Economic Vulnerability and Resilience to External Shocks: A Cross Country Study

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Abstract

In today's integrated world, countries are vulnerable not only to internal imbalances, but also to external shocks, which are much beyond the control of any host government. The Asian financial crises, the sub-prime crises, and the EU crises all showed the effect of the contagion and that the loss due to this risk was not only large, but also, the frequency of the shocks have increased. It is important for countries to measure their vulnerabilities to external shocks and assess and put in place important policy decisions that would increase the resilience to these shocks in order to prevent these shocks ending up in full-blown crises. The paper builds on the vulnerability and resilience indices developed so far by proposing modifications to the existing ones based on economic and social indicators. The paper also adds to the existing research by extending the scope of the study to arrive at the vulnerability and resilience scores at a global level.

Keywords: **economic resilience, economic vulnerability, economic openness, export concentration, human development, social development**

JEL Classification: O11, O12, O15, O57

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Globalization and liberalization of economies has been happening at a fast pace in the last couple of decades. Various countries are now debating on opening up of their core strategic and other sectors, which were not open earlier to foreign investments. At the same time, countries are viewing foreign investments as necessary for faster economic growth and development. Countries are also now more open to trade and there is a growing competition among countries to increase their share of the global trade. However, with growing openness towards international trade and capital flows comes the risk of exposure to external shocks. As the world is more integrated now, any negative news in any part of the globe would be transmitted to rest of the world.

The Asian Financial Crises (1997-98) was an example of how the contagion spread through the South Asian countries. The 2008 credit crisis, which primarily originated in U.S., had its fallouts in many countries across the globe. Ever since the end of the Asian financial crises, research is concentrating on whether one can predict the external shocks and whether an early-warning system can be put in place, in order to avoid the financial crises. Studies are also being done to find out whether the preexisting economic fundamentals can be used to predict the vulnerability of the countries and various pre- crises vulnerability measures are being proposed and are being developed upon. Based on the growing need expressed by the UN General Assembly to identify countries and

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classify them as least developed, an Economic Vulnerability index (EVI) was defined and constructed by the United Nations Committee for Development Policy.

Briguglio, Cordina, Farrugia, and Vella (2009) defined vulnerability as exposure to external shocks arising out of intrinsic features of the economy. These are inherent and permanent and not subject to policy or governance. On the other hand, resilience is a coping ability which enables a country to withstand and bounce back from adverse shocks. Resilience can be nurtured, subject to policy or governance. So, while the governments may not be able to do much on vulnerability, they can work on developing resilience by strategizing and formulating policies to face vulnerability.

Research into vulnerability and resilience has focused on small countries, which paradoxically had high GDP per capita despite a high exposure to economic shocks. These countries were open and depended upon foreign trade and investment to grow. However, as a result of their economic openness, they became vulnerable to external shocks. These countries had to develop resilience at the same time in order to absorb the external shocks. This could be developed only if the respective governments put in place policies to develop robustness and resilience.

This paper works on the existing literature on vulnerability and resilience indices and attempts to build one taking into consideration the economic and social indicators by assigning weights based on relative importance of these issues. The paper studies the economic vulnerability and resilience at a global level by taking into consideration as many countries as possible, subject to availability of data. The underlying assumption is that all countries, whether large or small, are susceptible to external shocks as the recent past has shown, and all the countries have to develop resilience in order to absorb external shocks.

Literature Review

Research into the measurement of economic vulnerability and resilience started picking up pace in the last decade with researchers trying to arrive at the best method of measuring vulnerability and resilience. While many of the research studies used a simple aggregation method of combining various indicators (economic and social) to measure vulnerability and resilience, some others assigned scores to each economy based on fuzzy logic. While some researchers used indices to measure the vulnerability of least developed countries and island nations, there are few researchers who have used the indices to measure vulnerability of a group of countries in a regional block like European Union.

OECD (2006) mentioned public debt measure (gross treasury debt/ GNP ; net public sector debt / GNP ; treasury debt servicing/ GNP ; treasury debt servicing/government revenue), external debt measure (private sector external debt/ GNP ; public sector external debt/ GNP ; total external debt/ GNP ; short term external debt/GNP ; external debt / exports of goods and services ; external debt/forex reserves), and macroeconomic indicators (central bank reserve/GDP) as key indicators for measuring economic vulnerability. To improve the resilience, the survey called on the countries to strengthen fiscal policy and bring in transparency and credibility to fiscal institutions. The report called for effective implementation of policies that have an impact on inflation. The paper also called for bank regulation and prudential supervision.

Around the same time, Chan and Wong (2007) proposed a data mining framework for measuring resilience. The focus of this paper was not to predict financial crises, but to assess the health of the economy. The framework was built on a two-stage feedback system. In the first stage, resilience scores were assigned to each economy based on fuzzy logic built around ambiguous reasoning of experts. In the second stage, the classification tree approach was used to estimate thresholds for each economic indicator, and examined the quality of the fuzzy score. The results from the second stage were then passed back to the first stage as feedback till the feedback system reached its equilibrium state.

Briguglio et al. (2009) attempted to conceptualize and develop a framework for measuring economic resilience. The paper conceptualized the risk associated with external shocks as depending on the vulnerability

and resilience. The paper explained that vulnerability is inherent in the economy and was measured in terms of economic openness, export concentration, and dependence on strategic imports. On the other hand, the paper explained resilience as the coping ability of the economy which had to be nurtured by policy and governance. Resilience was measured by the scores determined by degree of good governance, macro-economic management, social cohesion, and sound environmental management. The paper also classified countries into four scenarios: worst case, self made, prodigal, and best case based on the scores of the vulnerability and resilience index.

Guillaumont (2010) tried to assess the structural economic vulnerability of least developed countries (LDC) and small island developing states (SIDS) using the Economic Vulnerability Index (EVI) set up by United Nations Committee for Development Policy (CDP). The paper saw economic vulnerability as the function of size and frequency of exogenous shocks, exposure to these shocks, and resilience as the capacity to deal with these shocks.

Kondor and Staehr (2011) tried to measure the output performance of 27 EU members using regression analysis. To measure vulnerability and resilience, GDP growth was the dependent variable while credit to the private sector, loans to deposits ratio, gross external liabilities and current account balance, net international investment position, dependence on exports, the government debt and balance, size and income levels, and real effective exchange rate were the independent variables. Corina-Maria (2011) while analyzing Romanian vulnerability used changes in GDP, unemployment, investments, lending, fiscal policy measures, and government finances as measures of vulnerability.

Objective of the Study

The objective of this paper is to arrive at a meaningful method of measurement of economic vulnerability and economic resilience. This paper, though primarily based on the model propounded by Briguglio et al. (2009), attempts to use some more indicators to measure economic vulnerability and resilience. The paper also attempts to construct the scale not only on the small island nations and least developed economies, but on all the countries of the world subject to availability of data. Developing the indices would help to assess countries' vulnerability and resilience. The governments of countries which are highly vulnerable but low on resilience need to take important policy decisions. This research would help make important policy decisions not only at the country level, but also at the global level to identify and classify countries.

Methodology

Economic Vulnerability

In the current world, where the countries are open to trading with each other, these countries are exposed to exogenous shocks, which are beyond their control, which make these countries vulnerable. Cordina and Farrugia (2005) attempted to study vulnerability and focused mainly on three variables - economic openness, export concentration, and dependence on strategic imports. This paper tries to take the capital flows - FDI and FDI stock flows which are now playing a major role in exposing a country to external shocks.

(1) Economic Openness : Economic openness is measured by the total international trade to GDP. More the international trade of a country, more is the vulnerability to exogenous shocks. Merchandise trade and trade in services as a percentage of nominal gross domestic product (GDP) (which is published by UNCTAD) is taken for calculating economic openness (UNCTADSTAT, n.d.).

(2) Export Concentration : Concentration of exports on few products and services would expose a country to a far

greater risk and increase its vulnerability. To capture the export concentration, the UNCTAD data on concentration and diversification indices of merchandise exports by a country were taken.

(3) Import Concentration : If the imports of a country are much more dependent on strategic and essential products like energy, fuel, and industrial supplies, then it is more vulnerable to external shocks. To capture this data, the UNCTAD data on concentration and diversification indices of merchandise imports are taken.

(4) Inward FDI Flow : Over the years, many researchers, including Cordina and Farrugia (2005), suggested to include capital flows as the foreign capital flows would increase the vulnerability of the economies to external shocks. Greater inward FDI flows mean a growing confidence on the part of the foreign investors for long term investments. However, on the other hand, greater inward FDI inflows would increase the exposure of the countries to the external world. Inward FDI flow data from the World Bank was taken.

(5) Inward FDI Stock Flow : Portfolio stock flows from outside the country would mean growing investor sentiments in the economy of the host country. However, the direction and the pace of the portfolio flow are volatile and more so during any external shock. The pace of the withdrawal could be fast, leaving the countries reeling with severe problems. Again, the World Bank data was taken for inward FDI stock flow.

Economic Resilience

Economic Resilience measures the degree to which a country is able to tackle the effects of the exogenous shocks. Briguglio et al. (2009) explained economic resilience as the ability to avoid, withstand, and neutralize shocks. Micro and macro economic strength, market efficiency, governance, and social development are the variables that were used to develop the resilience index.

(1) Macro Economic Strength : A country with a strong macroeconomic condition is better placed to face any external shocks. A country with manageable government debt, manageable external debt of both the government and the private sector, large foreign exchange reserves, and reasonable fiscal deficit is better placed than a country whose debts and deficits are massive and non sustainable. The other macroeconomic indicators are the inflation levels and unemployment levels. The combination of both these figures - unemployment and inflation is commonly known as the Misery Index. The paper took all these macroeconomic figures from UNCTAD statistical data.

(2) Micro Economic Market Efficiency and Good Governance : Markets are set to be efficient if the markets adjust themselves quickly to equilibrium, and such markets can determine the efficient allocation of resources. At the same time, good governance is also important to ensure resilience. Without good governance and rule of law, there exists a possibility of chaos resulting in poor economic conditions. The economic freedom of the World Index (EFW Index) published by Fraser Institute is widely used as a measure of micro economic market stability and governance. The data was taken from Economic Freedom of the World Annual Report (2013) prepared by Gwartney, Lawson, and Hall (2013).

The EFW Index is designed to measure the degree to which the countries have put in place institutions and policies that would encourage economic freedom of the individuals. The EFW Index measures freedom in five major areas - size of governments, legal system and security of property rights, sound money, freedom of trade internationally, and regulations.

The 'size of the governments' shows the degree of economic freedom in the country. The greater the size of the government, the greater would be the government's involvement and less would be the economic freedom. The size of the government is measured in terms of four components - government consumption compared to private

consumption, government subsidies and transfers, the relative size of government enterprises and investments with respect to private investments, and the top marginal tax rate.

Efficient and effective legal system and protection of property rights is core to economic freedom and civil liberty. The greater the judicial independence, impartial courts and protection of property rights, the greater would be the economic freedom. Economic freedom is not possible without sound money. There are four components to measure sound money. The first three components - money growth, standard deviation of inflation, and inflation of the most recent year are used to measure the consistency of the monetary policy and long run stability. The fourth component - freedom to hold foreign currency accounts measures the ease with which other currencies can be used through domestic and foreign bank accounts.

Freedom to trade internationally is a key ingredient in economic freedom. The economic freedom would be measured by the degree of tariffs, the regulatory trade barriers, the black market exchange rates, and the controls that are put in place on movements of capital and people. The higher the tariffs, trade barriers, the black market, and more the control on movement of people and goods, the lesser would be the economic freedom. When regulations restrict entry into markets and also interfere in the freedom to engage voluntarily, then they restrict freedom. Regulation of three markets is considered in framing the economic freedom of the world index. The three markets are the credit markets, the labor markets, and business regulations.

(3) Social Developments : Any economy with good social development would develop resilience to economic shocks. Social development puts people in the center of the development and ensures that the development benefits people, especially the poorest of the poor. This paper takes the health and education indicators of the UNDP Human Development Index (HDI) as a proxy for measuring social development. The data were taken from the UNDP Human Development Report (2013). Health is measured by the life expectancy index, which is based on the expectancy of life at birth. Access to knowledge is measured in terms of education index that takes into account the mean years of schooling and expected years of schooling.

The data considered pertains to the year 2013. Data for the research was taken from UNCTAD and World Bank databases. Starting with a population size of 214 countries and eliminating the countries whose data could not be accessed on all the measures, the size of the sample came down to115.

Analysis and Results

Observations on each of the component mentioned under the economic vulnerability and economic resilience is taken and standardized using the well-known transformation given in equation (1) :

$$XSij = (Xij - Minj) / (Maxj - Minj) \quad \text{.....} (1)$$

where,
XSij is the value of the standardized observation *i* of variable *j* ;
Xij is the actual value of the same observation;
Minj and *Maxj* are the minimum and maximum values of variable *j*.

This transforms the values of observations in a particular variable array to take a value which ranges from 0 to 1. Then, by assigning weights based on the relative importance of each of the components, the vulnerability and the resilience index were created. While building the vulnerability index, all the five constituents (inward FDI stock, inward FDI, import concentration, export concentration, and trade openness) were given equal weights. The correlation among the vulnerability constituents is depicted in the Table 1. Except for high correlation between inward FDI stock and inward FDI, the remaining constituents show varying correlations. While building the resilience index, all the three constituents (macroeconomic strength, micro economic market efficiency with

Table 1. Vulnerability Correlation Matrix

Inward FDI Stock	1.00000				
Inward FDI	0.87779	1.00000			
Import Concentration	0.05114	0.08017	1.00000		
Export Concentration	-0.09081	-0.05839	0.66974	1.00000	
Trade Openness: Goods And Services	0.64935	0.66979	0.23200	-0.08702	1.00000

Table 2. Resilience Correlation Matrix

Microeconomic market efficiency and governance	1.00000		
Social Development	0.60874	1.00000	
Macroeconomic environment	0.13064	0.18488	1.00000

good governance, and social development) were given equal weights.

The correlation among the resilience constituents is depicted in the Table 2. The Table shows a reasonable correlation between social development and microeconomic market efficiency. The individual scores of each of the 115 countries and the resulted resilience indexes are given in the Table 3*. Countries like New Zealand, Hong Kong, Singapore, and Switzerland top the resilience table due to higher all round scores, while African countries are at the bottom of the table due to poor standings in each of the index constituents. The individual scores of each of the 115 countries and the resulting vulnerability index are depicted in the Table 4*. It is interesting to note that some of the countries like Hong Kong and Singapore, which score high in resilience also score high on vulnerability with other counties like Luxembourg, Malta, and Ireland due to greater openness. The relative performance of each of the 115 countries w.r.t both the resilience index and the vulnerability index are depicted in the Table 5*.

To get the relationship between per-capita GDP and resilience, regression was conducted and the results are shown in the Figure 1 which shows that more the per capita GDP, the more is the resilience. Per- capita GDP of any country, to a large extent, explains the vulnerability and resilience of the economy. A scatter plot was drawn between the resilience index and the vulnerability index. The results of the same are depicted in the Figure 2.

The well being of a country depends on the degree to which a country is vulnerable and the degree to which it has built its resilience. A look at Figure 2 shows that majority of the countries fall in the quarter which has high resilience and low vulnerability. The countries have put in place policies that make them resilient to external shocks. On the other hand, there are countries which are in the quadrant that has low resilience and low vulnerabilities. These are majorly African countries and include Ghana, Morocco, Namibia, Sierra Leone, Syria, Uganda, Zambia, and South Africa. These countries, though lucky that they are low on vulnerability to external shocks, have to work on developing resilience. This research paper has not come across any country in the most dangerous quadrant which has low resilience and high vulnerability.

Perhaps, the most interesting quadrant is the one which has high vulnerability and high resilience. The most prominent among these countries are Singapore, Hong Kong, and Luxemburg. These countries, though highly vulnerable, are paradoxically highly resilient. Also, these economies ranking high in the GDP per capita also implies two things. Highly vulnerable countries can also develop high resilience and secondly, these countries, even though are highly vulnerable, are also high on GDP per capita, which implies that high vulnerabilities need not mean low GDP per capita. This perhaps is explained in the regression equation results given in Table 6, which

Note : * Tables 3, 4,5 are included in the Appendix to maintain continuity and readability of the paper.

Figure 1. Per Capita GDP and Economic Resilience

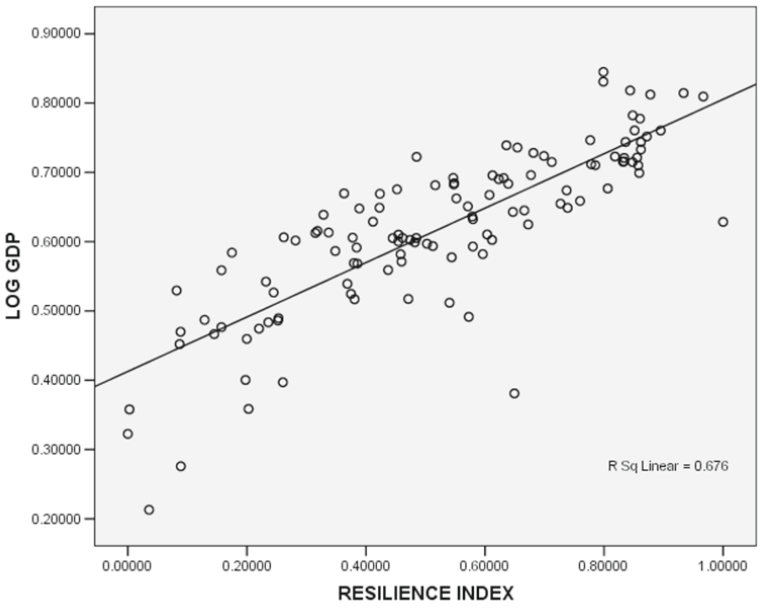
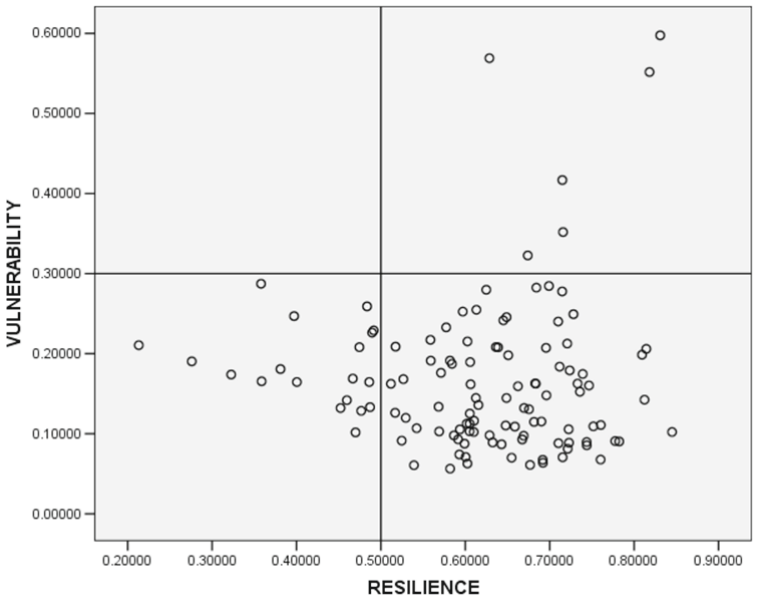


Figure 2. Economic Resilience and Vulnerability



statistically tests the developed indices. Per capita GDP (standardized) is regressed using OLS (Ordinary Least Square) on vulnerability and resilience indices.

Hence, the research paper is one more attempt to create a suitable index by adding indicators like capital flows, which have become very important in this integrated world for measuring vulnerability and resilience of countries, which would help countries to assess their economic health better and set in place programs that would help them to develop resilience and avoid potential crises.

Table 6. Regression Results

Variable	Coefficient
Dependent	GDP
Constant	-0.574 (-7.943)***
Vulnerability	0.234 (1.708)*
Resilience	1.712 (15.522)***
R^2	0.68
N	115

Policy Implications

As more and more countries are outward looking, embracing liberalization and globalization in order to grow, it is but inevitable that this openness would only make them vulnerable to economic shocks. Therefore, vulnerability in a liberalized world is not a choice for countries nowadays, barring very few countries who decide to close doors to the rest of the world. Therefore, it is important to note that when openness to trade and services are becoming inevitable and concentration of imports and exports depend more on the available resources and skills in that particular country, individual countries should put in place policy measures that would develop resilience in order to cope well from shocks.

Limitations of the Study and Scope for Further Research

The paper is based on historical data which perhaps can be used to assess the vulnerability and resilience of countries. But the scope remains for using forecasted data, provided that the forecasts would come true. In a dynamically changing environment, use of forecasted data might be a better predictor of vulnerability and resilience.

References

Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. (2009). Economic vulnerability and resilience: Concepts and measurements. *Oxford Development Studies, 37* (3), 229 - 247. DOI:10.1080/13600810903089893

Chan, N. H., & Wong, H. Y. (2007). Data mining of Resilience indicators. *IIE Transactions, 39* (6), 617 - 627. DOI: 10.1080/07408170600899565

Cordina, G., & Farrugia, N. (2005). *Measuring vulnerability: A methodological review and a refinement based on partner country and price volatility issues* (Occasional Paper No: 3/2009). Malta : Island of Small States Institute.

Corina-Maria, E.N.E. (2011). Romanian vulnerabilities in the current financial and economic crises context. *Journal of Knowledge Management, Economics and Information Technology, 4* (1), 82 - 91. Retrieved from http://www.scientificpapers.org/wp-content/files/1146_Ene_Maria_Corina_-_Romanian_Vulnerabilities_in_the_Current_Financial_and_Economic.pdf

Guillaumont, P. (2010). Assessing the economic vulnerability of small island developing states and the least developed countries. *Journal of Development Studies, 46* (5), 828 - 854.

Gwartney, J., Lawson, R., & Hall, J. (2013). *Economic freedom of the world.* Fraser Institute. Retrieved from http://www.freetheworld.com/2013/EFW2013-complete.pdf

Kondor, K., & Staehr, K. (2011). *The impact of the global financial crisis on output performance across the European Union: vulnerability and resilience* (Working Paper Series 3/2011). Estonia : Eesti Pank, Bank of Estonia.

OECD. (2006). Managing macroeconomic risks and improving resilience to shocks. In OECD, *OECD Economic Surveys: Turkey 2006.* Paris : OECD Publishing. DOI: http://dx.doi.org/10.1787/eco_surveys-tur-2006-4-en

The World Bank (n.d.). *Indicators.* Retrieved from http://data.worldbank.org/

UNCTADSTAT. (n.d). *Statistics.* Retrieved from http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sRF_ActivePath=p,15912&sRF_Expanded=,p,15912

United Nations Development Programme. (2013). *2013 human development report.* Retrieved from http://hdr.undp.org/en/2013-report

Table 3. Resilience Index: Country Ranking

Country	Microeconomic Market Efficiency and Governance	Social Development	Macro Economic Environment	Resilience Index	Rank
New Zealand	0.8876	0.9861	0.6612	**0.8449**	1
Hong Kong	1.0000	0.8130	0.6796	**0.8309**	2
Singapore	0.9598	0.7701	0.7246	**0.8182**	3
Switzerland	0.8655	0.8546	0.7231	**0.8144**	4
Australia	0.8112	1.0000	0.6256	**0.8123**	5
Norway	0.7329	0.9486	0.7466	**0.8094**	6
Japan	0.7430	0.8926	0.7113	**0.7823**	7
Canada	0.8133	0.8891	0.6303	**0.7775**	8
Finland	0.7932	0.8660	0.6225	**0.7605**	9
Denmark	0.7651	0.8460	0.6698	**0.7603**	10
Sweden	0.7269	0.8869	0.6414	**0.7517**	11
Israel	0.6667	0.8940	0.6789	**0.7465**	12
Germany	0.7209	0.8924	0.6183	**0.7439**	13
United States	0.7570	0.8952	0.5790	**0.7437**	14
Chile	0.7771	0.7830	0.6572	**0.7391**	15
Estonia	0.7691	0.8186	0.6197	**0.7358**	16
Netherlands	0.6968	0.8872	0.6149	**0.7330**	17
Saudi Arabia	0.6265	0.6407	0.9172	**0.7281**	18
Bahrain	0.7992	0.7390	0.6329	**0.7237**	19
United Kingdom	0.7691	0.8131	0.5864	**0.7229**	20
Peru	0.7289	0.7087	0.7296	**0.7224**	21
Austria	0.7309	0.8113	0.6217	**0.7213**	22
UAE	0.7851	0.6881	0.6891	**0.7208**	23
Iceland	0.6245	0.9111	0.6118	**0.7158**	24
France	0.6867	0.8678	0.5913	**0.7153**	25
Malta	0.7209	0.7983	0.6256	**0.7149**	26
Belgium	0.6867	0.8534	0.6042	**0.7148**	27
Cyprus	0.7390	0.7831	0.6131	**0.7117**	28
Spain	0.6968	0.8657	0.5686	**0.7104**	29
Kuwait	0.7329	0.6009	0.7963	**0.7100**	30
Ireland	0.7691	0.9227	0.4055	**0.6991**	31
Slovak Republic	0.6968	0.8033	0.5881	**0.6961**	32
Lithuania	0.7209	0.7720	0.5941	**0.6957**	33
Romania	0.6928	0.7541	0.6290	**0.6920**	34
Poland	0.6747	0.7745	0.6260	**0.6918**	35
Uruguay	0.6606	0.7403	0.6697	**0.6902**	36
Panama	0.6988	0.7199	0.6339	**0.6842**	37
Hungary	0.6245	0.8002	0.6259	**0.6835**	38
Mauritius	0.7932	0.5983	0.6568	**0.6828**	39

Bulgaria	0.6747	0.7177	0.6519	**0.6814**	40
Italy	0.5683	0.8452	0.6168	**0.6767**	41
Jordan	0.7369	0.6600	0.6295	**0.6755**	42
Bahamas	0.6908	0.7082	0.6230	**0.6740**	43
Georgia	0.6867	0.7330	0.5892	**0.6697**	44
Albania	0.6727	0.7072	0.6275	**0.6691**	45
Latvia	0.6365	0.7573	0.6085	**0.6674**	46
Costa Rica	0.6787	0.6787	0.6298	**0.6624**	47
Greece	0.5643	0.8555	0.5564	**0.6587**	48
Portugal	0.6406	0.7477	0.5764	**0.6549**	49
Malaysia	0.6004	0.6899	0.6623	**0.6509**	50
Fiji	0.6285	0.6836	0.6346	**0.6489**	51
Slovenia	0.5321	0.8027	0.6115	**0.6488**	52
Armenia	0.6908	0.7073	0.5455	**0.6479**	53
Barbados	0.5944	0.7349	0.6059	**0.6451**	54
Croatia	0.5562	0.7222	0.6503	**0.6429**	55
Philippines	0.6285	0.6184	0.6696	**0.6388**	56
Kazakhstan	0.5703	0.6612	0.6771	**0.6362**	57
Mexico	0.5482	0.7044	0.6445	**0.6324**	58
El Salvador	0.6466	0.5962	0.6435	**0.6288**	59
Luxembourg	0.7149	0.7782	0.3926	**0.6286**	60
Trinidad and Tobago	0.5863	0.6080	0.6800	**0.6248**	61
Honduras	0.6546	0.5454	0.6464	**0.6155**	62
Mongolia	0.5964	0.5950	0.6480	**0.6131**	63
Bolivia	0.4839	0.6158	0.7380	**0.6126**	64
Russia	0.5040	0.6223	0.7048	**0.6104**	65
China	0.4799	0.5903	0.7598	**0.6100**	66
Nicaragua	0.6586	0.5109	0.6493	**0.6063**	67
Paraguay	0.5502	0.6009	0.6663	**0.6058**	68
Thailand	0.5542	0.5563	0.7054	**0.6053**	69
Serbia	0.4940	0.7078	0.6139	**0.6052**	70
Tunisia	0.5703	0.6219	0.6231	**0.6051**	71
Jamaica	0.5763	0.6499	0.5815	**0.6026**	72
Brazil	0.4799	0.6215	0.7060	**0.6025**	73
Moldova	0.5502	0.6224	0.6324	**0.6017**	74
Azerbaijan	0.4237	0.6802	0.6870	**0.5970**	75
Colombia	0.5100	0.6267	0.6441	**0.5936**	76
Argentina	0.3675	0.7560	0.6554	**0.5929**	77
Indonesia	0.5843	0.5269	0.6632	**0.5915**	78
Sri Lanka	0.5040	0.6356	0.6199	**0.5865**	79
Kyrgyzstan	0.5201	0.6176	0.6149	**0.5842**	80
Turkey	0.5904	0.5498	0.6060	**0.5820**	81
Iran	0.4538	0.6168	0.6750	**0.5819**	82

Botswana	0.6064	0.4540	0.6716	**0.5773**	83
Algeria	0.2711	0.6038	0.8387	**0.5712**	84
Guatemala	0.6446	0.4102	0.6523	**0.5690**	85
Ukraine	0.3855	0.7162	0.6032	**0.5683**	86
Ecuador	0.3655	0.6520	0.6599	**0.5591**	87
Cambodia	0.6305	0.3861	0.6595	**0.5587**	88
Vietnam	0.5100	0.5023	0.6145	**0.5423**	89
Egypt	0.5020	0.5175	0.5980	**0.5392**	90
Uganda	0.6546	0.2774	0.6564	**0.5295**	91
Ghana	0.5984	0.3718	0.6097	**0.5266**	92
Morocco	0.4900	0.4271	0.6568	**0.5246**	93
Namibia	0.5201	0.4773	0.5547	**0.5173**	94
Syria	0.4197	0.4747	0.6562	**0.5168**	95
South Africa	0.5502	0.4084	0.5770	**0.5119**	96
Gabon	0.3755	0.4887	0.6103	**0.4915**	97
Papua New Guinea	0.5964	0.2126	0.6596	**0.4895**	98
Bangladesh	0.4699	0.3525	0.6390	**0.4871**	99
India	0.4558	0.3607	0.6420	**0.4862**	100
Zambia	0.6546	0.1946	0.6015	**0.4836**	101
Kenya	0.5763	0.3503	0.5033	**0.4766**	102
Cameroon	0.4639	0.2794	0.6802	**0.4745**	103
Nepal	0.4578	0.2984	0.6535	**0.4699**	104
Benin	0.4357	0.2775	0.6867	**0.4666**	105
Pakistan	0.4538	0.3234	0.6017	**0.4596**	106
Togo	0.3133	0.3723	0.6708	**0.4521**	107
Lesotho	0.3594	0.2152	0.6265	**0.4004**	118
Nigeria	0.4137	0.1970	0.5806	**0.3971**	109
Venezuela	0.0000	0.6030	0.5400	**0.3810**	110
Senegal	0.3916	0.1924	0.4919	**0.3586**	111
Sierra Leone	0.3996	0.0871	0.5872	**0.3579**	112
Ethiopia	0.3353	0.0819	0.5505	**0.3226**	113
Burkina Faso	0.4076	0.0041	0.4160	**0.2759**	114
Mozambique	0.2871	0.0000	0.3520	**0.2131**	115

Table 4. Vulnerability Index: Country Ranking

Country	Inward FDI Stock	Inward FDI	Import Concentration	Trade Openness: Goods and Services	Export Concentration	Vulnerability Index	Rank
Hong Kong	0.7724	0.5856	0.4521	1.0000	0.1775	**0.5975**	1
Luxembourg	1.0000	1.0000	0.1644	0.5836	0.0971	**0.5690**	2
Singapore	0.4534	0.5592	0.5922	0.8909	0.2629	**0.5517**	3
Malta	0.2008	0.1994	0.8274	0.3587	0.4980	**0.4169**	4
Iceland	0.6250	0.1078	0.3405	0.1901	0.4959	**0.3519**	5
Bahamas	0.1958	0.2393	0.4758	0.1619	0.5405	**0.3227**	6
Sierra Leone	0.0002	0.0692	1.0000	0.0964	0.2709	**0.2873**	7
Ireland	0.2763	0.3707	0.1400	0.3816	0.2541	**0.2845**	8
Panama	0.0297	0.1027	0.8670	0.2908	0.1222	**0.2825**	9
Trinidad and Tobago	0.0649	0.0894	0.7350	0.1684	0.3413	**0.2798**	10
Belgium	0.4204	0.4574	0.1379	0.3174	0.0554	**0.2777**	11
Zambia	0.0041	0.0752	0.2796	0.1430	0.7935	**0.2591**	12
Mongolia	0.0080	0.0999	0.4032	0.2262	0.5368	**0.2548**	13
Azerbaijan	0.0041	0.0715	0.0607	0.1264	1.0000	**0.2526**	14
Saudi Arabia	0.0310	0.1210	0.0947	0.1855	0.8141	**0.2493**	15
Nigeria	0.0019	0.0704	0.1607	0.1301	0.8716	**0.2469**	16
Fiji	0.0131	0.0800	0.6950	0.2429	0.1971	**0.2456**	17
Barbados	0.0312	0.1228	0.7300	0.2057	0.1181	**0.2416**	18
Kuwait	0.0205	0.0744	0.1309	0.1578	0.8172	**0.2401**	19
Botswana	0.0016	0.0827	0.2948	0.1185	0.6668	**0.2329**	20
Gabon	0.0059	0.0865	0.1062	0.1183	0.8282	**0.2290**	21
Papua New Guinea	0.0027	0.0686	0.4239	0.2470	0.3890	**0.2262**	22
Cambodia	0.0021	0.0712	0.4115	0.2590	0.3424	**0.2172**	23
Jamaica	0.0198	0.0727	0.3939	0.1318	0.4584	**0.2153**	24
UAE	0.0517	0.1060	0.1794	0.2893	0.4367	**0.2126**	25
Mozambique	0.0011	0.0706	0.2790	0.1385	0.5639	**0.2106**	26
Namibia	0.0116	0.0844	0.5806	0.1623	0.2050	**0.2088**	27
Kazakhstan	0.0255	0.1029	0.0832	0.1219	0.7077	**0.2082**	28
Cameroon	0.0010	0.0693	0.5119	0.0673	0.3912	**0.2081**	29
Philippines	0.0014	0.0691	0.5210	0.1107	0.3373	**0.2079**	30
Lithuania	0.0204	0.0800	0.4945	0.2743	0.1671	**0.2073**	31
Switzerland	0.3631	0.2042	0.0930	0.2274	0.1421	**0.2060**	32
Norway	0.1760	0.2525	0.0382	0.1131	0.4134	**0.1986**	33
Malaysia	0.0178	0.0849	0.3794	0.3696	0.1384	**0.1980**	34
Iran	0.0019	0.0709	0.0187	0.0730	0.7920	**0.1913**	35
Ecuador	0.0040	0.0690	0.2150	0.1171	0.5513	**0.1913**	36
Burkina Faso	0.0001	0.0685	0.2659	0.0643	0.5531	**0.1904**	37
Paraguay	0.0024	0.0702	0.2372	0.2220	0.4159	**0.1895**	38
Kyrgyzstan	0.0009	0.0726	0.4613	0.2762	0.1253	**0.1873**	39
Cyprus	0.1079	0.1169	0.3568	0.1588	0.1784	**0.1838**	40

Venezuela	0.0069	0.0705	0.0328	0.0170	0.7766	**0.1808**	41
Bahrain	0.0600	0.0747	0.1040	0.2686	0.3881	**0.1791**	42
Algeria	0.0027	0.0717	0.1140	0.1135	0.5786	**0.1761**	43
Chile	0.0451	0.1145	0.1699	0.1204	0.4231	**0.1746**	44
Ethiopia	0.0002	0.0686	0.3624	0.0747	0.3636	**0.1739**	45
Benin	0.0005	0.0694	0.4249	0.0894	0.2605	**0.1689**	46
Ghana	0.0018	0.0737	0.1132	0.1173	0.5350	**0.1682**	47
Senegal	0.0006	0.0695	0.3869	0.1001	0.2703	**0.1655**	48
India	0.0008	0.0694	0.5597	0.0550	0.1381	**0.1646**	49
Lesotho	0.0026	0.0697	0.0795	0.3293	0.3417	**0.1646**	50
Mauritius	0.0088	0.0854	0.2601	0.2185	0.2417	**0.1629**	51
Netherlands	0.1784	0.0407	0.2209	0.2932	0.0798	**0.1626**	52
Hungary	0.0454	0.0801	0.2336	0.3426	0.1106	**0.1625**	53
South Africa	0.0152	0.0697	0.5293	0.0769	0.1208	**0.1624**	54
Nicaragua	0.0040	0.0729	0.2475	0.2831	0.2014	**0.1618**	55
Israel	0.0405	0.1065	0.2776	0.1175	0.2592	**0.1603**	56
Costa Rica	0.0151	0.0845	0.1893	0.1357	0.3720	**0.1593**	57
Estonia	0.0612	0.1273	0.1677	0.3358	0.0701	**0.1524**	58
Slovak Republic	0.0460	0.0733	0.1509	0.3342	0.1353	**0.1479**	59
Bolivia	0.0034	0.0717	0.0800	0.1037	0.4644	**0.1447**	60
Slovenia	0.0354	0.0775	0.2078	0.2559	0.1466	**0.1446**	61
Australia	0.1116	0.1504	0.1519	0.0410	0.2575	**0.1425**	62
Pakistan	0.0005	0.0690	0.4201	0.0388	0.1812	**0.1419**	63
Honduras	0.0044	0.0738	0.1910	0.2041	0.2059	**0.1359**	64
Ukraine	0.0063	0.0757	0.2984	0.1927	0.0955	**0.1337**	65
Bangladesh	0.0002	0.0687	0.1402	0.0681	0.3888	**0.1332**	66
Georgia	0.0093	0.0780	0.2186	0.1546	0.2002	**0.1322**	67
Togo	0.0004	0.0691	0.2108	0.1661	0.2139	**0.1321**	68
Jordan	0.0177	0.0821	0.1935	0.2128	0.1470	**0.1306**	69
Kenya	0.0002	0.0686	0.2797	0.1107	0.1840	**0.1287**	70
Syria	0.0022	0.0731	0.1371	0.1014	0.3169	**0.1261**	71
Thailand	0.0099	0.0756	0.2271	0.2718	0.0414	**0.1252**	72
Uganda	0.0008	0.0692	0.2813	0.0815	0.1663	**0.1198**	73
Russia	0.0171	0.0839	0.0273	0.0695	0.3831	**0.1162**	74
Uruguay	0.0220	0.1033	0.2130	0.0672	0.1709	**0.1153**	75
Bulgaria	0.0312	0.0794	0.1604	0.2259	0.0773	**0.1148**	76
Moldova	0.0040	0.0712	0.1495	0.2286	0.1095	**0.1126**	77
Serbia	0.0104	0.0753	0.3111	0.1347	0.0309	**0.1125**	78
Finland	0.0797	0.1328	0.1039	0.1376	0.1003	**0.1109**	79
Armenia	0.0070	0.0779	0.1434	0.1024	0.2209	**0.1103**	80
Sweden	0.1864	0.0610	0.0776	0.1670	0.0542	**0.1092**	81
Greece	0.0154	0.0701	0.3389	0.0570	0.0634	**0.1090**	82
Vietnam	0.0037	0.0731	0.0544	0.3301	0.0732	**0.1069**	83

Peru	0.0073	0.0833	0.1021	0.0584	0.2769	**0.1056**	84
Colombia	0.0089	0.0761	0.0650	0.0217	0.3555	**0.1054**	85
Tunisia	0.0148	0.0758	0.0916	0.1974	0.1352	**0.1030**	86
Guatemala	0.0022	0.0713	0.2360	0.0955	0.1093	**0.1028**	87
New Zealand	0.0806	0.0759	0.1402	0.0804	0.1340	**0.1022**	88
China	0.0022	0.0729	0.2871	0.0818	0.0670	**0.1022**	89
Nepal	0.0000	0.0686	0.2749	0.0568	0.1083	**0.1017**	90
El Salvador	0.0062	0.0694	0.0995	0.1124	0.2031	**0.0981**	91
Sri Lanka	0.0012	0.0696	0.1515	0.0712	0.1961	**0.0979**	92
Albania	0.0054	0.0852	0.0654	0.1519	0.1795	**0.0975**	93
Indonesia	0.0032	0.0713	0.2075	0.0564	0.1267	**0.0930**	94
Latvia	0.0238	0.0771	0.1271	0.2011	0.0352	**0.0929**	95
Morocco	0.0070	0.0709	0.1239	0.1289	0.1262	**0.0914**	96
Canada	0.0859	0.1037	0.0684	0.0903	0.1059	**0.0908**	97
Japan	0.0084	0.0679	0.2672	0.0184	0.0898	**0.0903**	98
United States	0.0540	0.1007	0.2419	0.0141	0.0377	**0.0897**	99
Mexico	0.0145	0.0778	0.1411	0.0940	0.1183	**0.0891**	100
United Kingdom	0.0933	0.1101	0.0815	0.0930	0.0661	**0.0888**	101
Spain	0.0695	0.1138	0.1261	0.0777	0.0537	**0.0882**	102
Croatia	0.0397	0.0730	0.1017	0.1293	0.0903	**0.0868**	103
Germany	0.0424	0.0976	0.0756	0.1568	0.0554	**0.0855**	104
Austria	0.0989	0.0945	0.0108	0.1924	0.0092	**0.0812**	105
Argentina	0.0108	0.0774	0.1195	0.0417	0.1211	**0.0741**	106
France	0.0807	0.0927	0.0610	0.0742	0.0447	**0.0707**	107
Portugal	0.0523	0.0811	0.0809	0.1121	0.0238	**0.0700**	108
Denmark	0.1281	0.0000	0.0000	0.1734	0.0373	**0.0678**	109
Poland	0.0262	0.0803	0.0475	0.1520	0.0312	**0.0674**	110
Romania	0.0163	0.0754	0.0447	0.1302	0.0519	**0.0637**	111
Brazil	0.0173	0.0812	0.0871	0.0000	0.1286	**0.0628**	112
Italy	0.0274	0.0762	0.1244	0.0775	0.0000	**0.0611**	113
Egypt	0.0045	0.0724	0.0616	0.0661	0.0991	**0.0607**	114
Turkey	0.0127	0.0748	0.1069	0.0602	0.0275	**0.0564**	115

Table 5. Resilience and Vulnerability Indices

Country	Vulnerability Index	Resilience Index
Albania	0.09751	0.66914
Algeria	0.17610	0.57118
Argentina	0.07408	0.59295
Armenia	0.11030	0.64786
Australia	0.14248	0.81230
Austria	0.08116	0.72132
Azerbaijan	0.25256	0.59698
Bahamas	0.32267	0.67401
Bahrain	0.17910	0.72368
Bangladesh	0.13318	0.48711
Barbados	0.24156	0.64508
Belgium	0.27771	0.71475
Benin	0.16893	0.46665
Bolivia	0.14466	0.61257
Botswana	0.23286	0.57735
Brazil	0.06283	0.60247
Bulgaria	0.11483	0.68144
Burkina Faso	0.19038	0.27589
Cambodia	0.21724	0.55871
Cameroon	0.20814	0.47448
Canada	0.09084	0.77755
Chile	0.17462	0.73909
China	0.10221	0.61002
Colombia	0.10543	0.59360
Costa Rica	0.15931	0.66239
Croatia	0.08680	0.64292
Cyprus	0.18378	0.71173
Denmark	0.06777	0.76028
Ecuador	0.19127	0.55909
Egypt	0.06073	0.53916
El Salvador	0.09811	0.62878
Estonia	0.15245	0.73580
Ethiopia	0.17389	0.32257
Fiji	0.24562	0.64891
Finland	0.11087	0.76055
France	0.07065	0.71528
Gabon	0.22903	0.49150
Georgia	0.13215	0.66967
Germany	0.08555	0.74386
Ghana	0.16820	0.52663
Greece	0.10896	0.65873
Guatemala	0.10285	0.56904
Honduras	0.13585	0.61547
Hong Kong	0.59751	0.83089
Hungary	0.16247	0.68353
Iceland	0.35187	0.71580
India	0.16461	0.48618
Indonesia	0.09303	0.59149
Iran	0.19131	0.58185
Ireland	0.28455	0.69909
Israel	0.16029	0.74653
Italy	0.06109	0.67674
Jamaica	0.21531	0.60257
Japan	0.09034	0.78229
Jordan	0.13062	0.67547
Kazakhstan	0.20824	0.63620
Kenya	0.12866	0.47662
Kuwait	0.24014	0.71004
Kyrgyzstan	0.18726	0.58419
Latvia	0.09286	0.66743
Lesotho	0.16456	0.40037
Lithuania	0.20726	0.69565
Luxembourg	0.56902	0.62856
Malaysia	0.19801	0.65087
Malta	0.41685	0.71494
Mauritius	0.16291	0.68276
Mexico	0.08913	0.63238
Moldova	0.11258	0.60168
Mongolia	0.25481	0.61313
Morocco	0.09138	0.52462
Mozambique	0.21062	0.21307
Namibia	0.20878	0.51734
Nepal	0.10170	0.46990
Netherlands	0.16261	0.73297
New Zealand	0.10222	0.84494
Nicaragua	0.16180	0.60628
Nigeria	0.24692	0.39706
Norway	0.19864	0.80938
Pakistan	0.14192	0.45965
Panama	0.28249	0.68422
Papua New Guinea	0.22625	0.48954
Paraguay	0.18952	0.60579
Peru	0.10560	0.72239

Philippines	0.20789	0.63884
Poland	0.06744	0.69175
Portugal	0.07004	0.65490
Romania	0.06370	0.69196
Russia	0.11619	0.61036
Saudi Arabia	0.24926	0.72811
Senegal	0.16548	0.35859
Serbia	0.11248	0.60523
Sierra Leone	0.28732	0.35795
Singapore	0.55172	0.81820
Slovak Republic	0.14795	0.69606
Slovenia	0.14463	0.64878
South Africa	0.16238	0.51185
Spain	0.08817	0.71036
Sri Lanka	0.09791	0.58653
Sweden	0.10924	0.75174
Switzerland	0.20597	0.81440
Syria	0.12614	0.51683
Thailand	0.12518	0.60531
Togo	0.13206	0.45213
Trinidad and Tobago	0.27980	0.62480
Tunisia	0.10297	0.60512
Turkey	0.05642	0.58204
Uganda	0.11984	0.52947
Ukraine	0.13374	0.56833
UAE	0.21261	0.72077
United Kingdom	0.08880	0.72286
United States	0.08967	0.74373
Uruguay	0.11527	0.69020
Venezuela	0.18077	0.38098
Vietnam	0.10688	0.54230
Zambia	0.25907	0.48358