



ARTNeT Interactive Gravity Modeling Database

Tutorial

Trade and Investment Division
UNESCAP

Draft Version 1.0

Please send your comments, suggestions and questions to artnetontrade@un.org

This tutorial is a work in progress.

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ARTNeT Interactive Gravity Modeling Database

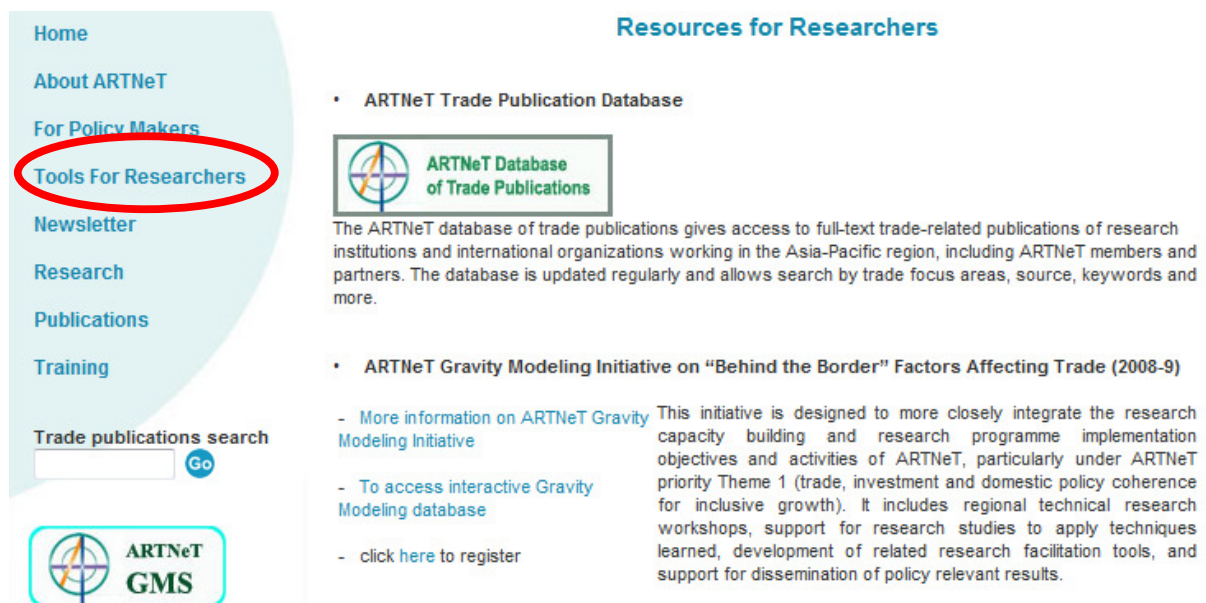
Access to Gravity Modeling Database

1. Access ARTNeT by typing the ARTNeT link in the address bar of the browser.

Link: <http://www.unescap.org/tid/ARTNeT/index.asp>



2. Go to Tools page by clicking “Tools For Researchers” link.



The Tools page is displayed.

3. Register in ARTNeT by clicking the “Register” link. Follow registration procedures to be sent via email. Proceed to Step 4 if you have already registered and have received your username and password.

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Resources for Researchers

- ARTNeT Trade Publication Database



The ARTNeT database of trade publications gives access to full-text trade-related publications of research institutions and international organizations working in the Asia-Pacific region, including ARTNeT members and partners. The database is updated regularly and allows search by trade focus areas, source, keywords and more.
- ARTNeT Gravity Modeling Initiative on “Behind the Border” Factors Affecting Trade (2008-9)
 - More information on ARTNeT Gravity Modeling Initiative
 - To access interactive Gravity Modeling database
 - [click here to register](#)

This initiative is designed to more closely integrate the research capacity building and research programme implementation objectives and activities of ARTNeT, particularly under ARTNeT priority Theme 1 (trade, investment and domestic policy coherence for inclusive growth). It includes regional technical research workshops, support for research studies to apply techniques learned, development of related research facilitation tools, and support for dissemination of policy relevant results.

Registration Form

Title :	Mr. ▼
Name :	<input type="text"/> *
Email :	<input type="text"/> *
Job title :	<input type="text"/> *
Organization/ Institution :	<input type="text"/>
Category belonged :	Please write in this format: Name, (Acronym) Bilateral Donors/Aid Agency ▼
Country :	Afghanistan ▼
Address1 :	<input type="text"/>
Address2 :	<input type="text"/>
City :	<input type="text"/>
Postal code :	<input type="text"/>
Phone :	<input type="text"/> Please write in this format: e.g. +66 (0) 2288 2250
Fax :	<input type="text"/> Please write in this format: e.g. +66 (0) 2288 2250

(*) Mandatory Field

|

You will receive a username and password via email within a few days.

4. Access ARTNeT Interactive Gravity Modeling Database by clicking “To access interactive Gravity Modeling database” link. Access the database by typing your login details and clicking the “Login” button.

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ARTNeT Login Page

Username :

Password :

Selecting Dataset

1. Open the data set to be used by clicking the “Use this data” button below the appropriate data set title.

There are several gravity model datasets in ARTNeT. Selection of the appropriate dataset can be guided by the description provided in the “Summary” section.

The first dataset is a time series data containing data for years 1994 to 2007.

The second dataset is a panel data containing data for 2006. It has additional variables relevant to trade facilitation.

More datasets will be added in the future. If you would like to contribute a dataset, please contact artnetontrade@un.org

ARTNeT Gravity Modeling Datasets



1. ARTNeT Data on Trade (1994 - 2007)

Summary: (Year: 1994 - 2007) - Basic Gravity Panel Dataset - Recommended use for estimation of TRADE POTENTIALS

Use this data

2. ARTNeT Data on Trade Facilitation (2006)

Summary: Year 2006; include trade facilitation and behind-the-border regulatory indicators

Use this data

Specifying and Estimating the Model

1. Set the Dependent and Independent variables. The data description page can be accessed to guide selection of variables.

Variable Name	Label	Unit / Types of Variables	Detailed Description	Origin (reporter, partner, RP)	Data Source
reporter	Reporter Name			Reporter	
partner	Partner Name			Partner	
yr	year				
ln_export_value	Net Exports(\$'million)USD	USD		RP	IMF DOTS: http://www.imfstatistics.org/dot/

The basic gravity model would have `ln_reporter_gdp` (GDP of exporter), `ln_partner_gdp` (GDP of importer) and `ln_distance` (distance between exporting and importing countries) as independent variables. The example shows the selection of `ln_export_value` as the dependent variable. And `ln_reporter_gdp`, `ln_partner_gdp`, `ln_distance`, `dum_contiguous`, `dum_colony_link`, `dum_colony_aft_1945` and `dum_same_ctype` as independent variables.

Select dependent variable

Choose independent variables [data description](#)

<input type="checkbox"/> <code>ln_export_value</code>	<input type="checkbox"/> <code>ln_us_gdp_growth</code>	<input type="checkbox"/> <code>ln_us_gdp_growth_lagged</code>
<input type="checkbox"/> <code>ln_jp_gdp_growth</code>	<input type="checkbox"/> <code>ln_jp_gdp_growth_lagged</code>	<input type="checkbox"/> <code>ln_chn_gdp_growth</code>
<input type="checkbox"/> <code>ln_chn_gdp_growth_lagged</code>	<input type="checkbox"/> <code>ln_ind_gdp_growth_rate</code>	<input type="checkbox"/> <code>ln_ind_gdp_growth_lagged</code>
<input checked="" type="checkbox"/> <code>ln_reporter_gdp</code>	<input checked="" type="checkbox"/> <code>ln_partner_gdp</code>	<input checked="" type="checkbox"/> <code>ln_distance</code>
<input checked="" type="checkbox"/> <code>dum_contiguous</code>	<input type="checkbox"/> <code>dum_comlang_official</code>	<input type="checkbox"/> <code>dum_comlang_ethno</code>
<input checked="" type="checkbox"/> <code>dum_colony_link</code>	<input type="checkbox"/> <code>dum_com_colonizer</code>	<input type="checkbox"/> <code>dum_cur_colony</code>
<input checked="" type="checkbox"/> <code>dum_col_aft_1945</code>	<input checked="" type="checkbox"/> <code>dum_same_ctype</code>	<input type="checkbox"/> <code>ln_otc_rpt</code>
<input type="checkbox"/> <code>ln_otc_par</code>	<input type="checkbox"/> <code>ln_otc_by_ex_rpt</code>	<input type="checkbox"/> <code>ln_otc_by_ex_par</code>
<input type="checkbox"/> <code>ln_otc_by_gdp_rpt</code>	<input type="checkbox"/> <code>ln_otc_by_gdp_par</code>	

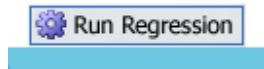
Addition of Fixed Effect dummies is optional. Year dummies should be considered for time series data. Reporter and Partner dummies may be considered for panel data, in particular to take into account multilateral resistance terms observed in the theory consistent with the gravity model¹. However, including such dummies prevents capturing of Reporter and Partner specific characteristics in the model.

To add fixed effect dummies

<input type="checkbox"/> reporter dummies
<input type="checkbox"/> partner dummies
<input checked="" type="checkbox"/> year dummies
<input type="checkbox"/> check for no intercept

¹ Refer to Anderson & Van Wincoop, 2003.

2. Execute by clicking the “Run Regression” button.



The results will be displayed at the bottom of the page.

Regression Statistics	
R Square	0.742452
Adjusted R Square	0.742420
Standard Error	1.874727
Observations	46923

Parameters				
Name	Coefficients	Standard Error	t-statistic	P-value
(Intercept)	-9.13039	0.110247	-82.817836	0
ln_reporter_gdp	1.03221	0.003668	266.888347	0
ln_partner_gdp	0.90336	0.003486	259.116826	0
ln_distance	-1.12882	0.010919	-107.008995	0
dum_contiguous	0.94948	0.04611	20.560320	0
dum_colony_link	0.32865	0.072942	4.505609	6.634237E-06

The Adjusted R Square is a measure of the strength of the model. An Adjusted R Square with a high magnitude demonstrates effectiveness of the model and the variables used. Most gravity models have Adjusted R Square values of 0.6 or higher.

Each coefficient shows the relationship between the independent variable to the dependent variable. The t-statistic and P-value shows the statistical significance of the relationship. The P-value is generally considered to be significant when it is less than or equal to 0.05. Using the above results, 1% increase in GDP of the exporting/reporter country results in 1.03% increase in its export. As the data is provided in natural logs (ln), the coefficient may be interpreted as elasticity.

Trade Projection

The Trade Projection function allows calculation of the impact of a change in a given factor included in the model (e.g. GDP of the partner country) on the dependent variable (e.g. exports) using the coefficients estimated earlier.

1. To generate trade projection, click “Trade Projection” link at the bottom of the page.

[Trade projection](#)
[Estimated to Actual Trade Ratio](#)

Conditions can be specified by clicking the “Change Condition” button.

Set condition for trade projection.

ln_reporter_gdp	change condition	no specific condition set, same values from based year will be used.
ln_partner_gdp	change condition	no specific condition set, same values from based year will be used.
ln_distance	change condition	no specific condition set, same values from based year will be used.
dum_contiguous	change condition	no specific condition set, same values from based year will be used.
dum_colony_link	change condition	no specific condition set, same values from based year will be used.
dum_col_aft_1945	change condition	no specific condition set, same values from based year will be used.

Set condition for trade projection.

ln_reporter_gdp
[Increase](#) 2 Check this box for % value [Save](#) [Remove](#)

Set condition for trade projection.

ln_reporter_gdp	change condition	2% Increase
ln_partner_gdp	change condition	no specific condition set, same values from based year will be used.
ln_distance	change condition	no specific condition set, same values from based year will be used.
dum_contiguous	change condition	no specific condition set, same values from based year will be used.
dum_colony_link	change condition	no specific condition set, same values from based year will be used.
dum_col_aft_1945	change condition	no specific condition set, same values from based year will be used.

Specify the Reporter, Base Year and Partner. The example shows the selection of Bangladesh as the Reporter, all countries as Partner and 2007 as the base year.

Click “Generate trade projection” button.

Select reporter : Select based year :

Select partners *Select partner country*

<input checked="" type="checkbox"/> Samoa	<input checked="" type="checkbox"/> Singapore	<input checked="" type="checkbox"/> Slovak Republic	<input checked="" type="checkbox"/> Solomon Islands
<input checked="" type="checkbox"/> South Africa	<input checked="" type="checkbox"/> Spain	<input checked="" type="checkbox"/> Sri Lanka	<input checked="" type="checkbox"/> Sweden
<input checked="" type="checkbox"/> Switzerland	<input checked="" type="checkbox"/> Tajikistan	<input checked="" type="checkbox"/> Thailand	<input checked="" type="checkbox"/> Tonga
<input checked="" type="checkbox"/> Turkey	<input checked="" type="checkbox"/> Turkmenistan	<input checked="" type="checkbox"/> United Kingdom	<input checked="" type="checkbox"/> United States
<input checked="" type="checkbox"/> Uzbekistan	<input checked="" type="checkbox"/> Vanuatu	<input checked="" type="checkbox"/> Viet Nam	

Generate trade projection for **ln_export_value**

The results will be displayed at the bottom of the page.

Reporter	Partner	Prediction under new conditions	Predicted value of based year	Difference between new prediction and based year value
Bangladesh	Hong Kong (China)	103.649	99.752	3.898
Bangladesh	Malaysia	85.668	82.446	3.221
Bangladesh	Mongolia	2.217	2.133	0.083
Bangladesh	Nepal	29.230	28.131	1.099
Bangladesh	Pakistan	92.760	89.272	3.488
Bangladesh	Singapore	68.492	65.916	2.576

Interpretation: A 2% increase in GDP of Bangladesh (reporter or exporting country) results in an increase in export from Bangladesh to Malaysia of \$3,221 million.

Estimated to Actual Trade Ratio

1. To generate estimated to actual ratio, click “Estimated to Actual Trade Ratio” link at the bottom of the page.



Select Reporter, Partner Year, then click Generate estimation button.

Choose countries and years for trade potential estimation.

Reporter:

- Bangladesh
- Belgium
- Brazil
- Brunei Darussalam
- Cambodia
- Canada
- China
- Czech Republic
- Denmark

Partner:

- Luxembourg
- Macau (China)
- Malaysia
- Maldives
- Mexico
- Mongolia
- Nepal
- Netherlands
- New Zealand

Year:

- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007

[Generate estimation](#) for In_export_value

The results are displayed at the bottom of the page.

Reporter	Partner	year	Actual	Predicted	Estimated to Actual Trade Ratio
Bangladesh	India	2006	152.854	2,457.009	16.07
Bangladesh	India	2007	209.714	3,251.660	15.51
Bangladesh	India	average	181.284	2,854.334	15.79
Bangladesh	Cambodia	2006	1.007	3.465	3.44
Bangladesh	Cambodia	2007	0.608	4.287	7.05
Bangladesh	Cambodia	average	0.808	3.876	5.25
Bangladesh	Nepal	2006	2.353	14.417	6.13
Bangladesh	Nepal	2007	4.480	17.209	3.84
Bangladesh	Nepal	average	3.417	15.813	4.98
Bangladesh	Indonesia	2006	16.283	63.638	3.91
Bangladesh	Indonesia	2007	19.485	78.739	4.04
Bangladesh	Indonesia	average	17.884	71.189	3.97
Bangladesh	Malaysia	2006	15.820	44.312	2.80
Bangladesh	Malaysia	2007	21.836	53.566	2.45
Bangladesh	Malaysia	average	18.828	48.939	2.63
Bangladesh	Hong Kong (China)	2006	112.741	56.810	0.50
Bangladesh	Hong Kong (China)	2007	113.333	64.864	0.57
Bangladesh	Hong Kong (China)	average	113.037	60.837	0.54

Interpretation: An estimated to actual trade ratio higher than 1 suggests that there is some untapped trade potential between the partner countries. The results above suggest that Bangladesh has more untapped export potential with India than with Hong Kong (China).

Filtering Data (Optional)

1. Set the desired filter for the data by clicking “Filter data.” Select the Reporter, Partner and Year by enabling the checkbox and clicking the “Apply Filter button.

The Reporter is the country whose trade relationship with different Partner countries is to be evaluated. The example shows Bangladesh as the Reporter country and all of the countries as Partner countries and 2001 to 2007 as years. Please note multiple years can only be applied to time series data while only one year is used for panel data (Trade Facilitation Dataset)

ARTNeT Gravity Modeling Analysis Tool

[Filter data](#) [Export data to excel file](#) [Select another dataset](#)

Select dependent variable
In_export_value

ARTNeT Gravity Modeling Analysis Tool

To filter dataset

Reporter:

- Armenia
- Australia
- Austria
- Azerbaijan
- Bangladesh
- Belgium
- Brazil
- Brunei Darussalam
- Cambodia

Partner:

- Armenia
- Australia
- Austria
- Azerbaijan
- Bangladesh
- Belgium
- Brazil
- Brunei Darussalam
- Cambodia

Year:

- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007

[Apply filter](#)

Exporting Results (Optional)

The results can be exported in excel by clicking “Export data to excel file” button. Exporting to an excel file is an optional step.

This regression model is based on

Reporters : All countries

Partner : All countries

Year : All

Residual Output Total observations: **46923**

Observations	reporter - partner	year	Actual value	Predicted Value	Residuals	Std. Residuals
1	Armenia - Czech Republic	1994	-2.18925	-0.98897	-1.20028	-0.64028
2	Armenia - France	1994	-0.83932	1.853417	-2.69274	-1.43643
3	Armenia - Georgia	1994	1.060564	0.489776	0.570787	0.304484
4	Armenia - Germany	1994	1.882513	2.368822	-0.48630	-0.25941
5	Armenia - Iran	1994	2.679787	1.742354	0.937432	0.500069
6	Armenia - Kazakhstan	1994	-0.09431	-1.63499	1.540684	0.821870
7	Armenia - Korea	1994	-4.96184	0.011630	-4.97347	-2.65307
8	Armenia - Netherlands	1994	-0.32850	0.678570	-1.00707	-0.53721
9	Armenia - Poland	1994	-0.87227	-0.03683	-0.83543	-0.44566
10	Armenia - RUSSIAN Federation	1994	4.430197	3.201044	1.229152	0.655685
...

To view all observations in Excel sheet, click [here](#)

[Filter data](#) [Export data to excel file](#) [Select another dataset](#)

Select the Reporter, Partner and Year, then click the “Export to excel” button.

To export to excel file

[↩ Back to regression](#)

Reporter:

- Azerbaijan
- Bangladesh
- Belgium
- Brazil
- Brunei Darussalam
- Cambodia

Partner:

- Iran
- Italy
- Japan
- Kazakhstan
- Kiribati
- Korea

Year:

- 2002
- 2003
- 2004
- 2005
- 2006
- 2007

Variables: (maximum 10 variables allowed including dependent variable)

- ln_export_value
- ln_us_gdp_growth
- ln_us_gdp_growth_lagged
- ln_jp_gdp_growth
- ln_jp_gdp_growth_lagged
- ln_chn_gdp_growth
- ln_chn_gdp_growth_lagged
- ln_ind_gdp_growth_rate
- ln_ind_gdp_growth_lagged
- ln_reporter_gdp
- ln_partner_gdp
- ln_distance
- dum_contiguous
- dum_comlang_official
- dum_comlang_ethno
- dum_colony_link
- dum_com_colonizer
- dum_cur_colony
- dum_col_aft_1945
- dum_same_ctr
- ln_otc_rpt

Export to excel

	A	B	C	D	E	F	G	H	I	J
1	Reporter	Partner	Yr	ln_us_gdp_growth	ln_reporter_gdp	ln_partner_gdp	ln_distance	dum_contiguous	dum_comlang_official	dum_com_colonizer
2	Bangladesh	Australia	1994	0.060686041	10.42728846	12.67081991	9.113567874	0	0	0
3	Bangladesh	Austria	1994	0.060686041	10.42728846	12.22352576	8.841007221	0	0	0
4	Bangladesh	Brazil	1994	0.060686041	10.42728846	13.21079495	9.659228888	0	0	0
5	Bangladesh	Brunei Darussalam	1994	0.060686041	10.42728846	8.315772744	8.120966279	0	0	1
6	Bangladesh	Canada	1994	0.060686041	10.42728846	13.24368505	9.430673578	0	0	0
7	Bangladesh	China	1994	0.060686041	10.42728846	13.23430878	8.018374528	0	0	0
8	Bangladesh	Denmark	1994	0.060686041	10.42728846	11.94206294	8.868281378	0	0	0
9	Bangladesh	Fiji	1994	0.060686041	10.42728846	7.509491484	9.271132509	0	0	1
10	Bangladesh	Finland	1994	0.060686041	10.42728846	11.5158012	8.762441815	0	0	0