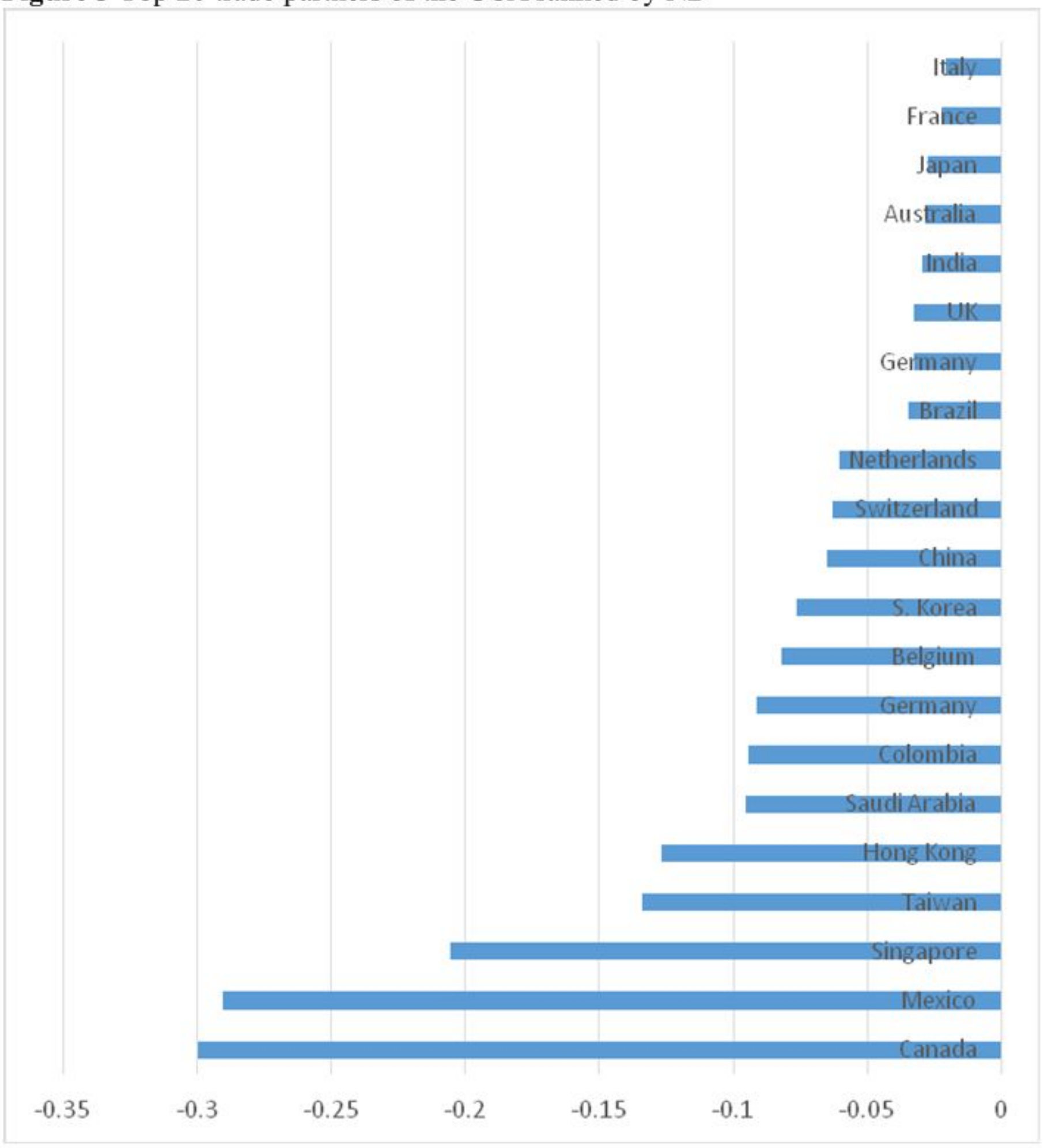
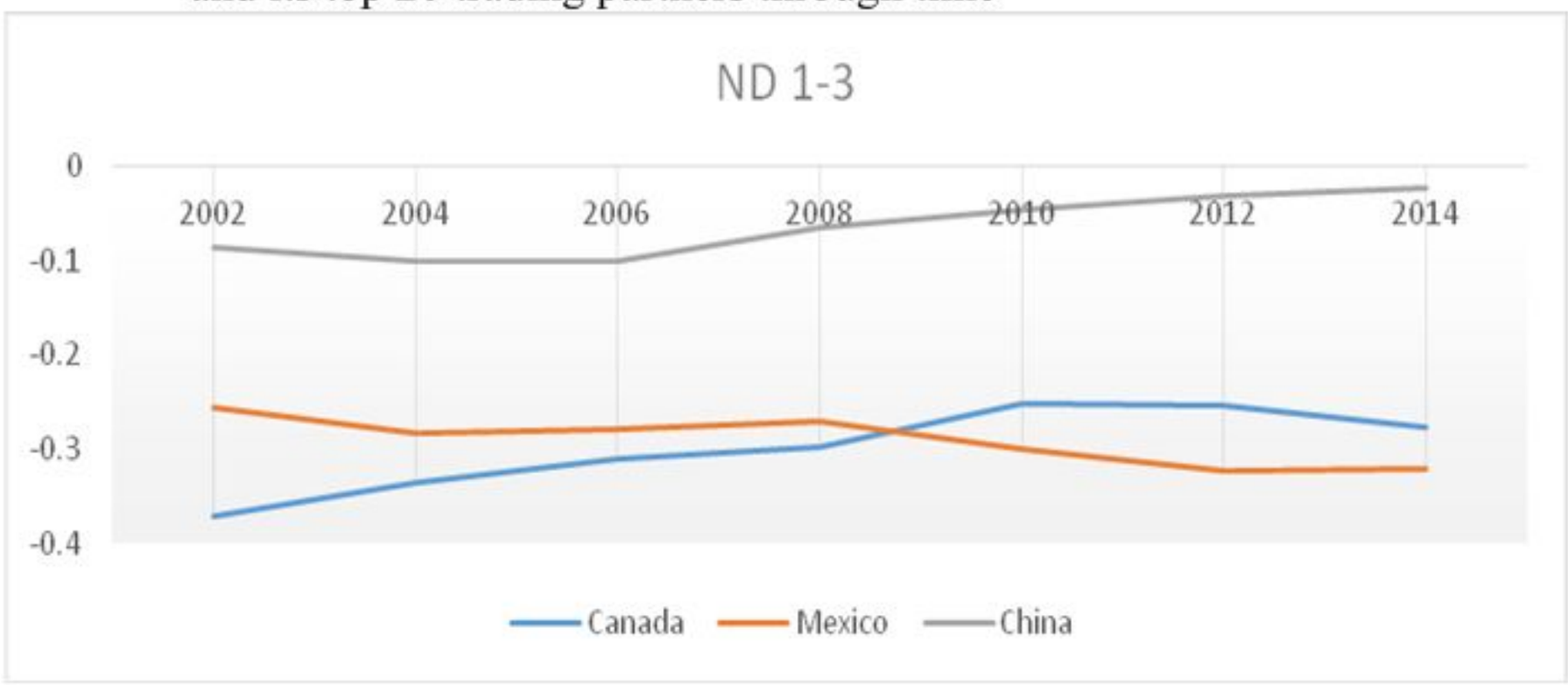
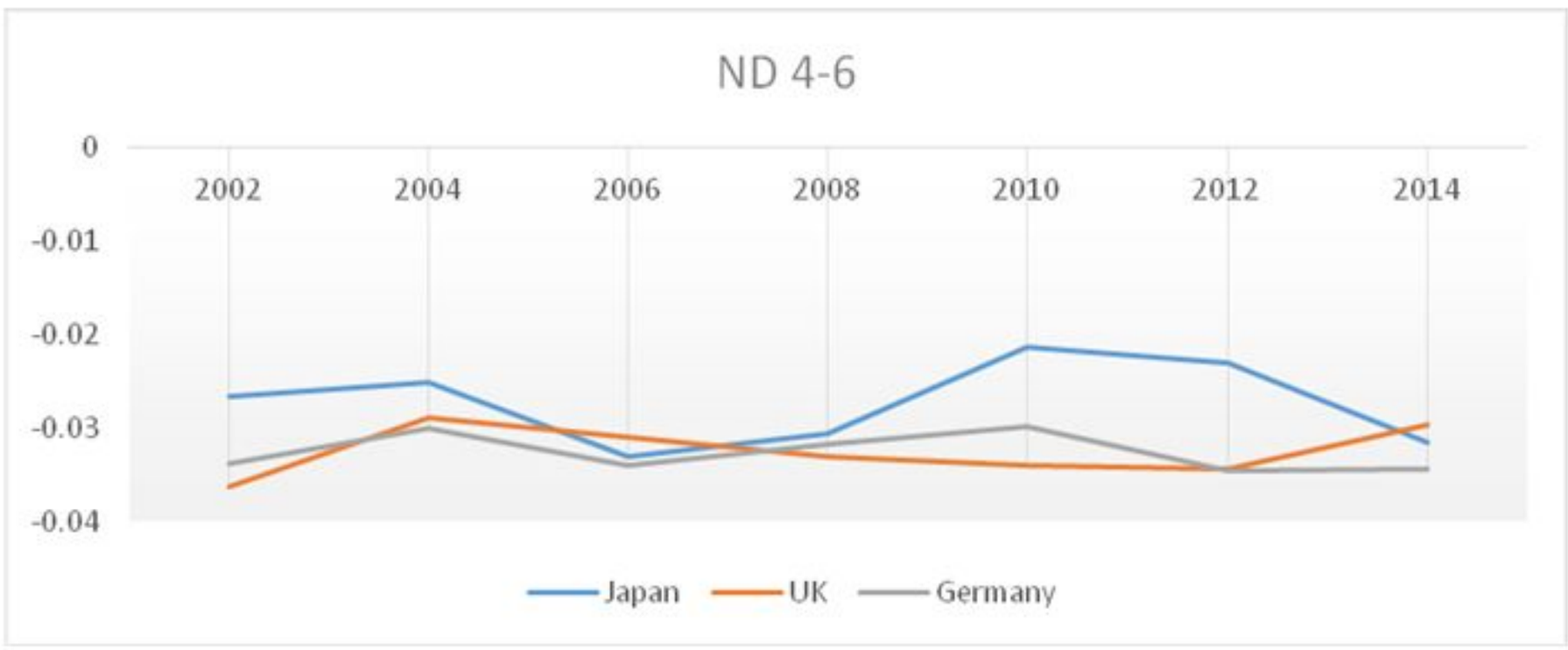
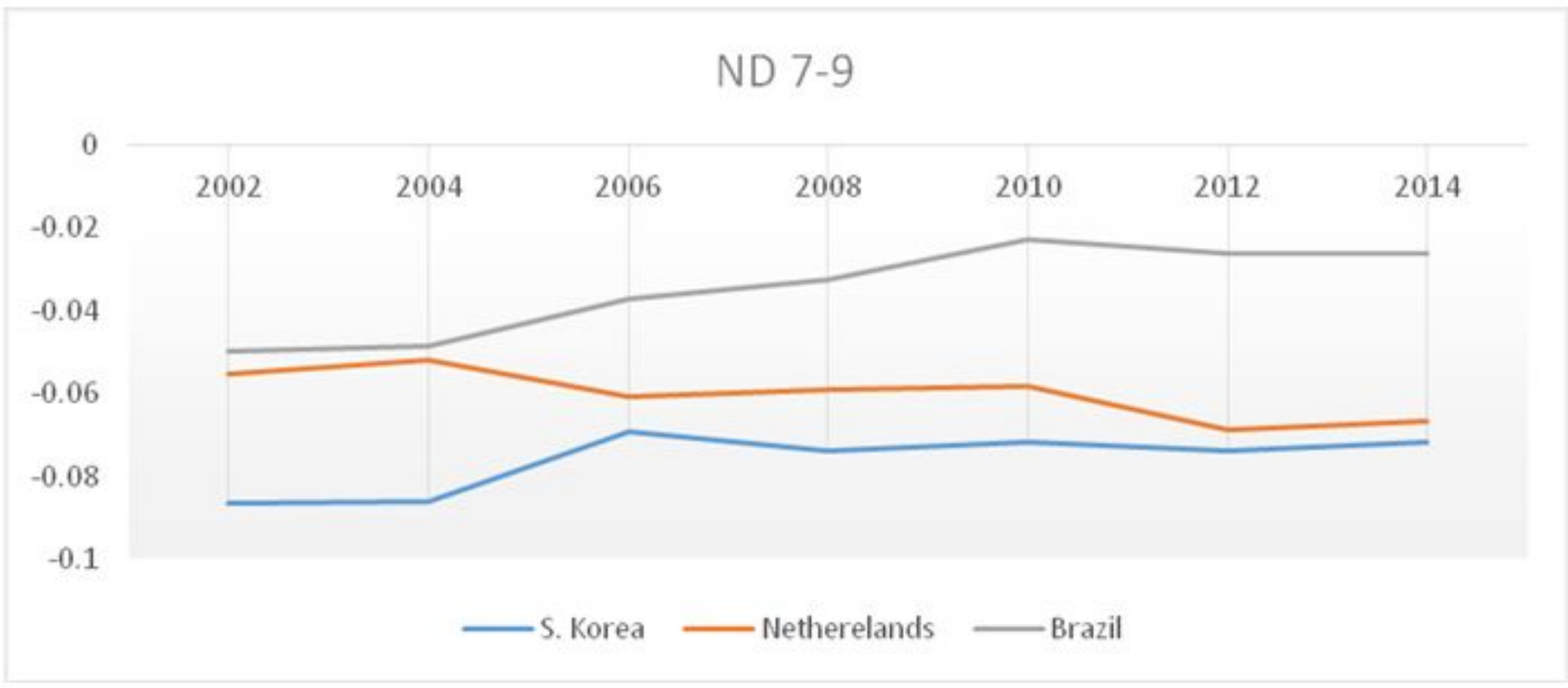


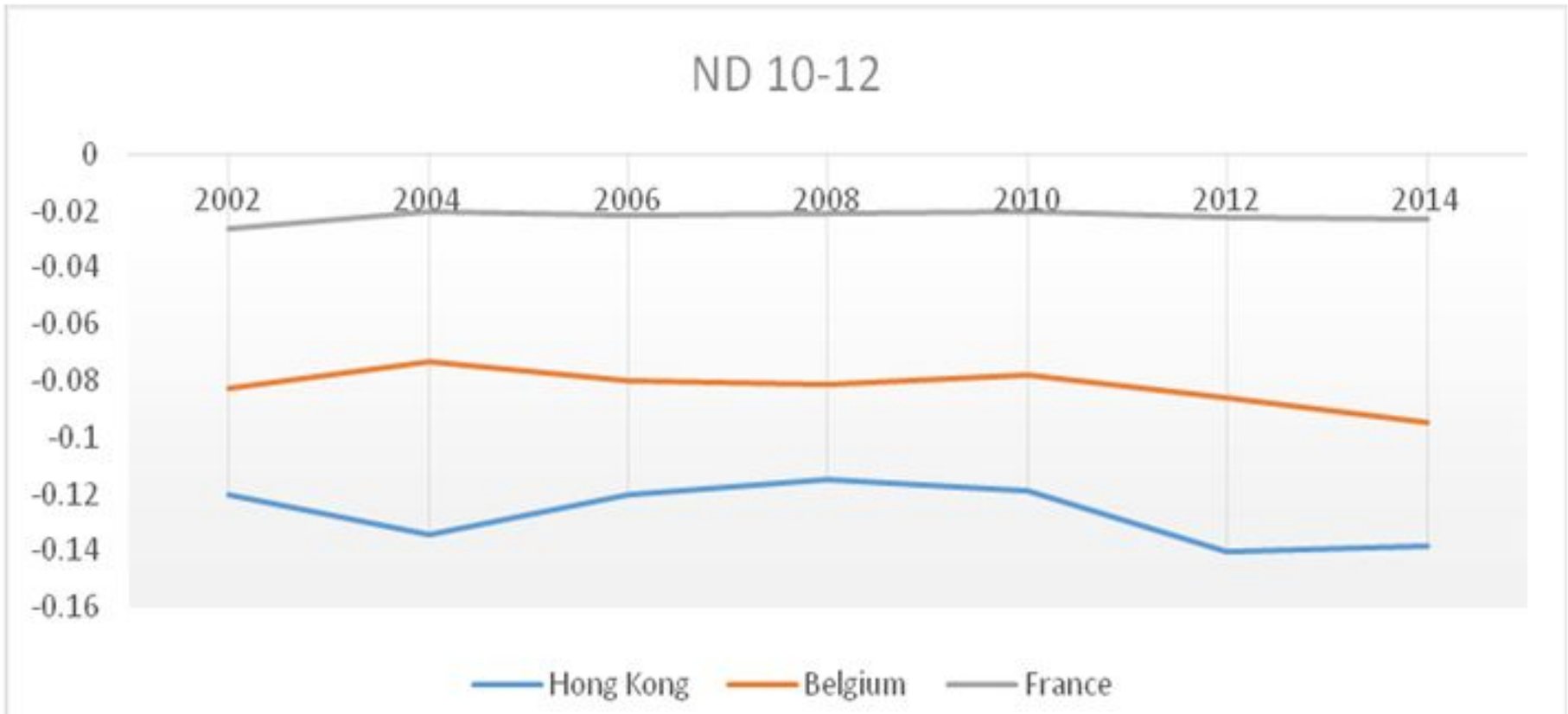
Figure 4 reports ND through time between the USA and its 20 most important partners as well as the World. Some countries have been moving somewhat towards zero (most notably China, Brazil, and Singapore) while other somewhat away from zero (most notably Mexico, Japan and Hong Kong); most ND numbers fluctuate slightly around their averages but, as stated above, with the exception of World, the numbers are negative indicating that the USA has a small power advantage over its major trade partners.

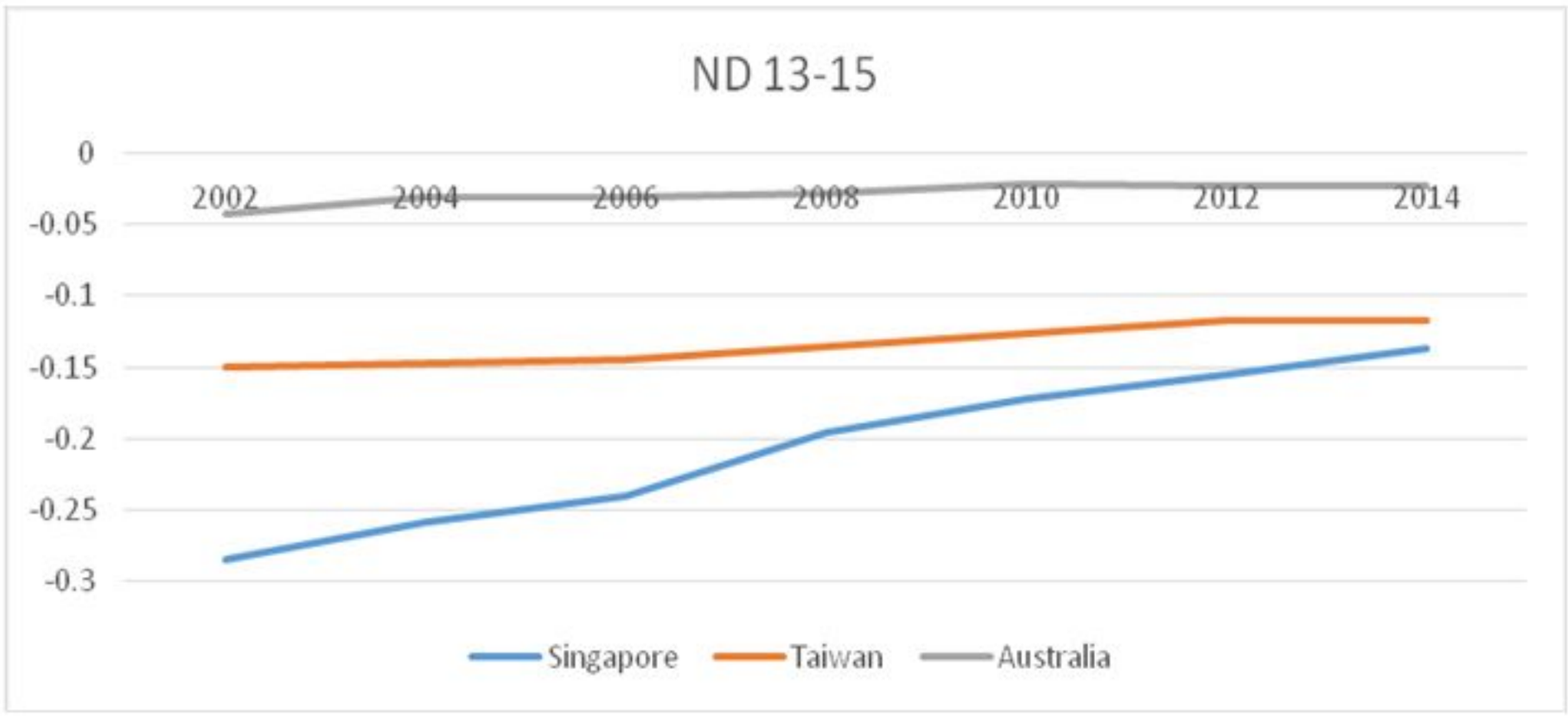
Figure 4 Net dependency between the USA, the World and its top 20 trading partners through time

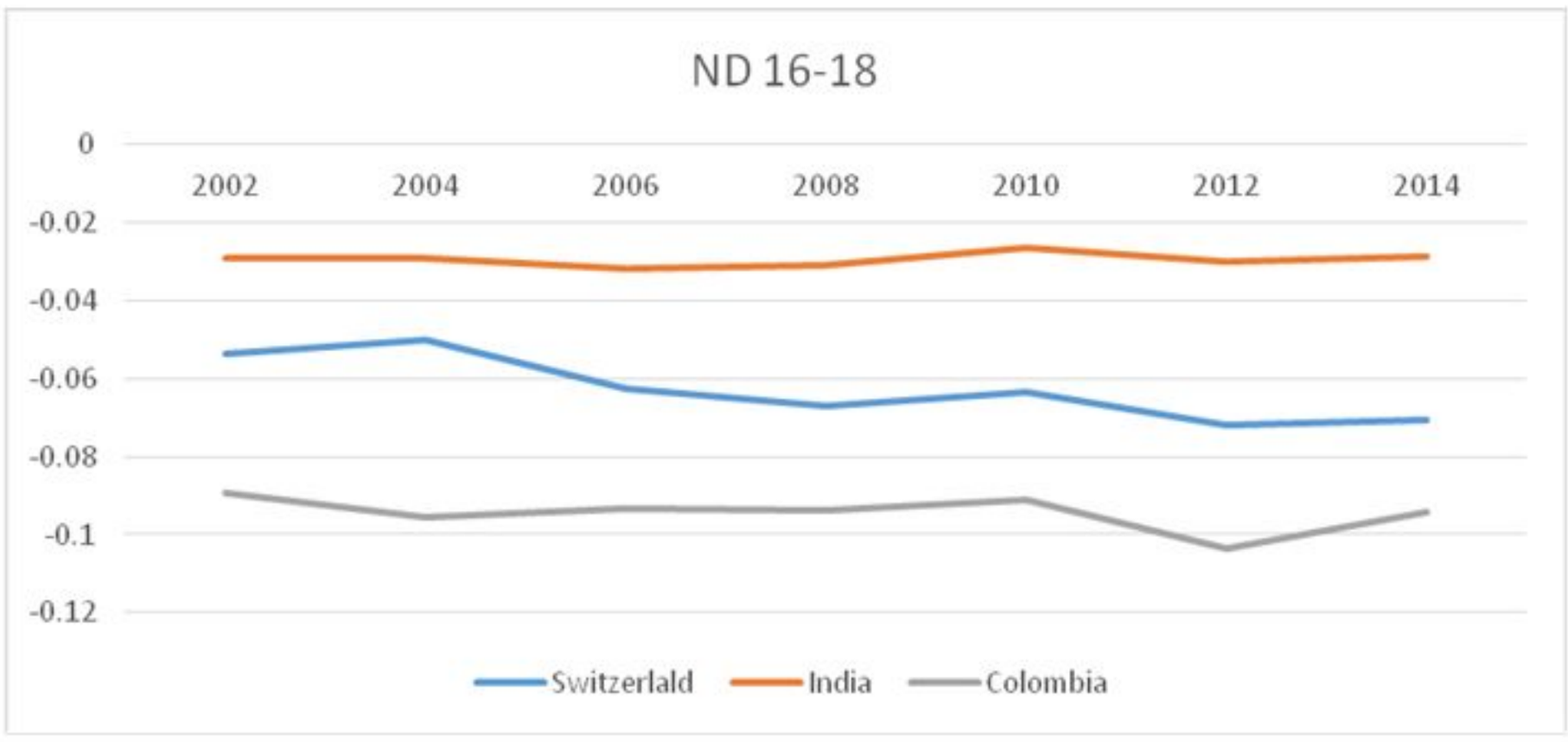


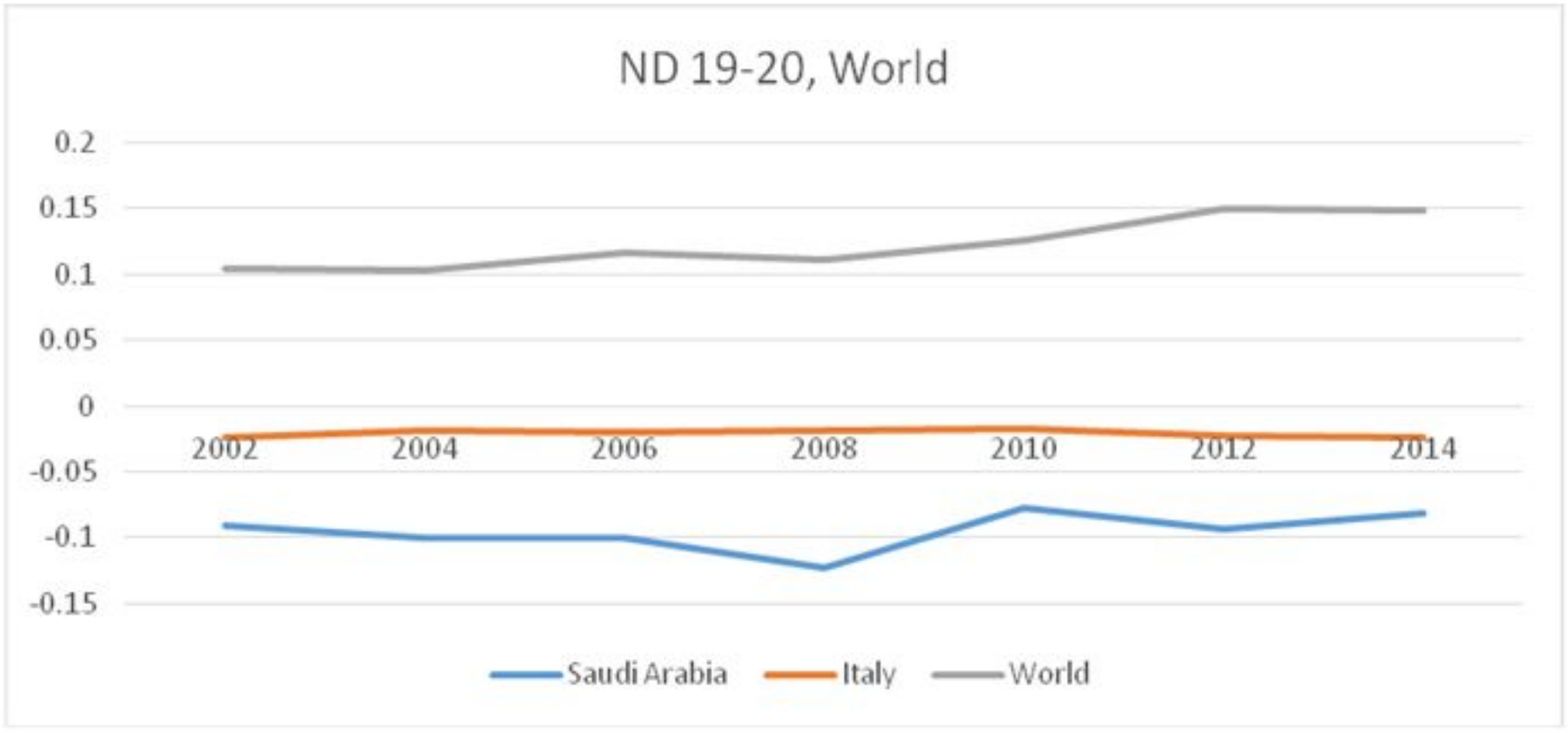





ND 10-12
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
-0.14
-0.16
2002
2004
2006
2008
2010
2012
2014
Hong Kong
Belgium
France


ND 13-15
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
2002
2004
2006
2008
2010
2012
2014
Singapore
Taiwan
Australia


ND 16-18
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
2002
2004
2006
2008
2010
2012
2014
Switzerlald
India
Colombia



3. Determinants of US Net Dependency: Competitiveness and Freedom Gaps

As the above tables and figures show USA's ND varies across trading partners as well as time and, naturally, one may wonder what variables may explain such variation. Logically, the competitiveness gap (CG) (in terms of product / service price and quality as well as innovativeness) between the USA and its trading partners ought to partially affect the size of ND. It appears reasonable to believe that a decrease in CG between the US economy and a trading partner would bring the two economies closer to a neutrality point or drive, inversely, the ND between the two closer to zero.

Drawing on the work of Porter (1990, 2001, 2005), Sala-i-Martin and Artadi (2004) proposed an improved measure of a nation's competitiveness by combining static and dynamic influences. As explained by Sala-i-Martin in an interview contacted by Snowdon (2006, p. 117),

> Porter distinguishes three levels of competitiveness. Poor countries are in the first stage of competitiveness where they compete through prices; you need to make things cheaply. For countries in the intermediate stage of development, they compete through quality – that is, you try to make things better than your neighbor rather than cheaper. For the developed countries, the key to competitiveness is innovation. This means that the factors that determine how cheap you can produce should be given more weight in countries that are poor than in richer countries. The factors that determine efficiency should be given more weight in intermediate countries, and the factors that drive innovation need to be given more weight in rich developed countries. Although the concept of stages of development appears in many of Porter's research papers, in his … index all these factors are given the same weight.

To explain the growth experience of nations, Sala-i-Martin and Artadi implemented Porter's idea of stages of development but assigned (through maximum likelihood techniques) weights to 110 factors, of which two thirds came from an opinion survey and one third from publicly available sources, chosen based on their importance relative to a nation's stage of development. They grouped their arsenal of factors into three categories or, in their language three "keys:" the key for factor-driven economies, the key for efficiency-driven economies, and the key for innovation-driven economies. In turn, these keys were set as functions of twelve factors or variables (in their language "pillars") summarized in the "f" and "g" functions (4) to (6) that follow below:

Key for factor-driven economies = f_1 (Basic requirements) (4)
where,
Basic requirements = g_1 (Institutions, Infrastructure, Macroeconomic stability, Health and primary education)

Key for efficiency-driven economies = f_2 (Efficiency enhancers) (5)
where,
Efficiency enhancers = g_2 (Higher education and training, Goods market efficiency, Labor market efficiency, Financial market sophistication, Technological readiness, Market size)

Key for innovation-driven economies = f_3 (Innovation and sophistication factors) (6)
where,
Innovation and sophistication factors = g_3 (Business sophistication, Innovation)

The index methodology of Sala-i-Martin and Artadi has been adopted by the World Economic Forum (2015) which makes available on-line, annually since 2006, rankings for 148 countries under the title Global Competitiveness Index (GCI). The on-line report stresses that the index is statistically robust and that, as such, it can serve, appropriately, as an estimate of the level of competitiveness and productivity and of an economy which in turn affects prosperity levels. Hence, the competitiveness gap between the USA and its trading partners, defined as $CG = GCI_{USA} - GCI_{OTHER}$, may be an important determinant of net dependency.

Similarly, the freedom gap (FG) (in terms of trade freedom, business freedom, financial freedom, etc) between the USA and its trading partners ought to partially affect the size of ND. For example, if the USA and trade partner X remove, bilaterally, import tariffs, each may become more or less dependent on the other depending on whether or not the benefits associated with tariff reductions outweigh the costs. Such benefits may be, among other, higher levels of income and consumption, inward FDI or insourcing, and enhanced competitiveness, whereas costs may be, among other, lower domestic production and as a result lower income, outsourcing, social and economic

displacements, environmental degradation, loss of production capabilities, and human trafficking. If trading nations are prepared to compete (that is, they have established proper policies and institutions) they ought to expect net benefits. But, it is unlikely that a newly-free trade partner would be ready to compete as soon as it opens up free trade with a freer partner such as the USA; hence it would be reasonable to expect that in the short-run, by and large, a decrease in the FG would cause a decrease in ND as well.

The Heritage Foundation (2015) has been compiling for 20 years now the Index of Economic Freedom (IEF) for 186 countries. In *About the Index*, the Foundation summarizes how the IEF is measured:

> We measure economic freedom based on 10 quantitative and qualitative factors, grouped into four broad categories, or pillars, of economic freedom:
> 1. Rule of Law (property rights, freedom from corruption);
> 2. Limited Government (fiscal freedom, government spending);
> 3. Regulatory Efficiency (business freedom, labor freedom, monetary freedom); and
> 4. Open Markets (trade freedom, investment freedom, financial freedom).
>
> Each of the ten economic freedoms within these categories is graded on a scale of 0 to 100. A country's overall score is derived by averaging these ten economic freedoms, with equal weight being given to each. One of the central tenants of the *Index* is its emphasis on promoting competitiveness through the principles of economic freedom. As global markets expand and become more interconnected, businesses are increasingly looking for resources to help identify competitive and profitable opportunities both in the United States and overseas. The *Index* is an important tool for meeting this need.

The IEF is about how economic freedom promotes competitiveness unlike the GCI which is about how competitiveness affects productivity and prosperity. The IEF relies on a small set of equally weighted variables, primarily, political freedom, regulatory freedom, and trade freedom factors. Hence, the freedom gap between the USA and its trading partners, defined as $FG = IEF_{USA} - IEF_{OTHER}$, may be an important determinant of net dependency.[4]

4. Empirics

Net dependency between the US and its trading partners depends on many qualitative and quantitative variables. Qualitatively, causality may run from security alliances, political systems, human rights, historical ties, culture and other such variables. Quantitatively, causality may run from the competitiveness and freedom indices described above as well as population distributions,

urbanization, carbon footprint and other such variables. In this section I choose to focus on the impact of CG and FG on ND and estimate, longitudinally, models (7) to (9) below:

Pooled Ordinary Least Squares Model:

$$ND_{it} = \beta_0 + \beta_1 CG_{it} + \beta_2 FG_{it} + \varepsilon_{it} \quad (7)$$

where ε_{it} = combined time-series and cross-section (or idiosyncratic) error

Pooled Fixed-Effects Model:

$$ND_{it} = \beta_i + \beta_1 CG_{it} + \beta_2 FG_{it} + \varepsilon_{it} \quad (8)$$

where β_i = unknown intercept for each country i

Pooled Random-Effects Model:

$$ND_{it} = \beta_0 + \beta_1 CG_{it} + \beta_2 FG_{it} + (\varepsilon_{it} + \omega_i) \quad (9)$$

where:

$(\varepsilon_{it} + \omega_i)$ = composite error, ω_i = within-country error, and

$ND_{it} = D_{uit} - D_{iut}$ = Net Dependency between the USA (u) and trading country (i)

t ≡ bi-annually (2002–2014), (βs) ≡ parameters to be estimated

$$\frac{\partial ND_{it}}{\partial CG_{it}} = \beta_1 < 0, \qquad \frac{\partial ND_{it}}{\partial FG_{it}} = \beta_2 > 0$$

$$D_{uit} = \text{Dependency of u on i} = \frac{X_{uit} + \alpha_u M_{uit}}{GDP_{ut} + \alpha_u M_{uit}}$$

X_{uit} = Exports of u to i

M_{uit} = Imports of u from i

GDP_{ut} = Gross Domestic Product of u

a_u = weight of importance that u attaches on its imports from i $(0 \leq \alpha_u \leq 1)$

$$D_{iut} = \text{Dependency of i on u} = \frac{X_{iut} + \alpha_i M_{iut}}{GDP_{it} + \alpha_i M_{iut}}$$

X_{iut} = Exports of i to u

M_{iut} = Imports of i from u

GDP_{it} = Gross Domestic Product of i

α_i = weight of importance that i attaches on its imports from u $(0 \leq \alpha_i \leq 1)$

$CG_{it} = GCI_{ut} - GCI_{it}$ = Competitiveness Gap between the USA (u) and trading country (i)

GCI_{ut} = Global Competitiveness Index score of the USA

GCI_{it} = Global Competitiveness Index score of country i

$FG_{it} = IEF_{ut} - IEF_{it}$ = Freedom Gap between the USA (u) and trading country (i)

IEF_{ut} = Index of Economic Freedom score of the USA

IEF_{it} = Index of Economic Freedom score of country i

Data sources (for details see endnote 2):

Yearly data for GDP, Exports and Imports for the computation of ND_{ijt} is readily available in various public sources such as the International Monetary Fund (2015) and the U.S. Department of Commerce (2015).

Yearly GCI scores/data for the 48 countries in this study is made available by the World Economic Forum (2015) for the time interval 2006–2014; during this time interval each country's time series exhibits very low variation; hence, the average, based on years 2006 to 2014, is used to fill in the missing values for 2002 and 2004.

Yearly IEF scores/data for the 48 countries in this study is made available by the Heritage Foundation (2015) for the time interval 2002–2014.

Based on GDP, exports and imports data, values of the depended variable (ND) between the US, the world and the top 48 highly ranked trading partners, in terms of trade volume, was computed and is being reported, as mentioned above, in Appendix 2. Data for GCI and IEF is available in the respective sources.

Letting $\alpha_u = \alpha_i = 1$, the data was set as panel data and functions (7) to (9) were estimated using pooled OLS, fixed-effects and random-effects panel data methodology. Table 3 below reports the results as they came out from the STATA mill.

Part 1 of Table 3 reports summary measures; the sizeable difference in the between and within variation (as demonstrated by the standard deviations of the variables) indicates that analysis with panel data methodology would be most appropriate.

Parts 2, 3 of Table 3 display, respectively, the pooled OLS and fixed-effects results.

Part 4 of Table 3 displays the random-effects results followed by the Breusch-Pagan and the Hausman test results. According to the Breusch-Pagan test, the random-effects results ought to be preferred to the pooled OLS results and according the Hausman test, the fixed-effects results ought to be preferred to the random-effects results.

Part 5 of Table 3 displays the fixed-effects results after correcting, through generalized least squares, for heteroskedasticity. These results are assumed best and as such are used for further analysis.

Table 3 Regression results for Pooled OLS, Fixed-Effects, and Random-Effects(*)

(*) ND11 = dependent variable = Net Dependency between the USA (u) and trading country (i) with $\alpha_u = \alpha_i = 1$,
FG = Freedom Gap between the USA (u) and trading country (i), and
CG = Competitiveness Gap between the USA (u) and trading country (i)]

Part 1 Summary measures

```
. xtsum $id $t $ylist $xlist
```

Variable		Mean	Std. Dev.	Min	Max	Observations
id	overall	24.5	13.87406	1	48	N = 336
	between		14	1	48	n = 48
	within		0	24.5	24.5	T = 7
t	overall	4	2.002983	1	7	N = 336
	between		0	4	4	n = 48
	within		2.002983	1	7	T = 7
ND11	overall	-.1107136	.1074027	-.5664263	-.0088198	N = 336
	between		.1050442	-.4827605	-.0123301	n = 48
	within		.0264327	-.2219485	.0147799	T = 7
FG	overall	1.333482	1.130949	-1.46	4.09	N = 336
	between		1.092459	-1.118571	3.527143	n = 48
	within		.3270393	.0591969	2.09491	T = 7
CG	overall	.9350223	.6050203	-.2542459	2.227664	N = 336
	between		.5900022	-.0440844	2.074651	n = 48
	within		.1555047	.5619384	1.383654	T = 7

Part 2 Pooled OLS results

```
. reg $ylist $xlist
```

Source	SS	df	MS		
Model	.759956735	2	.379978368	Number of obs	= 336
Residual	3.1043837	333	.009322474	F(2, 333)	= 40.76
				Prob > F	= 0.0000
Total	3.86434043	335	.011535345	R-squared	= 0.1967
				Adj R-squared	= 0.1918
				Root MSE	= .09655

ND11	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
FG	.0320517	.0049235	6.51	0.000	.0223665	.0417369
CG	-.0737284	.0092035	-8.01	0.000	-.0918326	-.0556242
_cons	-.0845163	.0104274	-8.11	0.000	-.1050282	-.0640044

Part 3 Fixed-Effects results

```
. xtreg $ylist $xlist, fe

Fixed-effects (within) regression               Number of obs      =       336
Group variable: id                              Number of groups   =        48

R-sq:  within  = 0.0430                         Obs per group: min =         7
       between = 0.0613                                        avg =       7.0
       overall = 0.0599                                        max =         7

                                                F(2,286)           =      6.42
corr(u_i, Xb)  = 0.0580                         Prob > F           =    0.0019

------------------------------------------------------------------------------
        ND11 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          FG |  -.0034265   .0053508    -0.64   0.522    -.0139584    .0071054
          CG |  -.0311734   .0112531    -2.77   0.006    -.0533229    -.009024
       _cons |  -.0769965   .0095357    -8.07   0.000    -.0957656   -.0582275
-------------+----------------------------------------------------------------
     sigma_u |  .10195968
     sigma_e |  .02798586
         rho |  .92993923   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 286) =    78.25                 Prob > F = 0.0000
```

Part 4 Random-Effects results accompanied by the Breusch-Pagan LM and Hausman Tests

```
. xtreg $ylist $xlist, re theta

Random-effects GLS regression                   Number of obs      =       336
Group variable: id                              Number of groups   =        48

R-sq:  within  = 0.0395                         Obs per group: min =         7
       between = 0.1206                                        avg =       7.0
       overall = 0.1143                                        max =         7

                                                Wald chi2(2)       =     17.32
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0002
theta          = .88866039

------------------------------------------------------------------------------
        ND11 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          FG |   .0022178   .0049883     0.44   0.657     -.007559    .0119947
          CG |  -.0399689   .0103134    -3.88   0.000    -.0601827    -.019755
       _cons |  -.0762993   .0164082    -4.65   0.000    -.1084587   -.0441399
-------------+----------------------------------------------------------------
     sigma_u |  .09441288
     sigma_e |  .02798586
         rho |   .9192319   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
Breusch and Pagan Lagrangian multiplier test for random effects

        ND11[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                    ND11 |    .0115353       .1074027
                       e |    .0008127       .0285081
                       u |    .0109182       .1044901

        Test:   Var(u) = 0
                                 chibar2(01) =   870.57
                              Prob > chibar2 =   0.0000
. hausman fixed random

                 ---- Coefficients ----
                |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                |    fixed        random       Difference          S.E.
----------------+----------------------------------------------------------------
             FG |  -.0034265     .0022178       -.0056443        .0019359
             CG |  -.0311734    -.0399689        .0087954        .0045019
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          8.52
                Prob>chi2 =        0.0141
```

Part 5 Fixed-Effects results after correction for heteroskedasticity

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (48)  =   94830.11
Prob>chi2 =      0.0000


. xtgls $ylist $xlist, p(h)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =        48          Number of obs      =       336
Estimated autocorrelations =         0          Number of groups   =        48
Estimated coefficients     =         3          Time periods       =         7
                                                Wald chi2(2)       =    122.53
                                                Prob > chi2        =    0.0000
```

ND11	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
FG	.0145812	.0029554	4.93	0.000	.0087887	.0203737
CG	-.0515773	.0047036	-10.97	0.000	-.0607961	-.0423585
_cons	-.067198	.003863	-17.40	0.000	-.0747694	-.0596266

In turn, to examine the impact of the importance, or weight α where ($0 \leq \alpha \leq 1$), that the US and its partner trading nations attach to imports from each other, all regressions in Table 3 were re-run at different values of α. The results were similar and all tests concluded in favor of the fixed-effects, corrected for heteroskedasticity, results. Table 4 reports the estimated coefficients at various levels of α_u and α_i (where u = USA and i = partner trading nation). [5] Row 1, reports the estimated coefficients (β_i, β_1, and β_2) of equation (8) that appear in Part 5 of Table 3. The remaining of the rows report the estimated coefficients of the same equation for different combinations of α. Column 4 reports predictions of average ND when FG = 1 and CG = 1. The last row reports the grand averages of the respective columns.

Comparing the prediction results in rows 1, 2 and 5, ND changes in favor of the USA as equal importance of imports (the same value of α for both) rises from 0, to 0.5, to 1.

Comparing the prediction results in rows 1 and 3, ND changes in favor of the USA as its import importance declines from 1 to 0. (Similarly for rows 5 and 6.)

Comparing the prediction results in rows 3 and 4, ND changes in favor of the USA as its import importance declines from 1 to 0 and the trading nation's rises from 0 to 1. (Similarly for rows 6 and 7.)

Table 4 The importance of imports (various value combinations of α_u, α_i)

Pooled Fixed-Effects Model: $ND_{it} = \beta_i + \beta_1 CG_{it} + \beta_2 FG_{it} + \varepsilon_{it}$

	α_u	**α_i**	(1) Estimated Intercept (β_i) and prediction (average of ND) when FG = CG = 0	(2) Estimated FG coefficient (β_2)	(3) Estimated CG coefficient (β_1)	(4) Prediction (average of ND) when FG = CG = 1
1	1.0	1.0	-0.0671980	0.0145812	-0.0515773	-0.1041941
2	0.0	0.0	-0.0355913	0.0091546	-0.0395538	-0.0659905
3	0.0	1.0	-0.0683762	0.0125368	-0.0499759	-0.1058153
4	1.0	0.0	-0.0320643	0.0094903	-0.0417683	-0.0643423
5	0.5	0.5	-0.0506476	0.0112024	-0.0476087	-0.0870539
6	0.0	0.5	-0.0519455	0.0108610	-0.0469412	-0.0880257
7	0.5	0.0	-0.0338230	0.0092733	-0.0406248	-0.0651745
			Grand average of estimated intercepts:	Grand average of FG estimated coefficients:	Grand average of CG estimated coefficients:	Grand average of predictions at FG = CG = 1:
			-0.048520843	0.011014229	-0.045435714	-0.082942329

Based on a limited numbers of samples, columns 1, 2 and 3 of Table 4 are sampling distributions of the respective coefficients and, as a result, their averages (or grand averages) are better estimates of the real population coefficients than the estimated coefficients of any one equation in rows 1 to 7 of Table 4. Therefore, the estimated equation that corresponds to (8) may be expressed as

$$ND_u = -0.048520843 + 0.011014229(FG) - 0.045435714(CG) \qquad (10)$$

The IEF varies between 0 (lowest) to 100 (highest); hence, FG may vary from -100 to 100 or, scaled, from -10 to 10. The GCI varies between 0 (lowest) to 7 (highest); hence, CG may vary from -7 to 7.[6] Table 5 reports average US Net Dependency (column 3) based on equation (10) at extreme values of FG and CG as well as at FG = CG = 0. As it may be seen, as FG declines and CG rises ND improves from $ND_u = 0.3796715$ to $ND_u = -0.4767131$.

Table 5 Average US Net Dependency based on the grand averages of columns 1 to 3 of Table 4 at various FG and CG values
$ND_u = -0.048520843 + 0.011014229(FG) - 0.045435714(CG)$

where $0 \leq FG \leq 10$, $0 \leq CG \leq 7$ (FG is scaled to vary between 0 to 10 instead of 0 to 100.)

	(1) $IEF_u - IEF_i = FG$	(2) $GCI_u - GCI_i = CG$	(3) ND_u
1	10 – 0 = 10	0 – 7 = -7	0.3796715
2	0	0	-0.0485208
3	0 – 10 = -10	7 – 0 = 7	-0.4767131

5. Summary and Conclusion

The paper proposes a measure of bilateral trade interdependency, more specifically, a measure of bilateral net dependency between counties i and j. Dependency between two nations i and j is measured as the ratio of trade between them over the country's respective GDP plus imports from the trading partner with imports weighted by a degree of importance.

As reported above, based on data available in various public sources, USA's net dependency between it and its top 48 trading partners, from 2002 to 2014, ranges in value from -0.48276 (Honduras) to -0.01233 (Poland). The average (variance) of net dependency between the US and the same countries is -0.110713604 (0.011034261) whereas between it and the World is 0.122372490 (0.000380610). Some countries have been moving towards zero (most notably China, Brazil, and Singapore) while other away from zero (most notably Mexico, Japan and Hong Kong.) Hence, trading nations

are more dependent on the US than the US is on them (the US has a small power advantage over its major trade partners) whereas the opposite is true for the USA vis-à-vis the World as a whole. Because trade volume figures (that appear in the numerator of the proposed measure) are small relative to GDP figures (which appear in the denominator) both averages are close to zero but far from their extreme values.

In an effort to explain the variation (between and within) exhibited by the proposed measure across countries and time, two explanatory variables were considered: the *Freedom Gap* (FG) and the *Competitiveness Gap* (CG) between the USA and the top 48 trading partner countries. Longitudinal analysis diagnostics supported the pooled fixed-effects approach and, after correction for heteroskedasticity, as expected, the FG and CG variables were found to exert, respectively, significant positive and negative effects on ND_u.

Additionally, using arbitrary FG and CG values, inclusive of extreme and zero, it was shown that a declining FG and a rising CG improve average ND_u; in other words, average ND_u becomes more negative implying that the US acquires more power over trading partners which may be used, selectively, for various policy objectives as they relate to bilateral trade policy and agreements, economic development efforts, and, if needed, trade sanctions.

The lessons drawn from the above analysis are primarily two: during the time period considered, (a) the USA depends less on its trading partners than they depend on it and (b) its net dependency between it and its trading partners is positively affected by the *Freedom Gap* and negatively by the *Competitiveness Gap*.

Assuming that the proposed measure is a valuable tool, future research can focus on (i) additional (or other) explanatory variables, (ii) the computation of NDs of other countries and the investigation of variables that explain the variation of those NDs, and (iii) using the measure to facilitate debate between nations in an increasingly digitally-connected and highly-tumultuous world.

NOTES

1. Let GDP = C + I + G + X - M (where C = aggregate consumption, I = aggregate investment, G = governmental spending, X = exports, M = imports). Suppose there exist only two counties i and j and that i produces only fish while j produces only meet. Assume that i desires to consume only meet and j desires to consume only fish. Let the dollar value of $X_{fish} = M_{meet} = \$1$. Therefore,

$D_{ij} = (X_{fish} + M_{meet}) / (GDP_i + M_{meet}) =$
$(\$1 + \$1) / (\$0 + \$0 + \$0 + \$1 - \$1) + \$1 = \$2,$

$D_{ji} = (X_{meet} + M_{fish}) / (GDP_j + M_{fish}) =$
$(\$1 + \$1) / (\$0 + \$0 + \$0 + \$1 - \$1) + \$1 = \$2,$

$ND_{ij} = D_{ij} - D_{ji} = \$0.$

2. Data sources:
-GDP (USA and other countries): International Monetary Fund <http:// www.imf.org/external/>
-Exports, Imports: International Trade Administration (U.S. Department of Commerce, Global Patterns of U.S. Merchandise Trade) <http://tse.export. gov/TSE/MapDisplay.aspx>
-GCI = Global Competitiveness Index: World Economic Forum (2015) <http://reports.weforum.org/global-competitiveness-report-2014-2015/report-highlights/#rankings>
-IEF = Index of Economic Freedom: Heritage Foundation (2015) <http://www.heritage.org/index/explore>

3. Data availability on trade and global competitiveness at the time of drafting this manuscript has determined the starting (2002) and ending (2014) periods of the time horizon considered. The choice of bi-annual instead of annual or quarterly data was based on the belief that structural changes in economies, such as those that relate to competitiveness, may be more intensely observed within longer rather than shorter time intervals. Thus, I expect that longer time horizons and shorter time intervals would only quan- titatively impact the results but not qualitatively.

4. The descriptions of GC and FG above imply that the two are somewhat related. Upon calculation of GC and FG based on publicly available data – see next section for details – the correlation between the two was +0.321 and statistically significant at less than 1%; not a surprising result given the difference in emphasis and construction methodologies.

5. Alternatively, the weight of importance could be estimated. However it would be difficult to come up with accurate estimates given that some imports are not reported for security or other reasons, or because import benefits may not be accurately measured due to difficulties associated with measurement of consumer utility. Hence, until such estimates become available, it may be reasonable to proceed by attaching, arbitrarily, different weights of importance to imports.

6. The 2014 USA scores of the Index of Economic Freedom and Global Competitiveness Index were, respectively, $IEF_u = 76.2$ and $GCI_u = 5.54$.

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Appendix I Council of Economic Advisers' (CEO) 2015 Economic Report of the President, USA (Introduction, p. 5)

> The world's economies are more interconnected than ever before. Since the middle of the last century, declining policy barriers, transportation costs, and communication costs have driven a swift rise in world trade and foreign investment, far outpacing the growth in world output. Even so, the potential economic gains from trade for the United States are far from exhausted. U.S. businesses must overcome an average tariff hurdle near 6.8 percent and countless non-tariff measures to serve the roughly three-quarters of world purchasing power and more than 95 percent of world population that resides outside America's borders.
>
> Expanding trade allows production inputs such as labor and capital to be used more efficiently, which raises overall productivity. U.S. businesses that grow in response to increased market access abroad support additional job opportunities. These firms are more productive and rely more on capital and skilled workers, on average, than similar non-exporting firms. Partly because of this, the wages paid by exporting firms tend to be higher than wages paid by non-exporters in the same industry. In particular, evidence for the United States suggests that, in manufacturing, average wages in exporting firms and industries are up to 18 percent higher than average wages in non-exporting firms and industries.
>
> In addition, international trade helps U.S. households' budgets go further. Because our trading partners also specialize in the goods and services for which they are relatively more productive, the prices of those goods and services in the United States are lower than if we could only consume what we produce. Trade also offers a much greater diversity of consumption opportunities, from year-round fresh fruit to affordable clothing. In fact, research estimates that the variety of imported goods increased approximately three-

fold between 1972 and 2001. This increase in variety provides U.S. consumers with value equivalent to 2.6 percent of gross domestic product (GDP). According to other estimates, the reduction in U.S. tariffs since World War II contributed an additional 7.3 percent to U.S. GDP, or approximately $1.3 trillion in 2014. Distributed equally, that translates into an additional over $10,000 in income per American household.

By increasing global production and consumption opportunities, international trade can promote world economic growth and development. Trade among nations offers a mechanism to reduce global poverty, which may decrease child labor and pull developing-country workers into jobs with improved working conditions. Trade can also be a force toward the empowerment of traditionally marginalized groups; for example, some empirical evidence suggests that decreased discrimination against women is related to the effects of global competition brought about by trade. Trade also facilitates the spread of new green technologies throughout the world, which decreases emissions and improves air and water quality.

Because the process of globalization shifts resources within national economies, however, it can also create challenges in areas like income inequality. For this reason, it is critical that globalization is managed – in terms of both the types of trade agreements the United States enters into and the domestic policies that are in place – in a way that ensures that more Americans can take advantage of the opportunities afforded by trade, while being better able to meet any challenges trade creates.

Appendix 2 Net Dependency between the USA, the World and its trading partners

#	World & Country	Year	ND (USA, Partners)
0	World	2002	0.103885612
	World	2004	0.10256487
	World	2006	0.116176018
	World	2008	0.111021881
	World	2010	0.125875569
	World	2012	0.148981984
	World	2014	0.148101494
1	Canada	2002	-0.370901388
	Canada	2004	-0.335608185
	Canada	2006	-0.310374768
	Canada	2008	-0.298926315
	Canada	2010	-0.250884378
	Canada	2012	-0.253942482
	Canada	2014	-0.276152579
2	Mexico	2002	-0.255107983
	Mexico	2004	-0.282897166
	Mexico	2006	-0.279696834
	Mexico	2008	-0.271557753
	Mexico	2010	-0.30005543
	Mexico	2012	-0.322228473
	Mexico	2014	-0.321076042
3	China	2002	-0.085713036
	China	2004	-0.100136919
	China	2006	-0.100574575
	China	2008	-0.066463089
	China	2010	-0.047365765
	China	2012	-0.031345707
	China	2014	-0.023658077
4	Japan	2002	-0.026601734
	Japan	2004	-0.02517821
	Japan	2006	-0.03294902
	Japan	2008	-0.030496059
	Japan	2010	-0.021435312
	Japan	2012	-0.023025698
	Japan	2014	-0.031446291
5	UK	2002	-0.036200709

	UK	2004	-0.028982707
	UK	2006	-0.030886041
	UK	2008	-0.033043103
	UK	2010	-0.033945796
	UK	2012	-0.034423923
	UK	2014	-0.029737696
6	Germany	2002	-0.033748456
	Germany	2004	-0.030060693
	Germany	2006	-0.033983742
	Germany	2008	-0.031646495
	Germany	2010	-0.029781088
	Germany	2012	-0.034614481
	Germany	2014	-0.034275199
7	S. Korea	2002	-0.086334629
	S. Korea	2004	-0.085928746
	S. Korea	2006	-0.069420245
	S. Korea	2008	-0.073835128
	S. Korea	2010	-0.07199038
	S. Korea	2012	-0.073861886
	S. Korea	2014	-0.071892601

8	Netherlands	2002	-0.055355072
	Netherlands	2004	-0.051805849
	Netherlands	2006	-0.060977022
	Netherlands	2008	-0.059185817
	Netherlands	2010	-0.058438491
	Netherlands	2012	-0.068981032
	Netherlands	2014	-0.066806798
9	Brazil	2002	-0.049976544
	Brazil	2004	-0.048637296
	Brazil	2006	-0.037130433
	Brazil	2008	-0.032391871
	Brazil	2010	-0.022787231
	Brazil	2012	-0.026284739
	Brazil	2014	-0.026245521
10	Hong Kong	2002	-0.120466822
	Hong Kong	2004	-0.134092347
	Hong Kong	2006	-0.119968425
	Hong Kong	2008	-0.114625076
	Hong Kong	2010	-0.119126211
	Hong Kong	2012	-0.140630141

	Hong Kong	2014	-0.138644921
11	Belgium	2002	-0.082540348
	Belgium	2004	-0.073353677
	Belgium	2006	-0.080188511
	Belgium	2008	-0.081366987
	Belgium	2010	-0.077828986
	Belgium	2012	-0.085725418
	Belgium	2014	-0.09470557
12	France	2002	-0.026473441
	France	2004	-0.02051937
	France	2006	-0.021625822
	France	2008	-0.020653667
	France	2010	-0.020401055
	France	2012	-0.022304151
	France	2014	-0.022698728
13	Singapore	2002	-0.283771389
	Singapore	2004	-0.257736539
	Singapore	2006	-0.239518992
	Singapore	2008	-0.195884311
	Singapore	2010	-0.171736765
	Singapore	2012	-0.155240206
	Singapore	2014	-0.136192062
14	Taiwan	2002	-0.149430608
	Taiwan	2004	-0.147579199
	Taiwan	2006	-0.143995829
	Taiwan	2008	-0.135052776
	Taiwan	2010	-0.126638075
	Taiwan	2012	-0.11751681
	Taiwan	2014	-0.117141445
15	Australia	2002	-0.042883708
	Australia	2004	-0.030431478
	Australia	2006	-0.030461553
	Australia	2008	-0.028835224
	Australia	2010	-0.022044205
	Australia	2012	-0.023218831
	Australia	2014	-0.023256575
16	Switzerland	2002	-0.05366551
	Switzerland	2004	-0.050300519
	Switzerland	2006	-0.062454329
	Switzerland	2008	-0.06713433

	Switzerland	2010	-0.063632614
	Switzerland	2012	-0.072069155
	Switzerland	2014	-0.070472433
17	India	2002	-0.029344385
	India	2004	-0.029439839
	India	2006	-0.032037587
	India	2008	-0.030927872
	India	2010	-0.026581148
	India	2012	-0.030311491
	India	2014	-0.028976952
18	Colombia	2002	-0.089358891
	Colombia	2004	-0.095593628
	Colombia	2006	-0.09314068
	Colombia	2008	-0.09395468
	Colombia	2010	-0.090887512
	Colombia	2012	-0.103690433
	Colombia	2014	-0.094438545
19	Saudi Arabia	2002	-0.091054167
	Saudi Arabia	2004	-0.100586092
	Saudi Arabia	2006	-0.099810316
	Saudi Arabia	2008	-0.122982263
	Saudi Arabia	2010	-0.07701304
	Saudi Arabia	2012	-0.093482249
	Saudi Arabia	2014	-0.081486845
20	Italy	2002	-0.023485464
	Italy	2004	-0.018493331
	Italy	2006	-0.019988345
	Italy	2008	-0.018552268
	Italy	2010	-0.01732517
	Italy	2012	-0.022170188
	Italy	2014	-0.023898176
21	Chile	2002	-0.087329518
	Chile	2004	-0.080309367
	Chile	2006	-0.099074934
	Chile	2008	-0.101911513
	Chile	2010	-0.077214755
	Chile	2012	-0.097342958
	Chile	2014	-0.093616765
22	Israel	2002	-0.151289055
	Israel	2004	-0.163803768
	Israel	2006	-0.182433209
	Israel	2008	-0.158917087

	Israel	2010	-0.129952314
	Israel	2012	-0.131858496
	Israel	2014	-0.117117613
23	Malaysia	2002	-0.295155591
	Malaysia	2004	-0.274852502
	Malaysia	2006	-0.276398692
	Malaysia	2008	-0.176311477
	Malaysia	2010	-0.150153896
	Malaysia	2012	-0.119604946
	Malaysia	2014	-0.125661527
24	Thailand	2002	-0.147403069
	Thailand	2004	-0.141136724
	Thailand	2006	-0.139139521
	Thailand	2008	-0.113842953
	Thailand	2010	-0.094503278
	Thailand	2012	-0.095774036
	Thailand	2014	-0.098711276
25	Turkey	2002	-0.027804268
	Turkey	2004	-0.020455177
	Turkey	2006	-0.019292263
	Turkey	2008	-0.018767847
	Turkey	2010	-0.019014017
	Turkey	2012	-0.022338472
	Turkey	2014	-0.022340696
26	Venezuela	2002	-0.193387298
	Venezuela	2004	-0.251596514
	Venezuela	2006	-0.243959472
	Venezuela	2008	-0.207038296
	Venezuela	2010	-0.150735864
	Venezuela	2012	-0.174663415
	Venezuela	2014	-0.18603646
27	Argentina	2002	-0.036950705
	Argentina	2004	-0.037943009
	Argentina	2006	-0.032142116
	Argentina	2008	-0.031584632
	Argentina	2010	-0.023171229
	Argentina	2012	-0.022797629
	Argentina	2014	-0.026551072
28	Russian Fed.	2002	-0.025914654
	Russian Fed.	2004	-0.023978318

	Russian Fed.	2006	-0.023033851
	Russian Fed.	2008	-0.019625197
	Russian Fed.	2010	-0.018807868
	Russian Fed.	2012	-0.017535662
	Russian Fed.	2014	-0.016296835
29	Spain	2002	-0.014399909
	Spain	2004	-0.011835525
	Spain	2006	-0.012318506
	Spain	2008	-0.012816703
	Spain	2010	-0.011933098
	Spain	2012	-0.014320726
	Spain	2014	-0.015899573
30	Peru	2002	-0.062189288
	Peru	2004	-0.083876508
	Peru	2006	-0.096489331
	Peru	2008	-0.093239387
	Peru	2010	-0.076628739
	Peru	2012	-0.077135624
	Peru	2014	-0.074911831
31	Philippines	2002	-0.204496803
	Philippines	2004	-0.163775558
	Philippines	2006	-0.132108869
	Philippines	2008	-0.092512471
	Philippines	2010	-0.073221427
	Philippines	2012	-0.067329155
	Philippines	2014	-0.06256405
32	Ecuador	2002	-0.123974799
	Ecuador	2004	-0.155116311
	Ecuador	2006	-0.197621903
	Ecuador	2008	-0.190975331
	Ecuador	2010	-0.170761649
	Ecuador	2012	-0.170548389
	Ecuador	2014	-0.175512278
33	Indonesia	2002	-0.055322494
	Indonesia	2004	-0.046785442
	Indonesia	2006	-0.040217935
	Indonesia	2008	-0.036737122
	Indonesia	2010	-0.029271181
	Indonesia	2012	-0.026520628
	Indonesia	2014	-0.02929442

34	D. Republic	2002	-0.258305156
	D. Republic	2004	-0.319819017
	D. Republic	2006	-0.225978558
	D. Republic	2008	-0.192825651
	D. Republic	2010	-0.169136391
	D. Republic	2012	-0.16762688
	D. Republic	2014	-0.176368044
35	Ireland	2002	-0.213842237
	Ireland	2004	-0.171518222
	Ireland	2006	-0.149074368
	Ireland	2008	-0.135809246
	Ireland	2010	-0.179563155
	Ireland	2012	-0.175215396
	Ireland	2014	-0.162063797
36	Costa Rica	2002	-0.312852056
	Costa Rica	2004	-0.302665178
	Costa Rica	2006	-0.298374114
	Costa Rica	2008	-0.269753241
	Costa Rica	2010	-0.332888941
	Costa Rica	2012	-0.365835777
	Costa Rica	2014	-0.29127451
37	South Africa	2002	-0.054439482
	South Africa	2004	-0.038438813
	South Africa	2006	-0.042406062
	South Africa	2008	-0.054653071
	South Africa	2010	-0.035425646
	South Africa	2012	-0.03904776
	South Africa	2014	-0.040386598
38	Guatemala	2002	-0.211732852
	Guatemala	2004	-0.214952504
	Guatemala	2006	-0.195820717
	Guatemala	2008	-0.186720556
	Guatemala	2010	-0.174322417
	Guatemala	2012	-0.181948504
	Guatemala	2014	-0.158118572
39	Honduras	2002	-0.563181926
	Honduras	2004	-0.566426287
	Honduras	2006	-0.509135742
	Honduras	2008	-0.47640659
	Honduras	2010	-0.419382048

	Honduras	2012	-0.427477624
	Honduras	2014	-0.41731293
40	Vietnam	2002	-0.083102938
	Vietnam	2004	-0.125556148
	Vietnam	2006	-0.142572835
	Vietnam	2008	-0.154407161
	Vietnam	2010	-0.158317123
	Vietnam	2012	-0.15388975
	Vietnam	2014	-0.185489279
41	Norway	2002	-0.035916733
	Norway	2004	-0.029849353
	Norway	2006	-0.026579738
	Norway	2008	-0.021930516
	Norway	2010	-0.022665626
	Norway	2012	-0.019009588
	Norway	2014	-0.018832766
42	Sweden	2002	-0.044859428
	Sweden	2004	-0.040169804
	Sweden	2006	-0.04111594
	Sweden	2008	-0.032474875
	Sweden	2010	-0.029945603
	Sweden	2012	-0.027189993
	Sweden	2014	-0.024440591
43	New Zealand	2002	-0.063632722
	New Zealand	2004	-0.048182783
	New Zealand	2006	-0.052223185
	New Zealand	2008	-0.041436992
	New Zealand	2010	-0.037613882
	New Zealand	2012	-0.037395108
	New Zealand	2014	-0.04036044
44	Austria	2002	-0.028251341
	Austria	2004	-0.025102872
	Austria	2006	-0.032542912
	Austria	2008	-0.025186064
	Austria	2010	-0.02305781
	Austria	2012	-0.030487512
	Austria	2014	-0.032009719
45	Poland	2002	-0.008819806
	Poland	2004	-0.010518001
	Poland	2006	-0.011922394

	Poland	2008	-0.012069155
	Poland	2010	-0.012037619
	Poland	2012	-0.015449518
	Poland	2014	-0.015494011
46	Kuwait	2002	-0.075200885
	Kuwait	2004	-0.077564606
	Kuwait	2006	-0.058132118
	Kuwait	2008	-0.064827846
	Kuwait	2010	-0.068505992
	Kuwait	2012	-0.087888696
	Kuwait	2014	-0.081582346
47	Algeria	2002	-0.057604194
	Algeria	2004	-0.09648403

	Algeria	2006	-0.139045346
	Algeria	2008	-0.11846413
	Algeria	2010	-0.095782475
	Algeria	2012	-0.05361178
	Algeria	2014	-0.031121428
48	Trinidad and Tobago	2002	-0.344751315
	Trinidad and Tobago	2004	-0.4860668
	Trinidad and Tobago	2006	-0.498582314
	Trinidad and Tobago	2008	-0.373901969
	Trinidad and Tobago	2010	-0.378647924
	Trinidad and Tobago	2012	-0.367627887
	Trinidad and Tobago	2014	-0.261853898