The Impact of Income on Imports

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Abstract

This paper looks to understand the impact of household income on national imports. Cross-sectional data in this study is obtained for the year of 2018 from 214 countries. Data is collected on national imports, household income, government spending, foreign investments, household savings rate, rural share of population, elderly share of population, unemployment rate, imports share of GDP, and import lead time. A positive relationship between national imports and household income is hypothesized and supported by the linear regression models constructed in this study.

I. INTRODUCTION

Purpose

This paper looks to understand the impact of household income on national imports. Specifically, this paper quantifies the relationship between national imports and household income.

Importance

This quantification is important for businesses and governments alike. Businesses need to adjust their import and/or export volumes in response to fluctuations in household income. Governments need to adjust their fiscal and monetary policies in response to fluctuations in import and export activity, which is affected by the fluctuations in household income.

Take a business in the United States with a supply chain highly depended on imports. After receiving a forecast on household income for the United States, the business would need to translate that forecast on household income into a decision on how much volume to import in order to maintain inventory levels.

Take another business in China with revenues highly depended on exports. After receiving the same forecast on household income for the United States, this business would need to translate that forecast on household income into a decision on how much volume to produce in order to match the export demand coming from the United States.

Hypothesis

It is expected that national imports increase as household income increases due to the globalization of modern-day supply chains. As household incomes rise, consumption is expected to increase in accordance with conventional economic theory. As consumption rises, national imports are expected to increase in response to domestic businesses sourcing inventory from non-domestic sources. While a business may source a large amount of its inventory from domestic sources, those domestic sources may source their own inventory from non-domestic sources. Thus, a positive relationship between national imports and household income is hypothesized.

II. LITERATURE REVIEW

Literature 1

In 1960, Polak and Boissonneault examined the relationship between income and imports. They looked at Australia, Austria, Belgium, Luxembourg, Burma, Canada, Colombia, Costa Rica, Cuba, Denmark, Dominican Republic, Ecuador, Egypt, Finland, France, Germany, Guatemala, Honduras, India, Iraq, Ireland, Italy, Japan, Mexico, Netherlands, New Zealand, Nicaragua, Norway, Peru, the Philippines, Portugal, Sweden, Switzerland, Thailand, South Africa, United Kingdom, and Venezuela. Their data came from the 1950s. They looked at exports, capital flows, and the ratio of imports to income. Unfortunately, they prepared a separate model for each country in their sample instead of producing a consolidated model to reflect the aggregate impact on imports. In addition, they used time-series data instead of cross-sectional data.

Literature 2

In 1975, Khan and Ross also examined the relationship between income and imports. Their paper looked at United States, Canada, France, Germany, Italy, United Kingdom, Japan, Belgium, Netherlands, Austria, Switzerland, Denmark, Norway, and Sweden. Their data came from the 1960s. They looked at domestic price levels as measured by the Wholesale Price Index in local currency terms. They also looked at income as measured by real Gross National Product. Unfortunately, they also prepared a separate model for each country in their sample instead of producing a consolidated model to reflect the aggregate impact on imports. In addition, they also used time-series data instead of cross-sectional data.

Contribution

Literature covering the relationship between national imports and household income are dated by several decades. Therefore, this paper provides an up-to-date study into the subject at hand by using recent data. In addition, this paper looks to build a comprehensive model to aggregate the impact of household incomes on national imports from multiple countries. Lastly, this paper will apply a heavier set of control variables to isolate the impact of household income more effectively on national imports.

III. DATA

Data and Variable Selection

Cross-sectional data is obtained for the year of 2018 from 214 countries. The list of observed countries is available under Appendix A. The source of the data is the World Bank. Data is collected on the following: (A) national imports in millions of US dollars, (B) household income represented by GDP per capita in US dollars, (C) general government spending in millions of US dollars, (D) net foreign direct investment inflows in millions of US dollars, (E) household savings rate as a percentage, (F) rural share of population as a percentage, (G) elderly share of population as a percentage, (H) unemployment rate as a percentage, (I) imports share of GDP as a percentage, and (J) the median import lead time in days.

Table 1 – Data and Variable Descriptions

Type	Name	Description	Year	Units	Source
Dependent	*imp*	National Imports	2018	USD (millions)	World Bank
Independent	*inc*	Household Income	2018	USD	World Bank
Control	*gov*	Government Spending	2018	USD (millions)	World Bank
Control	*fdi*	Foreign Investments	2018	USD (millions)	World Bank
Control	*sav*	Household Savings Rate	2018	Percentage	World Bank
Control	*rur*	Rural Share of Population	2018	Percentage	World Bank
Control	*eld*	Elderly Share of Population	2018	Percentage	World Bank
Control	*uem*	Unemployment Rate	2018	Percentage	World Bank
Control	*imr*	Imports Share of GDP	2018	Percentage	World Bank
Control	*ldt*	Median Import Lead Time	2018	Days	World Bank

Note that household income is represented by GDP per capita due to limitations in retrieving data on household disposable income for an acceptable number of countries. Government spending and foreign investments are control variables to account for the influence of other economic players. Household savings rate is a control variable to isolate money intended for consumption from household income. Rural share of population and elderly share of population are control variables to account for consumption behavior according to demographics. Unemployment rate is a control variable to isolate economic conditions among countries. Imports share of GDP and median import lead time are control variables to account for a country's dependency on imports.

Data Analysis

Each variable is represented by an acceptable number of observations. Given the varying number of observations among the variables, it is expected that linear regression models built on this collection of data will utilize less than the total 214 countries collectively observed throughout the data. Each linear regression model built on this collection of data must be inspected to ensure an acceptable number of observations.

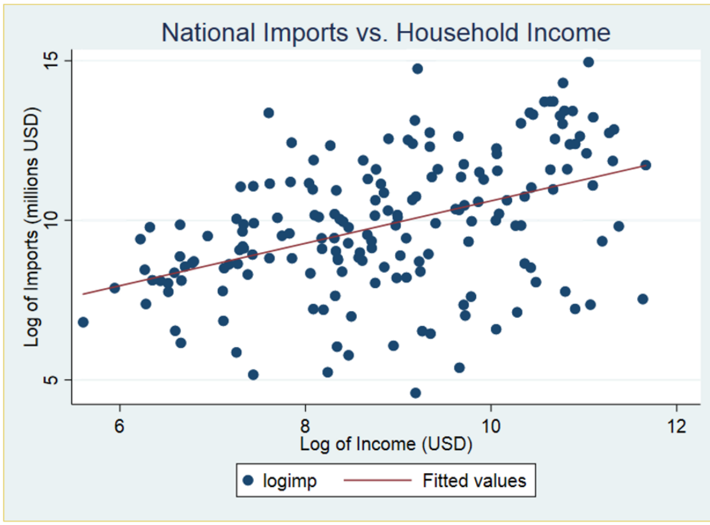
There are relatively high levels of deviations in the data for the dependent variable (national imports, *imp*) and the primary independent variable (household income, *inc*). A logarithm transformation applied to both variables seems appropriate in this circumstance.

Table 2 – Data Descriptive Statistics

Variable	Units	Observations	Mean	Standard Deviation	Minimum	Maximum
imp	USD (millions)	179	134,776	361,123	98	3,138,160
inc	USD	200	18,894	28,151	272	185,829
gov	USD (millions)	168	83,552	308,204	93	2,891,290
fdi	USD (millions)	198	5,562	43,596	-361,467	261,482
sav	Percentage	154	22.7	12.5	-58.3	64.1
rur	Percentage	211	38.7	23.9	0.0	87.0
eld	Percentage	190	9.0	6.3	1.1	27.6
uem	Percentage	190	7.7	5.8	0.1	29.4
imr	Percentage	179	50.3	28.8	10.0	188.6
ldt	Days	89	4.1	3.6	1.0	25.0

As anticipated in the hypothesis, a positive relationship between national imports and household income is visualized through the scatter plot of the dependent variable (national imports, *imp*) and the primary independent variable (household income, *inc*). Note that logarithm transformations are applied to better interpret the relationship in terms of elasticities. In addition, the logarithm transformations create an acceptable linear manipulation.

Figure 1 – Scatter Plot of Dependent Variable and Primary Independent Variable



Gauss-Markov Assumptions

1. **Linear Parameters.** All models in the following sections are linear in parameters since no transformations are applied to the parameters of the models.
2. **Random Sampling.** All data is obtained from random sampling since data is sourced from over 200 countries in a manner to fairly represent all regions of the world. See Appendix A for a list of countries organized by region.
3. **No Perfect Collinearity.** No perfect collinearity exists between explanatory variables as confirmed by a correlation matrix. See Appendix B for the correlation matrix.
4. **Zero Conditional Mean.** Results from the models in the following sections should be taken with caution since other factors not included in this paper may influence the results.
5. **Homoskedasticity.** Results from the models in the following sections should be taken with caution since the variance of the error term may not remain constant for scaling values for any explanatory variable.

IV. RESULTS

The Simple Linear Regression Model

The simple linear regression model is built on the relationship between the logarithm transformation of national imports (*imp*) and the logarithm transformation of household income (*inc*). Logarithm transformations are used to better interpret the model in terms of elasticities.

Model 1: Equation for the Simple Linear Regression Model

$$\log(imp) = \beta_o + \beta_1 \log(inc) + u$$

Table 3: Results for the Simple Linear Regression Model

Dependent Variable: National Imports log(*imp*)			
Type	**Component**	**Variable Description**	**Result**
Independent	log(*inc*)	Household Income	0.6648
Constant	Intercept		3.9636
Goodness-of-fit	R-squared		0.1983
Observations	N		178

The simple linear regression model results in a coefficient of 0.6648 for the primary independent variable. Given that this model uses a log-log transformation, this model suggests that national imports increase by approximately 0.6648% for every 1% increase in the average household's income. Likewise, national imports decrease by 0.6648% for every 1% decrease in the average household's income.

The simple linear regression model reports a r-squared value of 0.1983, meaning that the model can explain 19.83% of the variation in the dependent variable. This r-squared value may improve by adding control variables through a multiple linear regression model.

The Unrestricted Multiple Linear Regression Model

The unrestricted multiple linear regression model is built on the relationship between the logarithm transformation of national imports (*imp*) and the logarithm transformation of household income (*inc*) while controlling for (A) government spending, (B) foreign investments, (C) household savings, (D) rural population, (E) elderly population, (F) unemployment, (G) dependency on imports, and (H) import lead time.

Model 2: Equation for the Unrestricted Multiple Linear Regression Model

$$\log(imp) = \beta_0 + \beta_1 \log(inc) + \beta_2 gov + \beta_3 fdi + \beta_4 sav + \beta_5 rur + \beta_6 eld + \beta_7 uem + \beta_8 imr + \beta_9 ldt + \mathrm{u}$$

Table 4: Results for the Unrestricted Multiple Linear Regression Model

Dependent Variable: National Imports log(*imp*)			
Type	**Component**	**Variable Description**	**Result**
Independent	log(*inc)*	Household Income	0.2857
Control	*gov*	Government Spending	1.61e-6
Control	*fdi*	Foreign Investments	-1.69e-6
Control	*sav*	Household Savings Rate	-0.0144
Control	*rur*	Rural Share of Population	-0.0069
Control	*eld*	Elderly Share of Population	0.0358
Control	*uem*	Unemployment Rate	-0.0934
Control	*imr*	Imports Share of GDP	-0.0106
Control	*ldt*	Median Import Lead Time	0.0154
Constant	Intercept		9.6528
Goodness-of-fit	Adjusted R-squared		0.4907
Observations	N		65

The unrestricted multiple linear regression model results in a coefficient of 0.2857 for the primary independent variable. Given that this model uses a log-log transformation, this model suggests that national imports increase by approximately 0.2857% for every 1% increase in the average household's income in an isolated environment. Likewise, national imports decrease by 0.2857% for every 1% decrease in the average household's income in an isolated environment.

The unrestricted multiple linear regression model reports an adjusted r-squared value of 0.4907, meaning that the model can explain 49.07% of the variation in the dependent variable. The adjusted r-squared value is appropriate to use in evaluating a multiple linear regression model in order to account for the impact of the additional independent variables.

Model Comparison

Moving from the simple linear regression model to the unrestricted multiple linear regression model, the coefficient of the primary independent variable is noticeably reduced. This reduction implies that there is positive omitted variable bias in the simple linear regression model, meaning that the simple linear regression model overestimates the impact of household income on national imports.

The unrestricted multiple linear regression model dramatically improves the goodness-of-fit measurement of the simple linear regression model. This improvement is expected when adding additional independent variables to a linear regression model. The next step is to evaluate the statistical significance of the unrestricted multiple linear regression model to ensure that the control variables truly add value to the model.

Note that the unrestricted multiple linear regression model has 65 observations, a large reduction in sample size compared to the 214 countries on which data is collected. This reduction in the number of observations is due to gaps throughout the data. When building a model on a limited selection of control variables, the gaps in the data are not concerning. However, the gaps become concerning when a large selection of control variables is applied to a model as done in the unrestricted multiple regression model. As control variables are removed due to statistical insignificance, the number of observations in the resulting models should be inspected to ensure an acceptable level is reached once again.

Model Significance

Fortunately, the primary independent variable is statistically significant at the the 1% significance level in the simple linear regression model. However, it is no longer statistically significant at any level in the unrestricted multiple linear regression model. This circumstance may be corrected by removing unnecessary control variables. Most control variables are not statistically significant at any level. Thus, the multiple linear regression model can be restricted to those control variables that are statistically significant.

Table 5: Model Results and Statistical Significance

Dependent Variable: National Imports log(*imp*)				
Type	**Component**	**Variable Description**	**SLR Result**	**MLR Result**
Independent	log(*inc*)	Household Income	0.6648*** (0.1008)	0.2857 (0.2439)
Control	*gov*	Government Spending		1.61e-6*** (4.34e-7)
Control	*fdi*	Foreign Investments		-1.69e-6 (2.70e-6)
Control	*sav*	Household Savings Rate		-0.0144 (0.0183)
Control	*rur*	Rural Share of Population		-0.0069 (0.0121)
Control	*eld*	Elderly Share of Population		0.0358 (0.0306)
Control	*uem*	Unemployment Rate		-0.0934*** (0.0344)
Control	*imr*	Imports Share of GDP		-0.0106* (0.0060)
Control	*ldt*	Median Import Lead Time		0.0154 (0.0765)
Constant	Intercept		3.9636 (0.9063)	9.6528 (2.4548)
Goodness-of-fit	R-squared		0.1983	0.5624
Goodness-of-fit	Adjusted R-squared		0.1937	0.4907
Observations	N		178	65

Significant at *10%, **5%, ***1%

V. EXTENSIONS

Restricted Multiple Linear Regression Models

The restricted multiple linear regression model is built on the relationship between the logarithm transformation of national imports (*imp*) and the logarithm transformation of household income (*inc*) while only controlling for (A) government spending, (B) unemployment, and (C) dependency on imports. These control variables are kept in this model because they are statistically significant in the unrestricted multiple linear regression model.

Model 3: Equation for the Restricted Multiple Linear Regression Model (Round 1)

$$\log(imp) = \beta_0 + \beta_1 \log(inc) + \beta_2 gov + \beta_3 uem + \beta_4 imr + \mathrm{u}$$

The removed control variables are foreign investments, household savings, rural population, elderly population, and import lead time. These control variables were not statistically significant in the unrestricted multiple linear regression model. Confirming that the removal of these control variables is warranted, an F-test ran against these control variables shows that that they are not jointly significant at any acceptable significance level. See Appendix E for the STATA F-test output.

Fortunately, the restricted multiple regression model results in the primary independent variable becoming statistically significant once again at the 1% significance level. The control variable related to government spending remains statistically significant at the 1% significance level while the control variable related to unemployment becomes statistically significant at the 5% significance level. The control variable related to import dependency no longer remains statistically significant at this stage.

The multiple linear regression model can be restricted further by removing any control variable that loses its statistical signficance. Through this pruning process, two more rounds can be conducted until all independent variables are statistically significant at the 1% significance level.

Model 4: Equation for the Restricted Multiple Linear Regression Model (Round 2)

$$\log(imp) = \beta_0 + \beta_1 \log(inc) + \beta_2 gov + \beta_3 uem + \mathrm{u}$$

Model 5: Equation for the Restricted Multiple Linear Regression Model (Round 3)

$$\log(imp) = \beta_0 + \beta_1 \log(inc) + \beta_2 gov + \mathrm{u}$$

After fully pruning the multiple linear regression model as far as possible, the resulting model is built on the relationship between the logarithm transformation of national imports (*imp*) and the logarithm transformation of household income (*inc*) while only controlling for government spending. However, the goodness-of-fit measure for the multiple linear regression model can be slightly improved by reversing the last round of pruning where all independent variables are either statistically significant at the 1% or the 5% significance levels. In either case, the coefficient of the primary independent variable remains relatively the same.

Table 6: Restricted Model Results and Statistical Significance

Dependent Variable: National Imports log(*imp*)							
Type	**Component**	**Variable Description**	**SLR Result**	**MLR1 Result**	**MLR2 Result**	**MLR3 Result**	**MLR4 Result**
Independent	log(*inc*)	Household Income	0.6648*** (0.1008)	0.2857 (0.2439)	0.5832*** (0.1086)	0.5483*** (0.1064)	0.5877*** (0.0865)
Control	*gov*	Government Spending		1.61e-6*** (4.34e-7)	1.90e-6*** (3.63e-7)	2.06e-6*** (3.47e-7)	2.47e-6*** (4.10e-7)
Control	*fdi*	Foreign Investments		-1.69e-6 (2.70e-6)			
Control	*sav*	Household Savings Rate		-0.0144 (0.0183)			
Control	*rur*	Rural Share of Population		-0.0069 (0.0121)			
Control	*eld*	Elderly Share of Population		0.0358 (0.0306)			
Control	*uem*	Unemployment Rate		-0.0934*** (0.0344)	-0.0467** (0.0228)	-0.0471** (0.0229)	
Control	*imr*	Imports Share of GDP		-0.0106* (0.0060)	-0.0079 (0.0055)		
Control	*ldt*	Median Import Lead Time		0.0154 (0.0765)			
Constant	Intercept		3.9636 (0.9063)	9.6528 (2.4548)	5.8427 (1.0290)	5.777 (0.7679)	4.6534 (0.7679)
Goodness-of-fit	R-squared		0.1983	0.5624	0.4886	0.4786	0.3975
Goodness-of-fit	Adjusted R-squared		0.1937	0.4907	0.4688	0.4635	0.3902
Observations	N		178	65	108	108	167

Significant at *10%, **5%, ***1%

VI. CONCLUSION

Purpose Revisited

This paper looks to understand the impact of household income on national imports. Specifically, this paper quantifies the relationship between national imports and household income.

Hypothesis Confirmed

It is expected that national imports increase as household income increases. As this paper shows, there is a positive relationship between national imports and household income. In addition, this relationship is statistically significant at the 1% significance level under four of the five linear regression models developed in this paper.

Model Structures

This paper attempted to built on the relationship between the logarithm transformation of national imports and the logarithm transformation of household income while controlling for (A) government spending, (B) foreign investments, (C) household savings, (D) rural population, (E) elderly population, (F) unemployment, (G) dependency on imports, and (H) import lead time. Several of these control variables are found to be individually and jointly insignificant. Thus, those control variables are removed to improve the multiple linear regression model. After cleaning the multiple linear regression model, government spending and unemployment are the only control variables found to remain statistically significant alongside the primary independent variable (household income).

Final Results

All things considered, the linear regression models give a coefficient ranging from approximately 0.5 to 0.7 for the primary independent variable. Given that these models use log-log transformations, these models suggest that national imports increase by approximately 0.5% to 0.7% for every 1% increase in the average household's income. Likewise, national imports decrease by approximately 0.5% to 0.7% for every 1% decrease in the average household's income.

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APPENDIX

Appendix A: List of Observed Countries

North America (3)

Canada
Mexico
United States

Latin America (20)

Argentina
Belize
Bolivia
Brazil
Chile
Colombia
Costa Rica
Curacao
Ecuador
El Salvador
Guatemala
Guyana
Honduras
Nicaragua
Panama
Paraguay
Peru
Suriname
Uruguay
Venezuela

Caribbean (21)

Antigua and Barbuda
Aruba
Bahamas
Barbados
Bermuda
British Virgin Islands
Cayman Islands
Cuba
Dominica
Dominican Republic
Grenada
Haiti
Jamaica
Puerto Rico
Sint Maarten
St. Kitts and Nevis
St. Lucia
St. Martin
Trinidad and Tobago
Turks and Caicos Islands
Virgin Islands (U.S.)

Asia (22)

Bangladesh
Bhutan
Brunei Darussalam
Cambodia
China
Hong Kong
India
Indonesia
Japan
Macao
Malaysia
Maldives
Mongolia
Myanmar
Nepal
North Korea
Philippines
Singapore
Sri Lanka
South Korea
Thailand
Vietnam

Oceania (20)

American Samoa
Australia
Fiji
French Polynesia
Guam
Kiribati
Marshall Islands
Nauru
New Caledonia
New Zealand
Northern Mariana Islands
Palau
Papua New Guinea
Samoa
Solomon Islands
St. Vincent and the Grenadines
Timor-Leste
Tonga
Tuvalu
Vanuatu

Western Europe (25)

Andorra
Belgium
Channel Islands
Denmark
Faroe Islands
Finland
France
Germany
Gibraltar
Iceland
Ireland
Isle of Man
Italy
Liechtenstein
Luxembourg
Malta
Monaco
Netherlands
Norway
Portugal
San Marino
Spain
Sweden
Switzerland
United Kingdom

Eastern Europe (24)

Albania
Austria
Belarus
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czech Republic
Estonia
Greece
Hungary
Kosovo
Latvia
Lithuania
Moldova
Montenegro
North Macedonia
Poland
Romania
Russia
Serbia
Slovak Republic
Slovenia
Ukraine

Africa (49)

Algeria
Angola
Benin
Botswana
Burkina Faso
Burundi
Cabo Verde
Cameroon
Chad
Comoros
Congo, Dem. Rep.
Congo, Rep.
Cote d'Ivoire
Djibouti
Equatorial Guinea
Eritrea
Eswatini
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius
Mozambique
Namibia
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
Somalia
South Africa
South Sudan
Sudan
Tanzania
Togo
Uganda
Zambia
Zimbabwe

Middle East (29)

Afghanistan
Armenia
Azerbaijan
Bahrain
Egypt
Georgia
Iran
Iraq
Israel
Jordan
Kazakhstan
Kuwait
Kyrgyz Republic
Lebanon
Libya
Morocco
Oman
Pakistan
Qatar
Saudi Arabia
Syria
Tajikistan
Tunisia
Turkey
Turkmenistan
United Arab Emirates
Uzbekistan
West Bank and Gaza
Yemen

Appendix B: Correlation Matrix

	log(*imp*)	log(*inc*)	*gov*	*fdi*	*sav*	*rur*	*eld*	*uem*	*imr*	*ldt*
log(*imp*)	1.000									
log(*inc*)	0.4624	1.000								
gov	0.6070	0.2416	1.000							
fdi	0.2886	-0.0305	0.6441	1.000						
sav	0.0797	0.1636	0.0936	-0.0689	1.000					
rur	-0.3526	-0.7501	-0.1550	0.0405	-0.0475	1.000				
eld	0.3435	0.6315	0.1686	-0.0290	-0.1280	-0.3758	1.000			
uem	-0.3066	-0.1188	-0.1326	-0.0022	-0.3562	-0.0027	0.0678	1.000		
imr	-0.2112	0.2118	-0.3060	-0.3278	0.0062	-0.0984	0.2334	-0.0417	1.000	
ldt	-0.0403	-0.2714	0.0238	0.1288	-0.1510	0.0968	-0.2737	0.0845	-0.3048	1.000

Appendix C: STATA Output of the Simple Linear Regression Model

```
      Source |       SS           df       MS      Number of obs   =       178
-------------+----------------------------------   F(1, 176)       =     43.53
       Model |  160.792661         1  160.792661   Prob > F        =    0.0000
    Residual |   650.16267       176  3.69410608   R-squared       =    0.1983
-------------+----------------------------------   Adj R-squared   =    0.1937
       Total |  810.955331       177  4.58166854   Root MSE        =     1.922

------------------------------------------------------------------------------
      logimp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      loginc |   .6647612   .1007598     6.60   0.000     .4659083    .8636141
       _cons |   3.963626   .9063184     4.37   0.000     2.174975    5.752276
------------------------------------------------------------------------------
```

Appendix D: STATA Output of the Unrestricted Multiple Linear Regression Model

Source	SS	df	MS			
Model	90.0938991	9	10.0104332	Number of obs	=	65
Residual	70.1153032	55	1.2748237	F(9, 55)	=	7.85
Total	160.209202	64	2.50326879	Prob > F	=	0.0000
				R-squared	=	0.5624
				Adj R-squared	=	0.4907
				Root MSE	=	1.1291

logimp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
loginc	.2856548	.2438699	1.17	0.247	-.2030715	.7743811
gov	1.61e-06	4.34e-07	3.71	0.000	7.43e-07	2.48e-06
fdi	-1.69e-06	2.70e-06	-0.62	0.535	-7.11e-06	3.73e-06
sav	-.014369	.0182601	-0.79	0.435	-.050963	.0222249
rur	-.0068797	.0120822	-0.57	0.571	-.0310928	.0173335
eld	.035827	.0305937	1.17	0.247	-.025484	.0971381
uem	-.0933861	.0344047	-2.71	0.009	-.1623347	-.0244374
imr	-.0105801	.0060381	-1.75	0.085	-.0226807	.0015205
ldt	.0154052	.0764524	0.20	0.841	-.1378089	.1686193
_cons	9.652794	2.454778	3.93	0.000	4.733308	14.57228

Appendix E: STATA F-Test Output

```
( 1)  fdi = 0
( 2)  sav = 0
( 3)  rur = 0
( 4)  eld = 0
( 5)  ldt = 0

      F(  5,    55) =    0.67
           Prob > F =    0.6480
```

Appendix F: STATA Outputs of the Restricted Multiple Linear Regression Models

Round 1

Source	SS	df	MS		
				Number of obs =	108
				F(4, 103) =	24.61
Model	167.654771	4	41.9136927	Prob > F =	0.0000
Residual	175.453872	103	1.70343565	R-squared =	0.4886
				Adj R-squared =	0.4688
Total	343.108643	107	3.20662283	Root MSE =	1.3052

logimp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
loginc	.583171	.1086319	5.37	0.000	.3677252	.7986168
gov	1.90e-06	3.63e-07	5.22	0.000	1.18e-06	2.62e-06
uem	-.0466682	.0228271	-2.04	0.043	-.0919403	-.0013961
imr	-.0078815	.0055314	-1.42	0.157	-.0188517	.0030887
_cons	5.842735	1.028969	5.68	0.000	3.802018	7.883452

Round 2

Source	SS	df	MS		
				Number of obs =	108
				F(3, 104) =	31.82
Model	164.196334	3	54.7321112	Prob > F =	0.0000
Residual	178.912309	104	1.72031067	R-squared =	0.4786
				Adj R-squared =	0.4635
Total	343.108643	107	3.20662283	Root MSE =	1.3116

logimp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
loginc	.5483011	.1063625	5.16	0.000	.3373804	.7592219
gov	2.06e-06	3.47e-07	5.95	0.000	1.37e-06	2.75e-06
uem	-.047059	.0229382	-2.05	0.043	-.0925463	-.0015717
_cons	5.777265	1.033022	5.59	0.000	3.728744	7.825785

Round 3

Source	SS	df	MS		
				Number of obs =	167
				F(2, 164) =	54.10
Model	272.147816	2	136.073908	Prob > F =	0.0000
Residual	412.484402	164	2.51514879	R-squared =	0.3975
				Adj R-squared =	0.3902
Total	684.632218	166	4.12429047	Root MSE =	1.5859

logimp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
loginc	.58772	.0864702	6.80	0.000	.4169815	.7584585
gov	2.47e-06	4.10e-07	6.02	0.000	1.66e-06	3.28e-06
_cons	4.653435	.767911	6.06	0.000	3.137169	6.169702