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From Vanilla to Immiserizing Growth, Better Economy and Worse Living Conditions: A Case of Madagascar

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Abstract

This paper aims to explain and test Jagdish Bhagwati's theory on Immiserizing Growth, focusing on export elasticity of demand. The Immiserizing Growth Hypothesis refers to the phenomenon when a country's economic growth through international trade harms its citizens' welfare because its Terms of Trade (TOT) deteriorate from increased exports (Bhagwati, 1958). Since then, other scholars have argued the theory lacks real-world consideration and finds almost no real-world case where the theory holds (Pryor, 2007). The core of Bhagawati's theory is not just the relationship between the Gross Domestic Product (GDP) growth and increase in the poverty rate, but also how the deterioration of TOT and increasing trade cause Immiserizing Growth. How does the elasticity of a country's export sector affect that country's TOT? Does Dr. Bhagwati's causation still stand today? The paper's first section explains Bhagwati's theory in detail and examines past publications and studies on Immiserizing Growths. Then, the study applies the approach to Madagascar's economy from 1993 to 2008, excluding fiscal years 2002 and 2003 due to election violence. The case study hopes to establish causality between export supply inelasticity and the occurrence of Immiserizing Growth using empirical data. Lastly, the paper concludes with potential future case study plans and impacts.

Keywords: Country Study: Madagascar, Economic Growth and Terms of Trade, Immiserizing Growth Theory

1. Introduction

In 1958, Bhagwati published the article "Immiserizing Growth: A Geometrical Note" in *The Review of Economic Studies* and stunned the world with his theory and flawless calculation. The article debunks the common conception that all economic growth benefits people's welfare (Bhagwati, 1958). Economists have generally used political instability, income inequality, and corruption to explain the occurrence of Immiserizing Growth (Fosu, 2017). Bhagawati uses a mathematical model to show the benefit of increasing trade, demonstrated through a country's Production Possibility Frontier (PPF), will increase less than the corresponding rise in the prices of the imported goods, demonstrated through the change of Terms of Trade (TOT), and causes welfare to fall. He explains this outcome mostly from the import sector and summarizes his argument into three conditions that increase the possibility of Immiserizing Growth, (a) the country produces very little of its importables, (b) the demand for importables is price inelastic, and the consumers will purchase the same amount of

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importables regardless of its price change, (c) the supply of the importables is inelastic and does not increase as much as the increase in demand. At the same time, he acknowledges that the conditions of the import sectors only matter when the country's export sector is also price inelastic (Pryor, 2007; Bhagwati, 1958). While the study wants to focus on the import sector, it is almost impossible to find the needed data (from the sources at Madagascar) or establish causality between two variables, because many other factors affect why and what a country imports, such as the availability of the natural resources or a suitable rainfall. This paper takes the second-best approach and tests Bhagwati's original causal inference between export price elasticity and Immiserizing Growth.

People refer to Madagascar as the eighth continent of the world. It is large and lush in resources from timber to vanilla. At the same time, it is also one of the poorest countries in the world, plagued by natural disasters and corrupt leaders leading to irregularities and imperfections in decision making. Today, more than 70% of Madagascar's people live in extreme poverty, one of the highest rates in the world according to the source at Central Intelligence Agency. The island is home to unique plants and animals like lemurs, baobab trees, and blue couas. Its economy is fragile and export-dependent, with little to no domestic factory or production capabilities. Madagascar's main exports are vanilla and cloves. Madagascar supplies about 80% of the world's natural vanilla, and its price has remained steady until 2015. (Steavenson, 2019). As an island, its import sectors consist mainly of capital and consumer goods that cannot be produced locally, such as petroleum and automobiles. In addition, its import of intermediate goods such as rice and wheat is not impacted by the country's export production since they are essential goods. These goods are also hard to calculate since they can be donated or purchased by a Madagascar-based international aid agency. Lastly, data on these products and consumer demand are almost impossible to gather, given lacunae in the record keeping and the existence of the poverty level. Consumers have no actual taste or preference when facing starvation (UNICEF).

On the other hand, export data is much more consistent and feasible to determine the export sector's elasticity. The growth in the export sector and its inelasticity are essential conditions for Bagawati's theory. Therefore, Madagascar's export sector study is the best way to test the hypothesis given the constraints.

From late 1994 to 2008, Madagascar's GDP grew two to five percent annually except in 2002 and 2003. During that time, Madagascar experienced significant political instability that resulted in large-scale and long-term violence. This is why the study excludes the fiscal years 2002 and 2003 (BBC News, 2018). While Madagascar's GDP grew consistently from 1994 to 2008, its TOT index changed from increasing to declining at the turn of the century. From 2000 to 2008, Madagascar saw an increase in the population living in extreme poverty while its TOT index fell year after year (World Bank).

2. Definitions and Equations

Immiserizing Growth is a relatively simple concept that requires a little understanding of economic terminologies. After that, the paper explains the theory in mathematical format and discusses its alterations. A literature review follows this.

2.1 Production Possibilities Frontier (PPF)

As is widely known, the Production Possibilities Frontier (Curve) is a locus of combinations of two goods that is used to represent a nation's production capability. The

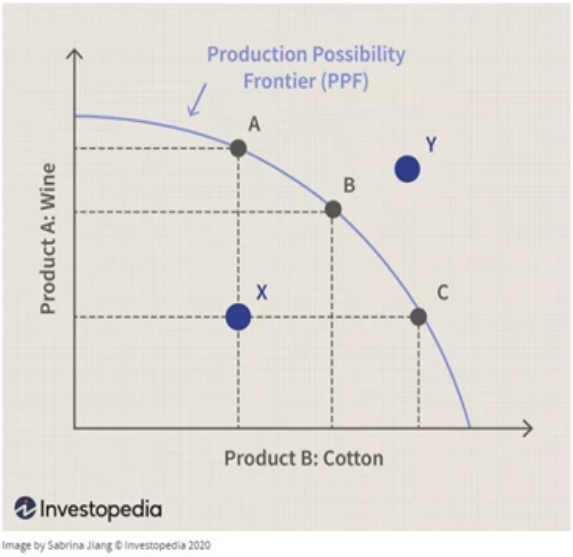

Figure 1. Production Possibility Frontier (PPF) Graph by Sabrina Jiang.

Note: Credit Sabrina Jiang at Investopedia.

following chart shows the most efficient use of a country's resources. The graph is generally curve-shaped, as shown in Figure 1. If a country's production point is within the curve (point X in Figure 1), its resources are not used efficiently. On the other hand, if a country's production point is outside the curve (point Y in Figure 1), its goal is unattainable with its domestic capabilities. The ideal situation is when a country's production falls on the curve (Points A, B, and C in Figure 1). Under the assumption of optimal and total production, if it wants to produce more of one good, it must reduce the output of the other good. Lastly, a country's PPF can shift inward or outwards due to many different factors such as technology advancement or high unemployment.

2.2 Terms of Trade (TOT)

It is an indicator of a country's trade balance. The ratio is calculated using the formula . If a country's TOT is above 100, it means the country is gaining more capital through trade and the opposite means a depletion of capital through trade. Based on the equation, an increase in TOT is triggered by an increase in export prices and a decrease in TOT is caused by an increase in the import price.

2.3 Import and Export Elasticity

It refers to how sensitive the market is towards a shift in quantity supplied or change in price. Elastic means a product/sector is sensitive to change in price or demand. It means this product/sector will change its price when its demand changes. On the other hand, inelastic means a product/sector is not sensitive to change in price or demand. It will see little to no change in price when the demand changes. The elasticity of a product or sector can be calculated using. If the result is bigger than 1, it means the product/sector is elastic and a result less than 1 means the product/sector is inelastic. In general, inelastic goods are food, medicine, or gasoline, essential goods. Elastic goods are luxury cars, non-essential to daily life.

2.4 Indifference Curve

It is a graph made of data points. These points represent the price point in which the consumers will have the same preference for either good. At these points, consumer enjoy equal benefit from good A or good B. Therefore the consumer is indifferent at choosing between good A or good B.

2.5 Bhagwati's Original Argument

Assumptions are made to simplify the demonstration. Dr. Bhagwati uses a two country, two commodity model with full employment. The original theory argues if a country's export causes the price of its importable to increase at a higher rate than gain in income from increasing export, Immiserizing Growth will occur. To demonstrate the effect, the study borrows a graph from Dr. Pryor. In this graph, Figure 2, the nation's PPF shifts from P' to P", but its TOT declined from R' to R". In turn, the new production point is F" and the new consumption point is H". Since the indifference curve after growth, I", is lower than indifference curve before growth, I', the citizens are worse off. In short, the increase in the PPF brought by the growth is offset by the effects of declining TOT (Bhagwati, 1958; Pryor, 2007).

Bhagwati focuses his paper on demonstrating how the domestic supply of the importables and its price elasticity can affect the possibility of Immiserizing Growth. He argues that if a country's demand for importables is price

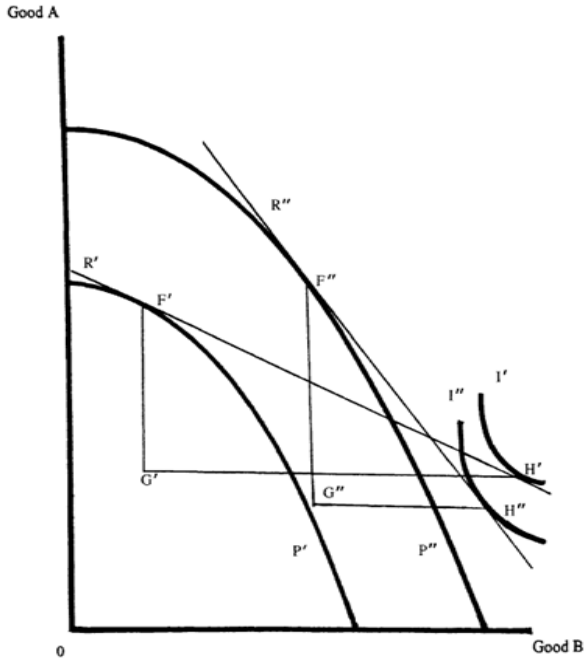

Figure 2. Illustration of immiserizing growth by Dr. Pryor.

Note: Pryor, 2007

inelastic and the domestic supply cannot increase when the demand increases, the consumer will have to pay more for the same quantity of goods. This will increase the Index of Import Price, which will lead to a decline in TOT. However, this is only half of the picture, the increase in the Index of Import Price can be offset if the Index of the Export Price increases at the same or higher rate. The effect of price elasticity and change in quantity supplies on the export sector is the reverse of price elasticity and change in quantity demand in the import sector. Since the study cannot find data for the import sector, it uses the export sector to demonstrate the same point. In general, goods with few alternatives essential to daily life tend to be price inelastic. If a country exports such a good, an increase in the quantity exported will not bring a proportional addition to the commodity's price. This will result in a decline in the relative cost of the export goods, which means it is worth less than before the increase in production. When this occurs, a country's Index of Export Price decreases. A country that exports only a few goods and is export-dependent tends to be most affected by this (Bhagwati, 1958; Pryors, 2007; Shafer, 2019).

3. Literature Survey

The current studies on Dr. Bhagwati's theory can be grouped into theoretical and development-focused camps. The theoretical base argues against the original theory and works to find alternative explanations. The development camp incorporates Immiserizing Growth into development studies and refers to the term without mentioning its TOT or Elasticity conditionalities. This is why the study wants to look exclusively at Dr. Bhagwati's theory through a case study.

The theoretical camp argues that Dr. Bhagwati's theory is based solely on economic concepts without considering the true nature of international trade. The implantation of tariffs or inefficient allocation of resources to boost a country's factor endowment can also lead to Immiserizing Growth without the deterioration of the TOT (Johnson, 1967). American Economist Dr. Pryor argues that Dr. Bhagawti does not consider how TOT and growth can "fluctuate considerably in the short- and middle-run…." In addition, the independent variable (TOT) and dependent variable (Economic Growth) are not independent phenomena, and therefore a causal inference cannot be established (Pryor, 2007). Lastly, the term Immiserizing Growth in the real world cannot be explained by TOT and elasticity alone. To illustrate the phenomenon, one must focus on economic and socio-political causes and consider issues like climate change, education, infrastructure, etc (Shaffer, 2019). By conducting the study on the export sector, the tariff is no longer an issue. The study will address the alternative explanation to the causality, but it believes the original theory is still worth a closer dive, which none of the economists above have done.

In the development camp, researchers tend to overlook the fundamentals and try to conduct large-scale empirical studies. This camp argues that 10 to 35 percent of all countries experience economic growth without poverty reduction. Therefore, all these countries are experiencing Immiserizing Growth (Dollar, 2002). This statement is incomplete. It creates the illusion that all these countries have deteriorating TOT or their export sector is price inelastic when they can be affected by other reasons. Researchers have attributed the Immiserizing Growth to causes like structural reform or discrimination (Liu, 2019; Shaffer, 2019). Dr. Chang's study on Immiserizing Growth in Centrally Planned Economy (CPE) is an exceptional case study, and it uses Dr. Bhagwati's theory in its entirety.

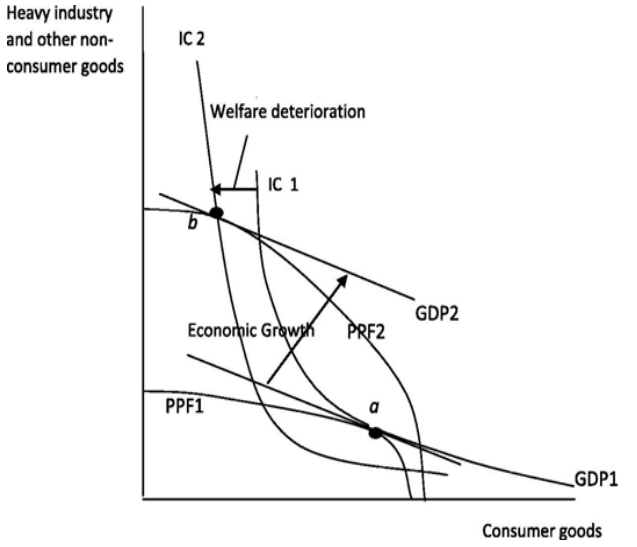

Figure 3. Immiserizing growth in a command economy illustrated by Dr. Chang.

Note: Credit Sabrina Jiang at Investopedia.

In a CPE economy, the government shifts resources to the heavy industry while keeping a set price on consumer goods. In this case, the consumer goods are importables and the heavy industry represents the exportables. The set price makes consumer goods inelastic while production is reduced since resources are shifted to the heave industry. This results in a skewed shift in the country's PPF as shown in Figure 3. Production and consumption are now at point b. This results in a lower Indifference Curve (IC 1 IC 2). A lower IC curve represents a deterioration in consumer well-being and therefore the occurrence of Immiserizing Growth. While this model is more internal than external, it nevertheless touched on TOT and elasticity (Chang, 1991, 2018).

This paper fills in the gaps of the development camp by looking at both the actual development indexes such as poverty rate and the Gini coefficient and the TOT index and export price elasticity.

4. Case Study

Using data from the World Bank, United Nations International Trade Statistics Database (UN Comtrade), this section studies Madagascar's export sector and overall economy from 1993 to 2008. Madagascar is a medium-size country in terms of both population and landmass. It has been relatively peaceful for the past two decades, except for the riots and instability after the 2002 election. The study excludes all data from 2002 and 2003 to avoid external uncertainties that can affect data accuracy (Central Intelligence Agency). The following sections are divided into the study of macro data and microdata.

4.1 Macro Data

Based on Figure 4, the study concludes that Madagascar experienced Immiserizing Growth according to Bhagwati's economic model. From 1993 to 1999, Madagascar's GDP increased positively, represented by the red line, and its poverty rate decreased, represented by the green bar. However, from 2000 to 2008, its poverty rate increased while its GDP grew positively. The increase in the poverty rate represents a decline in the welfare of the citizens. The blue line in the graph represents the country's TOT. Madagascar's economy experienced actual growth when its TOT increased and the opposite when its TOT declined. This data is consistent with Dr. Bhagwati's theory on the Macro level. In addition, Madagascar saw a 244% increase in the export sector between 2000 and 2008 compared to a modest 39% increase between 1993 and 1999. This data proves Madagascar had a considerable increase in output

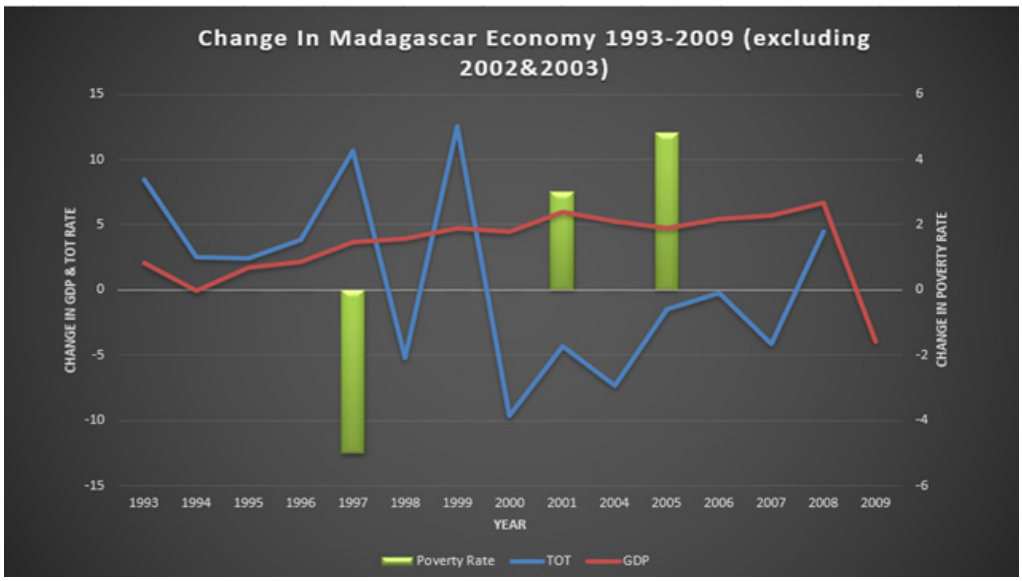

Figure 4. Madagascar Economy 1993-2009, Graph by author.

Note: Source: World Bank. Created on 3/10/2022

during the same period it is experiencing Immiserizing Growth.

It is important to note that Madagascar's per capita GDP and GNI (gross national income) from 2000 to 2008 show a positive increase during the decline of TOT. This can be attributed more to income inequality than actual income growth. Madagascar's Gini coefficient, an indicator of inequality, increased by seventeen percent from 2000 to 2008. Lastly, while Madagascar's GNI per capita grew from 2000 to 2008, it remains lower than Madagascar's GNI per capita in the 1990s (World Bank).

4.2 Microdata

On the Macro-level, Madagascar experienced Immiserizing Growth attributed to the deteriorating TOT index. However, is there evidence to prove the deterioration of TOT is the result or partially attributed to growth in the export sector? This section compares data from 1993 to 1999 to the data from 2000 to 2008. Suppose the supply of the goods is inelastic and there is an increase in quantity supplied from 2000 to 2008. In that case, one can conclude the export sector is responsible for the deterioration of TOT.

Using World Integrated Trade Solution, WITS, a database by the World Trade Organization, the top exporting goods of Madagascar by year based on the harmonized system (HS) code and trade value are found. It is vital to note that Madagascar's export sector had some changes and makeovers between 1993 and 2008. The textile industry took on a much more significant role after 2000, but the study cannot analyze the growth because such an industry did not exist before the TOT started to decline. However, the following goods were ranked consistently as the top exportables of Madagascar:

- Coffee; not roasted, HS 09011
- Frozen Shrimp, HS 030613
- Cloves, HS 090700
- Vanilla beans, HS 090500

Based on the data from UN Comtrade, tables are constructed for every commodity using the style of Table 1. The database provided only the trade value and quantity. Using the formula Total Value/Total Quantity, the table gets the Per Unit Price. The result can be used to study if there is a drastic change in market price. The calculation for elasticity uses the formula. The result is interpreted based on its value. If a good's majority elasticity is above 1, it is price elastic and vice versa.

According to the calculation, none of the commodities is supply elastic. This means when the producer exports more of the same product, the Per Unit Price does not change proportionally. This is the same as the previous prediction. Figure 4 gives an overall view of the elasticity of the four commodities.

Given the knowledge none of the products is price elastic, is there a significant increase in the quantity supplied between 2000 and 2008 compared to the quantity supplied between 1993 and 2000? If there is an apparent increase across all commodity types, it proves Madagascar's Immiserizing Growth is based on the inelasticity of the export sector. However, the final result is mixed. While the average quantity of shrimps and vanilla beans exported increased by 71% and 98%, the average

Table 1. Madagascar clove export data and calculations by the author

Commodity	Year	Trade Value (US$)	Qty	Per Unit Price (US$)	Change in Price %	Change in Quantity %	Elasticity
Cloves (whole fruit, cloves a	1993	6353225	11358429	0.559340116			
Cloves (whole fruit, cloves a	1994	7494871	14116916	0.530914188	-5.214550041	21.65613066	-4.15302001
Cloves (whole fruit, cloves a	1995	11269895	17127484	0.658000615	21.37855901	19.27108858	0.901421306
Cloves (whole fruit, cloves a	1996	5612307	7268112	0.772182239	15.96741624	-80.82911358	-5.062128547
Cloves (whole fruit, cloves a	1997	12238989	15838944	0.772714961	0.068965359	74.18367792	1075.665796
Cloves (whole fruit, cloves a	1998	9201809	9926274	0.927015414	18.15587399	-45.89652608	-2.527916095
Cloves (whole fruit, cloves a	1999	17870427	7822467	2.284500146	84.53857418	-23.7065491	-0.280422864
Cloves (whole fruit, cloves a	2000	45869190	14874508	3.083745022	29.77676509	62.1408007	2.086888905
Cloves (whole fruit, cloves a	2001	91335249	17692692	5.162314983	50.41365112	17.30688546	0.3432976
Cloves (whole fruit, cloves a	2004	38072658	13582952	2.802973757	-59.24057	-26.28076979	0.443627902
Cloves (whole fruit, cloves a	2005	30108217	8308441	3.623810652	25.54424866	-48.18798877	-1.8864516
Cloves (whole fruit, cloves a	2006	26942310	12584608	2.14089386	-51.44814583	40.93387231	-0.795633577
Cloves (whole fruit, cloves a	2007	16631228	6313782	2.63411502	20.65843948	-66.36360029	-3.21242078
Cloves (whole fruit, cloves a	2008	26963535	10525875	2.561643094	-2.789657437	50.02587642	-17.93262347

Note: Source: World Bank. Created on 3/14/2022

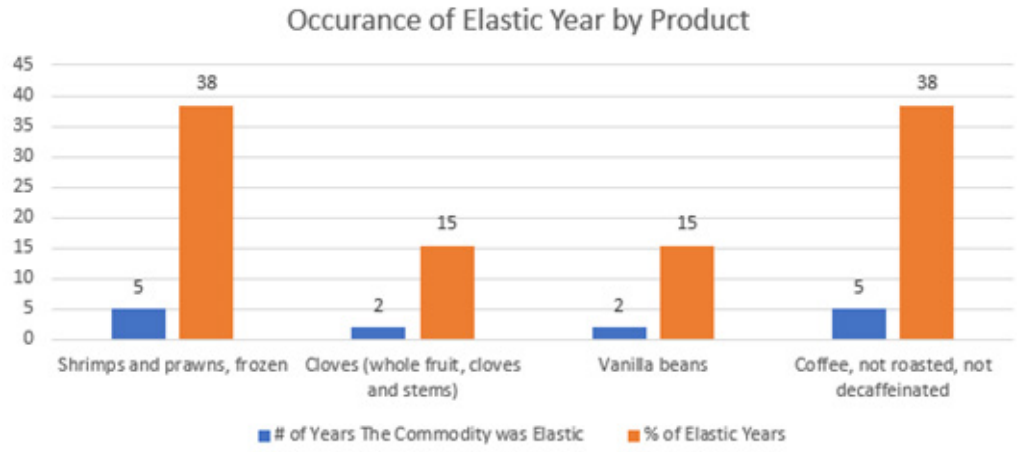

Figure 5. Product elasticity 1993-2009, graph by author.

quantity of cloves and coffee exported decreased by 3% and 119%. In the case of two commodities with increasing quantity, their average Per Unit Price increased at a much slower rate than the increase in quantity. This observation is consistent with the finding that these commodities are price inelastic.

The average Per Unit Price increased by 111% in the clove market, and the quantity supplied decreased by 3%. Perhaps Madagascar is already the maximum production possibility for cloves. There is no rational decision as to why Madagascar will not increase its production given the rise in price other than it is not physically possible. The Per Unit Price decreased by 29% in the coffee bean market. It would be natural to see a decrease in coffee production since there are alternative and more profitable commodities to trade, such as vanilla beans. It is also possible that world coffee production shifted focus since Madagascar is not directly on the coffee belt.

While the cloves and coffee bean sector did not export more products, it remained price inelastic. The study shows that Madagascar's export sector is supply inelastic. The number of exportable goods increased while its Terms of Trade were declining, which resulted in positive GDP growth, but a decline in the nation's welfare. Does this establish causality between supply elasticity and the occurrence of Immiserizing Growth on the micro-level? There is not sufficient evidence to conclude it does. Two out of four commodities tested did not increase production from 2000 to 2008. However, vanilla and shrimp exports can represent up to 45% of all Madagascar's exports though the Figure 5 is usually around 20-40%. Therefore it is reasonable to attribute the deterioration of Madagascar's TOT from 2000 to 2008 to the increase in the production of vanilla and shrimp because they are both inelastic exportables. Since the study proved that deteriorating TOT leads to Immiserizing Growth on the macro level, a partial causality can be established between the inelasticity of exportables and Immiserizing Growth.

5. Summary and Conclusion

This study is very much conducted on a small scale. If there is sufficient time and resources, analyses on all of Madagascar's exportables should be performed. This will give the complete picture of whether (a) Madagascar drastically increased its output during the same time it experienced Immiserizing Growth (b) the increased outputs are price inelastic or elastic (c) there are other potential reasons behind Madagascar's decline in welfare while its GDP is increasing?

Given the constraint, the study still proved Madagascar experienced Immiserizing Growth from 2000 to 2008 due to deteriorating TOT. Some of Madagascar's significant exportables are price inelastic, which contributed to the deterioration of TOT during the Immiserizing Growth period because of its increased output.

This result does not directly prove causality between export inelasticity and the occurrence of Immiserizing Growth. However, it does provide evidence that one contributes to the other. It supports Bhagwati's original

theory and paves the way for future studies on the effect of deteriorating TOT. Much more studies need to be done before one can thoroughly test Bhagwati's theory, and this work hopes to serve as the very first step.

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