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Growth and Sectoral Development: A Stock-Flow-Consistent Model of the Effects of Trade Liberalization in Ghana

Thesis Submitted to the Levy Economics Institute of Bard College

by Harrison J. Karlewicz

Annandale-on-Hudson, New York May 2019

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PLAGIARISM STATEMENT

I have written this project using in my own words and ideas, except otherwise indicated. I have subsequently attributed each word, idea, figure and table which is not my own to their respective authors. I am aware that paraphrasing is plagiarism unless the source is duly acknowledged. I understand that the incorporation of material from other works without acknowledgment will be treated as plagiarism. I have read and understand the Levy Economics Institute of Bard College statement on plagiarism and academic honesty as well as the relevant pages in the Student Handbook.

Harrison J. Karlewicz May 15th, 2019

ABSTRACT

The dawn of neoliberalism brought with it a litany of trade policies for developing nations, including recommendations to liberalize trade barriers, remove capital controls, and develop in relative comparative advantages in the global economy. These policies were buttressed with Computable General Equilibrium models that showed positive welfare gains for liberalizing nations. This paper reviews the historical record around trade policy, theories of trade, as well as the methodological approaches used to examine the effects of trade liberalization in the neoliberal era. It posits an alternative using Stock-Flow-Consistent modeling methods, looking particularly at the case of Ghana and its own tariff regime. Drawing from heterodox traditions, such as Marxist, Structuralist, and Post-Keynesian tendencies, alternative assumptions and modeling techniques are utilized to examine the effects of trade liberalization on a developing country. The basic conclusion is that there is historical and theoretical evidence that protectionism can aid in the sectoral development of a nation's industries. Additional modeling recommendations and avenues for further research are given as well, concluding that there is still much to be developed for open economy macro-modeling in the development context.

Keywords: Computable General Equilibrium; Exchange Rates; Industrial Policy; Infant Industry; Macroeconomic Model; Open Economy Growth; Patterns of Trade; Protectionist; Stock-Flow-Consistent Models; Social Accounting; Tariff; Trade Liberalization; Trade Policy.

JEL Classifications: B50, C68, C69, E10, F13, F43, O24, O25

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INTRODUCTION

Issues of trade have been at the forefront of nation-building and economic debate, whether it was between the Scholastics and their arguments over the morality of prices of trade, or the Mercantilist and Camerialist traditions and their concern with the development of certain industries and the fiscal position of the State. David Ricardo, of course, made what is probably the most known contribution to this matter in the western developed world, in which he argues forcefully for the benefits of free trade for the development of a nation. To this day however, issues of trade between nations have not disappeared, as is evident by the Trump Administration and many American's concerns over trade deals and its effects on their wages and well-being. Thus, the importance of trade is undeniable and seems to be perennially an issue of national concern for countries around the world. It is undeniable that trade plays a vital role in the economic development of a nation, and that a country's trade policy can aid in its own development or significantly hinder its progress and even jeopardize the autonomy of its own people.

This paper seeks to explore the issue of trade protectionism and whether it is a viable policy tool for the economic development of nations. This goes against the prevailing conventional wisdom of the day, which is that protectionism inevitably distorts prices, disallowing first-best outcomes and generating welfare losses for consumers as well as producers who have to compete against protected industries. But, considering the historical record concerning protectionism, such a view is suspect. Developing economies may be severely lacking in the policies tools necessary to grow and develop their own manufacturing, industrial, and services sectors, providing employment and growing incomes for its own people, and much less to allow for convergence of global incomes. Hence, free trade may act to maintain the inequalities present within the system, and absent corrective measures such an inequality will persist and perhaps worsen. Such an alternative approach is explored here and contrasted with the mainstream neoclassical variation of Ricardo's theory.

Additionally, this paper examines the state of open-economy models, their structural assumptions, and the choice of model closure. Alternatives are proposed, which can radically change the results of these models. Taking Ghana as an example of a developing nation that has

aggressively pursued liberal policies since the 1980s, a theoretical approach to constructing a model for the economy is proposed. These results are then juxtaposed to what is known about the Ghanaian economy and policy recommendations for its development are provided based off the model's results, as well as the alternative trade theories explored.

The structure of this paper will take the following form. First, a section which reviews the history of globalization since the 1980s – what could be referred to as the era of neoliberalism – and its record will be explored. This will be done in tangent with a review of the macro modeling that was done to simulate and predict the effects of neoliberal policy concerning trade liberalization and other pillars of the Washington Consensus. Secondly, a section which examines theories of trade and its relationship to the development of a nation will be explored, working both within the tradition of Ricardo and what is now commonly referred to the neoclassical school, as well as examining heterodox traditions ranging from Marxist to Post-Keynesian perspectives. Earlier traditions that were contrary to Ricardo, such as the Mercantilists, will be included in this camp, albeit it is a stretch to define them as being a heterodox school of thought given their dominance earlier in history. Thirdly, a methodology largely based on the work of Wynne Godley and Marc Lavoie (2012), as well as Lance Taylor (2004), will be developed as an alternative modeling approach to the question of trade policy and development. This will be followed by a fourth section which examines the Ghanaian economy, its history, and its vital features. A fifth section is provided which simulates such a model through three scenarios, followed by a conclusion which will synthesis the results of the simulation with what was developed in the previous sections.

It should be noted that the model presented in this paper is not meant to be a perfect representation of the Ghanaian economy, but rather as a general starting point from which to build an applied model for an economy such as Ghana's. The need for better modeling assumptions and techniques for developing economies will become apparent when reviewing the literature on trade policy. Hopefully, such models can and will provide a much-needed tool for developing economies to strategize and appropriately develop policy to grow their economies in a sustainable and equitable way. Vitaly, it is the theory behind a model which determines its successful utilization in the real world.

GLOBALIZATION, DEVELOPMENT & CGE MODELING

In light of the Great Financial Crash in 2007-8 and its rippling effects throughout the world, as well as rising inequality within and trade tensions between nations, much has changed since the "Golden Era" of the 1950-60s. By the 1980s, this era was over. Beckoned in by the Reagan and Thatcher administrations in the Anglosphere, and through what was known as the Washington Consensus internationally, policies of tariff reduction and removal of tariff and non-tariff trade barriers, capital account liberalization, and calls for the reduction of government debt and balanced budgets via austerity were implemented widely. This was the dawn of the neoliberal era we now live in. Many of these policies were demanded as preconditions for lending with the World Bank and IMF, especially in the form of Structural Adjustment Programs, forcing many developing nations with crippling debts to implement free trade policy and remove what protections they had for their own industries. This marked the beginning of a process away from state-led economic development, and towards market-oriented approaches.

The United Nations Conference on Trade and Development's (UNCTAD) "Trade and Development Report 2018" echoes many of the same patterns continuing internationally and stresses the way in which they are causing increased global inequality, uneven development, and hampering the growth of the developing world. The authors of this latest report even go so far as to suggest that "talk of free trade [provides] a useful cover for the unhindered movement of capital and an accompanying set of rules… that [discipline] government spending and [keep] the costs of doing business in check" (UNCTAD 2018). They call for caution and warn of growing parallels between the current decade and the chaos of the 1930s. Simply put, UNCTAD warns that policies of free trade and austerity in the midst of growing inequality, financial fragility, and weak growth will not hold or provide results.

Many of the problems of globalization, development, and trade that are apparent today have occurred in some way or another before. Economic tensions that existed in the 1930s in large part had to do with the structure of international finance and international trade at the time. It is also not correct to see the past *purely* as eras of free trade or strong protectionism - like most things, history has a particular but complicated path. It's important to note that prior to the "Golden Era" of the United States, as well as prior to the dawn of the neoliberal era in the

1980s, many developing (now industrialized) nations utilized trade barriers to protect and develop their industries. As Ha-Joon Chang (2002, 2003a, 2008) states, virtually all developed countries actively used interventionist industrial, trade, and technology policies aimed at promoting infant industries during their catch-up periods in terms of economic growth. What is commonly referred to as the era of free trade, started by Great Britain in 1846 with most of the world following suit by the 1880s, was short lived and doesn't adequately take into account what was the norm prior to this experience.

Looking particularly at the history of the United States and what is now the United Kingdom, Chang (2002) shows that both of these nations developed and excelled in the way they did primarily because of their expertise in industrial protection. The English monarchs actively used import quotas and outright bans, export subsidies, and tariffs to develop England's own textile industry, overcoming what had traditionally been a relationship of primary commodity production in which England exported raw wool to be processed in what is now Belgium and the Netherlands, who manufactured cloth to be sold back to England. Building up to the era of Great Britain's empire, the British actively used protection to develop an industrial powerhouse unmatched by any at the time. It's only once Great Britain had secured an absolute advantage over other nations that it began to preach free trade. Similarly, the United States is home to what Chang (2003b, 2004) considers to be the mastery of protectionism, primarily located within the work of Alexander Hamilton along with some now forgotten American economists, such as Daniel Raymond and Henry Carey, as well as the contemporarily unknown German economist, Friedrich List. Chang (2002) shows that the United States has had some of the world's highest tariffs, as seen in Table 1, which endured for much of the latter half of the 19th century and into the first half of the 20th century, reaching as high as an average of 50%. Apparently even President Ulysses S. Grant at one time quipped that "within 200 years, when America has gotten out of protection all that it can offer, it too will adopt free trade" (Chang 2004). Indeed, with the dawn of neoliberalism, such a shift in American political culture did occur by the 1980s.

Table 1: Average Tariff Rates on Manufactured Products for Selected Developed Nations in Their Early Stages of Development (weighted average percentages)

	1820	1875	1913	1925	1931	1950
Austria	R	15-20	18	16	24	18
Belgium	6-8	9-10	9	15	14	11
Denmark	25-35	15-20	14	10	N/A	3
France	R	12-15	20	21	30	18
Germany	8-12	4-6	13	20	21	26
Italy	N/A	8-10	18	22	46	25
Japan	R	5	30	N/A	N/A	N/A
Netherlands	6-8	3-5	4	6	N/A	11
Russia	R	15-20	84	R	R	R
Spain	R	15-20	41	41	63	N/A
Sweden	R	3-5	20	16	21	9
Switzerland	8-12	4-6	9	14	19	N/A
UK	45-55	0	0	5	N/A	23
US	35-45	40-50	44	37	48	14

Source: Chang (2004). R indicates here that other restrictions exist, so tariff rate is not useful.

In what could be seen as an Anglo-American hegemony in world economic affairs post-WWII, the United States, the United Kingdom, and many others, along with the World Bank and the International Monetary Fund (IMF), has steadily pushed for continued liberalization of merchandise and capital flows in international trade. Initial success over time would bring the General Agreement on Tariffs and Trade (GATT) and eventually the World Trade Organization (WTO). Much of the policy agenda has formulated into what has been called the Washington Consensus, with calls for a reduction of tariffs and other trade barriers, stringent patent and copyright agreements, independent financial institutions, and austere government fiscal policy. As Chang (2003b) points out, this wave of liberalization has seen the growth rate of the world fall from 3.2 to 2 percent annually between 1960-1980 and 1980-2000. Further, he argues that the former communist nations of the Soviet bloc experienced the fastest fall in living standards in modern history. Contrary to the historical evidence, neoliberalism continues to push for freer trade and disallows state industrial policy.

From this perspective, Ha-Joon Chang and Ilene Grabel (2004-5) have tackled what they call the six myths of development: 1) that neoliberal policy has succeeded over the past 25 years, 2) that today's industrialized nations today developed on the basis of free trade, 3) that state-led development policies will fail because of the current global economy, 4) that developing countries need discipline imposed on them by international institutions and independent central banks, 5) that the East Asian miracles are of specific, historical origin and not replicable, and 6) that the Anglo-American model is the one, true, universal approach to development. Chang and Grabel counter all of these by referencing the historical record, as has already been explored to a degree in this paper. They again bring attention to the fact that economic development has occurred generally under conditions of protection and state-led development, with development with conditions of free trade being the exception. More recently, this is brought home with the reality of the development of the "Asian Tigers," who extensively used industrial policy and only partially adopted to Washington Consensus policies.

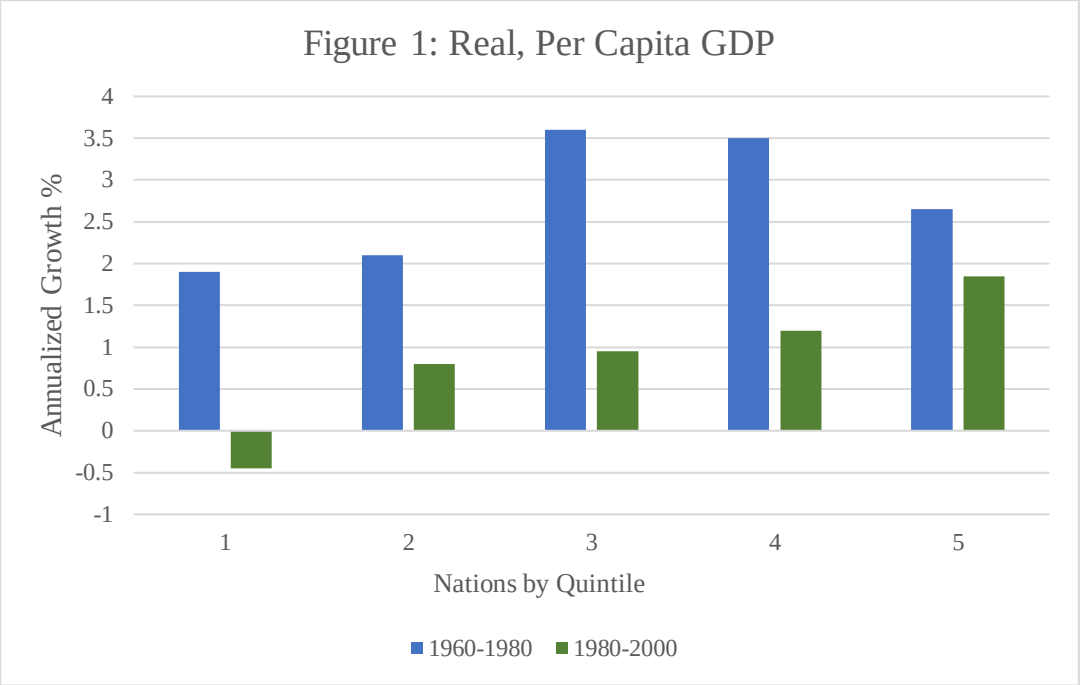
In response to continued calls for tariff reductions, Chang (2005) has repeatedly claimed that developing nations should be reasonably allowed more leeway in adjusting their tariff rates if agreed upon reductions are too drastic and the costs of adjustment are larger than had been calculated. Furthermore, he points out that the degree of reduction for some developing nations is much more drastic than others (for example, a reduction from 70-10% compared to 15-10%) and may have an outsized effect on the nation. Chang and Grabel (2004-5) also discuss the importance of development finance as the institutional compliment of industrial policy, warning of its dangers in the context of financial liberalization instead. Strong capital controls, coordination of firm's taking position with foreign debt, and directed encouragement of foreign direct investment with the goal of growing export capacity are all important factors in a nation's development as well. Chang (2005) concludes that a fairer approach would make the developed world give up its protection concerning agriculture and textile production (something the developed West has always maintained is necessary in their trade agreements), along with more flexible tariff reductions for the developing world and state-led development policy. Chang (2015) specifically speaks to Africa as well, stating no discernable reason as to why such industrial policies shouldn't work on the continent, given that Africa is more institutionally developed than the industrialized West was at a comparable level of income. All in all, Ha-Joon

Chang cast much doubt on the touted gains of trade liberalization and its ability to develop the Third World.

Further evidence concerning the effects of trade liberalization on the world economy and the growth of developing nations can be found elsewhere as well. Jose Antonio Ocampo and Lance Taylor (1998) found when looking at the effects of trade liberalization in developing economies that the benefits of liberalization were modest, with those countries with the highest rates of growth (such as the "Asian Tigers") as demonstrably not following a *liberal* trade policy regime, with targeted and informed government intervention and protection of export industry. And, in as much as manufacturing is the driving force of economic growth, the deindustrialization of much of the developing world after the first wave of neoliberal policy reforms (such as in Mongolia), brought about by liberalization, exchange rate appreciation, and higher interest rates combined with austerity policy, could have long run growth implications for the developing world. Furthermore, in an additional paper a year later, Lance Taylor (1999) found that globalization had led to increasing household inequality, with increasing returns going to the top 10-20% of the population. Liberalized capital flows had helped some nations grow, but this came along with significant downside risks in rapidly changing market conditions leading to national illiquidity and exchange rate appreciation in the wake of liberalization which could lead to significant output losses and rising unemployment.

Mark Weisbrot, *et al.* (2001) found that the era of globalization, defined as the two decades between 1980-2000, saw massive reversals of the growth rates seen in the two decades prior, 1960-1980. Breaking countries into five groupings, each quintile representing the respective distribution of per capita income at those times, Weisbrot, *et al.* are able to compare the respective rates of growth from the two sets of decades. Notably, almost all countries experienced much slower and sluggish growth – some even negative growth – in the 1980-2000 period. The most severe reversal was within the two middle quintiles. They posit that while this data does not prove that the policies of globalization are the exact cause of this slow down, they at least present "*prima facie* [evidence] that some structural and policy changes implemented during the [1980s to 2000s] are at least partly responsible for these declines" in GDP growth in the developing world. For example, nations that started in the second set of countries saw their GDP growth decline from an annual average of 2.1 percent to 0.8 percent in the 1980-2000

period, while nations that started in the third set of countries saw their GDP growth decline from 3.6 percent to just under 1 percent. Some nations that started off in the poorest grouping, the first group, even fell into negative GDP growth. These results are provided below in Figure 1. Such a loss of growth implies the lost potential of lifting millions of the poor out of poverty, and a potential failure of the first round of globalization.



Source: Weisbrot, et al. (2001)

Mark Weisbrot and Dean Baker (2003) provide an additional investigation into the relative impact of trade liberalization on developing countries, as well as investigating the modeling assumptions and techniques used to create analysis that favors free trade policies. Simply put, Weisbrot and Baker critique the common assumption of full employment and the choosing of model closures that favor liberal policy conclusions. The wide range of possible alterations to the basic computable general equilibrium (CGE) models used also allows for a wide range of results, such as a Presidential Council of Economic Advisor's report from 1994 that found trade liberalization would bring about $200-100 billion in gains, while another model by Brown, Deardorff, and Stern (2001) only predicted a gain of $12.7 billion. These models also tend to assume that lost tariff revenue from the removal of trade barriers will be replaced with lump-sum taxation - a technical impossibility in the real world. Furthermore, these same models

predict larger gains from the removal of trade barriers for the developing world, rather than for the developed world. This would be to imply that a unilateral reduction of trade barriers (only in the developing world) would yield greater benefits to the developing world over the reduction of trade barriers in the industrialized core. Weisbrot and Baker (2003) point out that such a result comes about in the model because developing countries already have higher tariffs, and therefore have more room for greater reductions. Additional considerations are given concerning the need for growing foreign exchange reserves after liberalization and the growing financing constraint this presents.

Ha-Joon Chang (2003b), again, reflecting after the collapse of a WTO meeting in Cancun in 2003 seems to reiterate many of the same points. As already stated, Chang points out that the economic record shows that the growth rate of the world had fallen from 3.2 percent to 2 percent between 1960-1980 and 1980-2000 - the same time periods used by Weisbrot, *et al.* (2001). Specifically, this fall in growth for developing nations is calculated as moving from 3 percent to 1.5 percent annually. For Chang, the view that reciprocal trade liberalization would bring about gains for all countries is based on a highly unrealistic model, such as the Heckscher-Ohlin-Samuelson trade model of comparative advantage with its factor-price equalization. Additionally, the one-sidedness of the WTO meetings demonstrated a bias in favor of the already developed, industrialized core over the developing nations of the world, of whom had less representation when bargaining over trade deals. The continued denial of protectionism for developing nations, according the Chang, has devastating consequences for their long-term growth.

A much later review of the CGE models being touted in defense of greater trade liberalization is given by Frank Ackerman and Kevin Gallagher (2008). They conclude that there are three main flaws with these models: 1) the gains talked about from liberalization are often small, especially for developing countries, 2) there is little consensus on the extensions made to these CGE models beyond the basic design, and 3) that the unrealistic assumptions utilized by many of these models mean that questions of employment effects, income distribution, and long-term growth are excluded by design. Of the models looked at, Ackerman and Gallagher focus on the Global Trade Analysis Project (GTAP) model, which according to them is the most well-known and used variant, as well as the World Bank's LINKAGE model.

Comparing the two models, Ackerman and Gallagher (2008) look at two main papers. The first is a CGE model of the global benefits of trade liberalization by Thomas Hertel and Roman Keeney (2005), which used GTAP 6 data, reflecting the world as it was in 2001. Their findings show that most of the benefits of removing trade barriers concentrate in the developed world, with gains only showing as larger when looked at in terms of percentage of GDP for the developing world. Furthermore, those gains to the developing world are concentrated in Argentina, Brazil, India, China, and Vietnam (also contingent on whether manufacturing or agricultural industries are liberalized). The second paper, by Anderson, *et al.* (2005), used the World Bank's LINKAGE model and attempted to model a more dynamic process, working with 2001 data and projecting up to 2015. This model also showed similar results, with gains also concentrating in the developed world, and the gains for the developing world concentrating (half of those gains) to a similar listing and number of countries.

In comparison, Hertel and Keeney (2005) found that total liberalization would bring about global gains of $84 billion, while Anderson, *et al.* (2005) found gains could be as high as $287 billion, while if correcting to have a similar static picture as in the first model, the gains could be $156 billion. The LINKAGE model also provided for potential "Doha scenarios" in which full liberalization was not achieved, giving gains still of about $96 billion. The wide range of potential gains from liberalization is telling, and as noted by Ackerman and Gallagher (2008), largely has to do with the structure of the models, the data of choice, and the extensions added to the model (e.g., LINKAGE adopts dynamic productivity assumptions while the GTAP models typically do not).

Ackerman and Gallagher (2008) also point to large variations in the predicted number of people lifted out of poverty from such liberalization measures. For example, Anderson *et al.* (2005) suggest a poverty reduction of 6 million people, or roughly 0.3 percent of the global poor, based off their numbers. Alternatively, William Cline (2004) suggested a reduction of 438 million people. Ackerman and Gallagher suggest that the difference in these numbers arises from Clines decision to use GTAP 5 data (which reflects the world as it was in 1997-98) rather than GTAP 6, so gains already achieved from prior liberalization are counted again. Additionally, Weisbrot, Rosnick, and Baker (2004) criticize Cline for calculation errors, which when corrected for drop his predictions by about 100 million. Further corrections, such as recalculating Cline's model

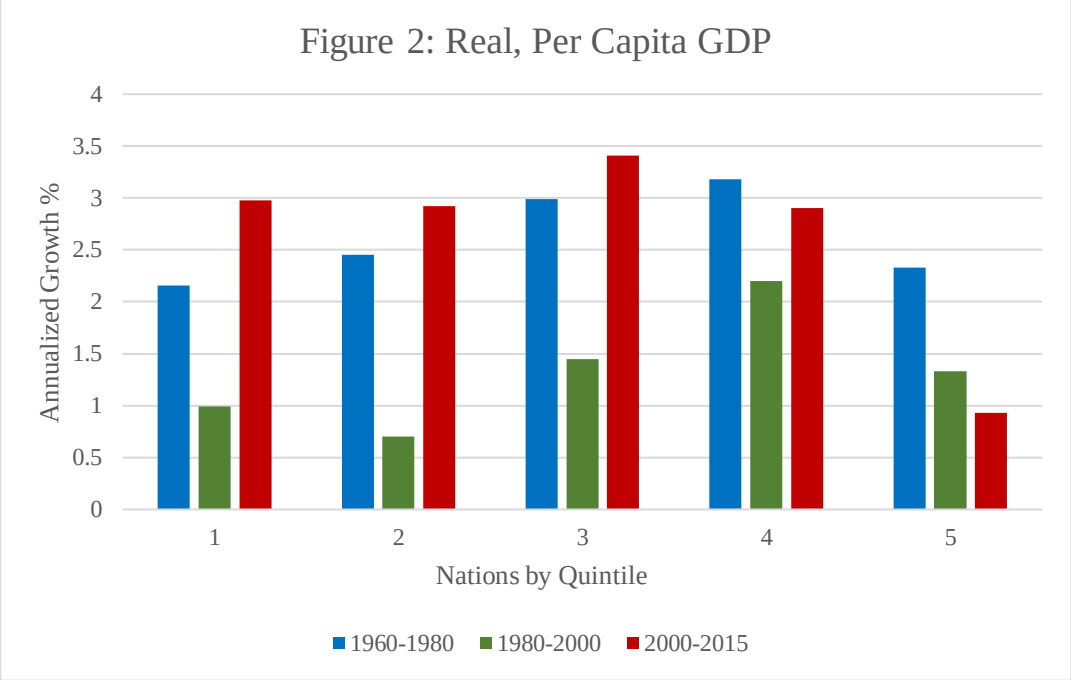
using GTAP 6 data instead, leads to results that are much closer to Anderson *et al.*'s (2005) number of 6 million.

Some innovations to the standard CGE model are noted by Ackerman and Gallagher (2008), but as stated before, there is no consensus on these extensions. For example, Brown, Deardorff, and Stern (2002) provide a model which attempts to incorporate New Trade Theory, or increasing returns to industrial manufacture, rather than constant returns to scale. Their results still find gains to trade liberalization, but only with the removal of trade barriers around industrial manufacture - a reversal of a trend noticed in almost all other CGE models, being that agricultural liberalization brings about gains while manufactures liberalization tends to bring about losses. Interestingly, these results also fly in the face of most New Trade Theory proponents, who argue for protectionism to help develop industrial capacity. Another innovative paper mentioned is given by Francois, *et al.* (2003) and their attempt to develop "tariff-equivalent" numbers for international trade in services - since trade barriers to services generally have to do with lack of access to markets rather than distorting tariffs. While such a development is interesting, Ackerman and Gallagher note that it is not clear what the appropriate way to model the trade of services internationally is.

More importantly, Ackerman and Gallagher (2008) point to the static structure of most of these models. They do not provide insights into long term growth, and the purported gains from the liberalization are a one-time thing - there is no promise of continued GDP growth at that level. The structure of the CGE models used for trade also have significant sensitivities when it comes to the choice of parameter values. Taylor and von Arnim (2006) demonstrated the importance of Armington elasticities and the values chosen for them, with different values giving wildly different conclusions. Joseph Stiglitz and Ed Charlton (2004) in another review also lamented about the poor fit of standard assumptions for CGE trade models and the reality of much of the developing world. Constructing models that guarantee full employment and implement Say's Law do not correspond well with the brute facts of chronic unemployment, underutilization, and informal production. Much of these models also assume that jobs are, as said before, created when workers are displaced so that full employment is maintained - another assumption that neglects the reality of social displacement and dispossession in the history of capitalist

development. Overall, there's much to question about the legitimacy and usefulness of the reigning set of behavioral assumptions and choices of closure.

As a final reflection of the reality of the developing world and the effects of globalization, we can look at the final two reports from Weisbrot and the Center for Economic and Policy Research's (CEPR) Scorecard Report series on development. Mark Weisbrot and Rebecca Ray (2011), using the same methodology as Weisbrot, *et al.* (2001), found a small increase in growth rates for nations at all quantiles, but the rate of growth itself remained sluggish. This third period, running from 2001-2010, saw an improvement most likely because of the rapid ascendancy of China, as well as growth in India, and due to changing market conditions internationally. David Rosnick, *et al.* (2017) updates this analysis again, and finds that this increase in growth is maintained when the date range is expanded to 2001-2015. Only with the exception of the fifth quantile, all quantiles recovered in their growth to at least levels prior to the 1980-2000 period. This updated data is presented below in Figure 2.



Source: Rosnick, et al. (2017)

Rosnick, *et al.* (2017) go further to analyze the strong effect the growth rates of China and India have on these averages, finding that India marginally affects the rate of growth and drops the

global country average from 4.28 to 3.98 percent, while removing China from the data set drops the global country average from 4.28 to 3.24 percent. In large part then, it can be reasonably argued that this global growth recovery is not a story about the success of globalization, but a success story about China's chosen development and globalization strategies – their industrial and trade policies. They also suggest that the IMF's loss of power and influence with most mid-quintile countries may have aided in their increased growth rates, contributing to a greater global average overall. But most importantly, as Weisbrot and Ray (2011) pointed out, "[the] Chinese economy is still, after more than three decades of reform, very much a state-led economy." A large part of the recent success in growth cannot be attributed to the neoliberal policies implemented in the 1980-2000 period, as closer inspection reveals that much of this success has come from countries who bucked these norms. If anything, the financial collapse and the exposure of the fraud committed by major Anglo-American financial institutions, among others, signals that the growth of the developed West may have largely been based on speculative bubbles and financial market frenzy – strategies that have failed to bring the developed nations out of their current stagnation.

THEORIES OF TRADE & COMPARATIVE ADVANTAGE

The question remains then as to why free trade is considered *the* policy solution for global development and alleviation of poverty, why tariffs and trade barriers are seen as inefficient and cost producing, and why state intervention and industrial policy is ruled out almost entirely (except when the developed nations require it during business cycle downturns). For the sake of simplicity, we can examine this by placing theorists into two general camps: free traders and protectionists. Free traders typically place their origin with David Ricardo and his Law of Comparative Costs, although significant modifications have been made to his theory by others within the neoclassical tradition. Those placed in the protectionist camp are done so mainly in their opposition to the purported benefits to free trade, rather than any particular policy or theoretical point of view. Historically this view is placed with the Mercantilists but has its more developed form with the likes of Karl Marx or John Maynard Keynes, who, while not Mercantilists themselves, defended aspects of this tradition as reasonable. More contemporary scholars such as Erik Reinert and Ha-Joon Chang are also notable here. Developments beyond this have been on the nature and determination of exchange rates, the terms of trade, and the current and capital accounts of a nation. Although the neoclassical tradition will be explored, this paper admittedly will draw the majority of its influence from the Marxist, Structuralist, and Post-Keynesian perspectives.

Famously, David Ricardo (1817) and his *Principles of Political Economy and Taxation* laid out the foundation for the consensus around trade theory in the modern era. In opposition to the Corn Laws of his day, Ricardo argued that free trade would be beneficial to a nation because it would allow trading partners to specialize in their own comparative advantages, making everyone involved better off. In his classic example, Ricardo demonstrates this principle by looking at two countries, England and Portugal, and their production of two goods, cloth and wine, within autarky and afterwards with opening trade. By comparing the relative costs of production in each country, given in Table 2 below, he is able to show how trade between the two countries can increase total production of both goods and allow each country to specialize in their own comparative advantage by doing so. Note, that in this example Portugal starts with an absolute advantage in the production of both goods, but nonetheless a mutually beneficial arrangement can be made.

Table 2: Example of Ricardo's Law of Comparative Costs with Specialization

Country	**Cloth Production in Units of Labor Hours**		**Wine Production in Units of Labor Hours**	
England	15		30	
Portugal	10		15	
	Before Trade		**After Trade**	
	Cloth	**Wine**	**Cloth**	**Wine**
England	8	5	18	0
Portugal	9	6	0	12
Total	17	11	18	12

Source: Reinert (2007) gives this example in Appendix I. Ricardo's original example is found in cited text.

As seen in the example, although Portugal has an absolute advantage (it requires fewer labor hours for each commodity production), it can benefit by specializing in the production of wine. This is because, as seen in the example given in Table 2, trade specialization allows for one more unit of each commodity to be produced, moving from 17 to 18 units of cloth and 11 to 12 units of wine overall. Notably, Ricardo's theory makes some assumptions. This is that there are no transport costs, there are only two goods being produced and they are homogenous in nature, factors of production are perfectly mobile, there are no tariffs or other trade barriers, and there is perfect knowledge allowing buyers and sellers to know where the cheapest goods can be found. Additionally, capital flows largely do not exist in this model, and Hume's specie-flow model is utilized to explain how this comparative specialization is supposed to bring the model back to balanced trade (this is akin to the Mundell-Fleming model in contemporary times). Founded in Ricardo's labor theory of value, he is able to demonstrate that trade would be beneficial to nations – an argument made in the context of debates over corn tariffs in England at the time.

Although not universally accepted at the time, Ricardo's theory has had a profound influence on the discipline – especially with Anglo-American economists. Such a theory was the theoretical and rhetorical basis of the British empires policy shift towards free trade in the late 1840s. This theory also lays the foundation for more contemporary models, such as the Heckscher-Olin-Samuelson model with its factor-price equalization as a way of incorporating marginalism in place of Ricardo's original labor theory of value approach, while at the same time maintaining

his Law of Comparative Costs. It's fair to say that comparative advantage, then, has become a largely uncontested consensus within the economics discipline up to this day in the developed Anglo-American nations, although there are some notable exceptions to this generalization.

Paul Krugman (1979, 1980) built on this consensus post-WWII, which was formalized in the Heckscher-Ohlin-Samuelson of comparative advantage in trade – whose adjustment mechanism to the model was, again, factor-price equalization. Noting that the patterns of trade wasn't fully explained by such a theory, Krugman sought to develop more content into the theory that could be corroborated by the empirical data available. This was done by constructing a general equilibrium model of noncomparative trade between two nations (identical in capabilities, endowments, and tastes, etc.), driven by increasing returns internal to firms. His model utilizes a simplified version of Dixon-Stiglitz monopolistic competition and product differentiation between firms. Within this construction, opening trade between the two countries acts as an increase in the labor supply of both, which increases the level of output as well as product variety itself. Thus, according to Krugman, trade need not result from technological or factor-price differences, but "may simply be a way of extending the market and allowing exploitation of scale economies." This formed the basis of what came to be known as New Trade Theory, with its addition of increasing returns to scale with international trade.

Another common reference in the contemporary economics literature on international trade, and often times the author of a class's textbook, is Robert C. Feenstra. Addressing the question of protectionism directly, Feenstra (1992) identifies numerous ways in which trade barriers produce costs and welfare losses for the protecting nation and its trading partners. He argues that rents arising from import quotas should not be thought of as simple, non-distortionary transfers to trading partners, but rather as disguised efficiency losses for trading partners. Interestingly, renowned free trader Jagdish Bhagwati and T.N. Srinivasan (1980) once argued that the assumptions of rent seeking do not carry over with tariff and revenue seeking, with results from Heckscher-Ohlin-Samuelson variant models showing ambiguous or positive welfare results. Nonetheless, Feenstra was well within the disciplines consensus in stating such a conclusion. Numerous other studies are also cited by Feenstra, providing evidence of deadweight and efficiency losses from import tariffs and quotas, all modeled within the

framework developed by Paul Krugman (1989, 1991) for trade regimes within monopolistic, rather than perfect, competition.

Robert Feenstra and Hiau Looi Kee (2007) also found links between trade liberalization and increased product variety within monopolistic competition by examining the effects of NAFTA on Mexico compared to the opening of China's economy. Later, Feenstra (2006) examines other possible gains from trade under monopolistic competition models, such as price reductions due to increasing returns to scale and the self-selection of firms with only the most productive surviving internationally after trade liberalization. Feenstra finds no evidence that trade liberalization leads to price reductions because of firms' greater abilities to tap into increasing returns to scale, and instead comes across negative findings in the literature. The only case of falling prices is given by Badinger (2007), who finds some evidence of a reduction of markups after the Single Market Programme in the EU. From this perspective, Feenstra claims that the issue of currency unions and the gains from trade liberalization is an open question. Beyond additional evidence in defense of increased product variation, Feenstra also finds evidence that trade liberalization would lead to an increase in the average productivity of firms. Because exporting firms tend to have higher productivity than their non-exporting peers within the industry, trade liberalization will lead to increased competition as domestic producers are outcompeted by cheaper imports.

In his latest review, Feenstra (2018) summarizes these findings as modern trade theory, allowing for several sources of gains in trade in addition to traditional comparative advantage. Feenstra grounds these additional gains in trade in Ricardo, such as with increased product variety resulting from trade, because Ricardo proclaimed, "foreign trade… [is] highly beneficial to a country, as it increases the amount and variety of the objects which revenue may expend." All of these gains in trade are demonstrated in models that assume monopolistic competition, which still produce productivity gains and increased product variety as a result of trade liberalization. Harkening back to Bhagwati (1965), Feenstra stresses evidence that suggest trade barriers such as import quotas would inhibit the competitive pressure of imports and thus reducing a possible gain from trade. Citing recent work by Caliendo *et al.* (2017) on tariffs and other trade barriers, Feenstra even claims that the results "imply that ongoing efforts to liberalize trade under WTO are important because it is quite possible that countries have first-order gains from reducing

tariffs even when tariffs are small." Thus, Feenstra concludes from his findings and others work that the evidence is supportive of the benefits of trade liberalization and the removal of most trade barriers is reasonable and would bring increased welfare gains for nations that partake in such reforms. Ricardo's comparative advantage holds as sound economics.

Of course, comparative advantage is not an uncontested principle when one looks outside what is considered neoclassicalism. A critique of comparative advantage from a Marxist perspective that's worth noting - and there are many of them - is written in a series of papers from Anwar Shaikh (1979, 1980a, 1980b). In them he examines Ricardo's Law of Comparative Costs and its derivation from Ricardo's theory of price and his theory of money. Noting that most critics, neoclassical *and* Marxist, maintain the validity of Ricardo's law and instead point to an *ad hoc* addition with which to fine tune it, or claim that Ricardo's law only works within a free market and is therefore invalid in an age of monopoly capital, Shaikh proposes an actual critique and refutation of the Law of Comparative Costs grounded in Marx.

Shaikh (1980b) begins by looking at two components of the Law of Comparative Costs: the principle of comparative advantage and some automatic mechanism that regulates the pattern of trade in accordance with that principle. The first principle can be simply explained by taking two goods, a and b, and two nations, 1 and 2, and comparing their relative price ratios. This can be written as $\left(\frac{p_a}{p_b}\right)_1$ and $\left(\frac{p_a}{p_b}\right)_2$. If $p_a < p_b$ and is smaller in the first nation compared to the second nation, then $p_b < p_a$ in the second nation. Between these two sets is the range of comparative advantage. Explained by Shaikh (1979) using Ricardo's classic England and Portugal example as well, we can see how this principle operates within international trade (a similar example was given above in Table 2). Assuming both England and Portugal produce cloth and wine, but England produces cloth in 100 working hours and wine in 120 working hours, while Portugal produces cloth in 90 working hours and wine in 80 working hours. Thus, Portugal is more efficient and can produce more cheaply, making England uncompetitive, importing cloth and wine instead and producing a trade deficit with Portugal. This trade deficit is financed with gold, so the supply of gold is steadily drained from the English economy into the Portuguese economy. But this drain causes the supply of gold to be less than demand, making the commodity prices fall in England and the relative money prices to rise in Portugal.

Because cloth is closest to being equally costly between England and Portugal, this is the first commodity that will become a comparative advantage in trade for England. Vitally, for this result to occur, is the second component mentioned earlier. This model relies on the quantity theory of money to adjust the terms of trade such that the trade deficit is balanced or reversed.

Shaikh (1980b) explains how this automatic mechanism has lived on as the required structure to make comparative advantage work as Ricardo described. The Heckscher-Ohlin-Samuelson model replaces Ricardo's labor theory of value with a marginalist approach, the Law of Factor Proportions, where the real social costs of a commodity to the nation are the commodities it must forgo - meaning that, again, full employment is assumed. The simpler Heckscher-Ohlin model also attributes cost differences to the national endowments of capital and labor, which helps justify global inequalities and uneven development in the name of comparative advantage. All of these criticisms of Ricardo and improvements on his model maintain the validity of comparative advantage within their models.

Shaikh's (1980a) own criticism is founded in Marx, who develops the connections between value and money price on the assumption that prices of production are directly proportional to values. Equalization of profit rates and a general rate of profit necessitate a transformation in the form of values from direct money prices to prices of production. If the sum of prices is equal to the sum of values divided by the value of a unit of money (gold), and the total amount of money required for circulation is equal to the sum of prices divided by the velocity of circulation, then the total money required for circulation is the sum of values divided by the value of a unit of money times the reciprocal of the velocity of money. Shaikh claims that Marx rejects that a pure increase in the money supply would lead to a pure increase in prices. Instead, an increase in the money supply will lower the rate of interest and increase effective demand, but it would not raise prices in the long run. They would initially rise but fall back to the point of profit equalization. Thus, there is no "automatic mechanism." Nations with a trade deficit will stay with a chronic deficit balanced by a gold flow, with fluctuating interest rates to clear the model. From this perspective, Shaikh is able to conclude that absolute advantage will not transform into comparative advantage because of changes in the money supply. Rather, absolute advantage is the rule, with firms seeking simply to produce at the lowest unit cost for the going rate of profit.

Later, Anwar Shaikh (1999) is able to expand his criticism of comparative advantage by turning his attention to exchange rates. For Shaikh, real exchange rates between nations (or the international terms of trade) are determined by equalization of profit rates across international regulating capitals, with socially determined national real wages. If capital is allowed to circulate internationally, then it will search for the highest rate of return – with technological innovations causing profitability to rise and wane in industries as capital moves into industries with higher rates of profit, saturating them and working to equalize profit rates in the long-run. Thus, the profit rates in the investment of regulating capitals is what drives the process, meaning that absolute cost advantage is what rules prices and competition. In a similar manner to national prices, the variability of terms of trade (which in this sense is the price of consumer goods for one country times the exchange rate $p_{cA} \cdot e$ divided by the price of capital in the regulating country p_{kB}) is bounded by the positivity of sectoral profits. These adjustments in prices in accordance with the prices of production *do not guarantee balanced trade*. Rather, they may lead to a collapse of trade completely, or for differing national profit rates which causes flows of international capital to sustain the trade imbalance. In this way, Shaikh claims to have come at a formulation of Thirlwal's law via imbalanced trade rather than balanced trade.

In sum, Shaikh (1999) argues that the long-run real exchange rate is actually regulated by relative real costs of production and international capital flows. Free trade, then, simply reflects the structural inequalities in the real production costs of nations rather than a comparative advantage in production. In order words, absolute advantage. This would also imply that currency devaluations will not affect trade balances unless real wages or productive capabilities change as well. Hence, the race to the bottom in domestic wages with the increasing globalization of the world economy. Absent the ability to generate new industries and value-added production activities due to liberalization and neoliberal policy regimes, many countries are left with nothing else other than to lower their socially determined national wage level. Of course, Shaikh's analysis assumes the free flow of capital across international borders, suggesting that others insistence on the importance of capital controls for developing nations has some credence. In a context of largely liberalized capital flows, developing nations are left exposed to the potential of changing market conditions robbing them of investment as capital quickly leaves the country in search of higher rates of return.

Turning to examine the principle of comparative advantage when capital is bounded nationally and immobile, Ramaa Vasudevan (2012) builds an analysis very similar to that given by Shaikh (1999) and his price formulations. Vasudevan uses corn as the numeraire good and steel as it's capital good input for her own examples. In her first scenario, there is open trade and capital flows, with two countries, each specializing in one of the two goods. With this first result, she is able to show that the real exchange rate (the international terms of trade) is between the autarky relative prices of the two countries and their respective terms of trade once opening up to each other's economies. Differing real wages or techniques of production cause these results to disappear, with absolute advantage being the norm with a wide range of possibilities, wherein one economy potentially produces everything with the other only importing (meaning they are nationally uncompetitive on the global market). Vasudevan refers to this possibility as one which creates "empty production economies." Once capital immobility is introduced as an assumption, the trade balance becomes a consequence of quantity clearing. Comparative advantage follows if terms of trade are determined and lie between both nations' respective autarky relative prices. Trade based on the competitive technique choice of each nation is likely to result in incomplete specialization, with the larger country setting the terms of trade. In conclusion, Vasudevan finds that absolute advantage would be the norm driving the patterns of trade, with comparative advantage only arising in a situation in which capital flows are nationally bounded – a situation only brought about by active state policy, rather than free trade, in the current global context.

Other economists such as Ha-Joon Chang (2003a) also challenge the free trade doctrine, which he defines as the international development policy establishment, which pushes conservative macroeconomic policy, liberalization of international trade and investment, privatization, and deregulation. Rather, as stated before, Chang points to the historical record on protectionism, finding evidence that tariffs were powerful policy tools in the face of limited budgetary capacity and control over investment resources for developing states in the past. What is now the developed OECD by and large used tariff policy and other trade barriers to protect their own infant industries, along with coordinated import substitution, capital controls, and industrial investment. This flies in the face of the current consensus on the universal benefits of removing trade barriers and having free trade.

The view expressed by Chang above can largely be attributed to the scholarship of Erik Reinert (2007) and his work on trade and the history of thought surrounding the Mercantilist and Camerialist traditions. Reinert stresses the shortcomings of the assumptions laid out in the Ricardian theory, with its lack of distinction between increasing and decreasing returns in economic activity, as well as the historical record which demonstrates the prevalence of protectionism in the development of nations such as the United Kingdom or the United States, as already described above. Rather than "specializing" in what a countries comparative advantage at a particular point in time is, Reinert argues that nations should seek to emulate what the leading economies of the time are doing and attempt to develop their own increasing returns industries, along with fermenting synergistic effects between urban environments and the rural countryside. To specialize in primary commodity production is to "specialize in being poor," as there are qualitative differences between different kinds of economic activity that can and do matter in the long-run. Using a counter example to Ricardo's, given by Franklin Graham – an American economist from the early 20th century – Reinert is able to clearly make this point. This is provided below in Table 3.

Table 3: Franklin Graham's Theory of Uneven Development with Specialization

	Country A: Before			Country B: Before		
Product	Man-days	Output per man-day	Total	Man-days	Output per man-day	Total
Wheat	200	4	800	200	4	800
Watches	200	4	800	200	3	600
	Country A: After			Country B: After		
Product	Man-days	Output per man-day	Total	Man-days	Output per man-day	Total
Wheat	100	4.5	450	300	3.5	1050
Watches	300	4.5	1350	100	2	200

Source: Reinert (2007) gives this example in Appendix III.

In order to make the point, we should note that the production of wheat is an industry facing diminishing returns (an often-cited phenomena given Ricardo's understanding of land rents and agricultural production), while the production of watches faces increasing returns as a value-

added industry. Before trade, country A and country B collectively produce 1,600 units of wheat and 1,400 units of watches, all valued in wheat units at 3,200 total. Country A captures 1,714 of this in total wheat units, while Country B captures 1,486 of this in total wheat units, with a price of 4 wheat to 3.5 watches. Thus, Country B is marginally poorer and more efficient in producing wheat relative to watches, while Country A is equally efficient in both.

If these two nations specialize, then Country A will specialize in watch production while Country B will specialize in wheat production because it is more efficient for A to produce watches than for B to do so. Because of the qualitative nature of these two industries, increasing production of wheat lowers the output per man-day, while increasing production of watches raises output per man-day. World production marginally changes, with a total of 1,500 wheat and 1,550 watches being produced, for a world total of 3,271 in wheat units. However, Country A now captures 1,993 wheat units while Country B only captures 1,278 wheat units of the total share. What was an unequal distribution of wealth is now even more unequal, as Country B has specialized in a diminishing returns industry and will see output drop as production expands, with Country A experiencing the opposite effect. Reinert (2007) was able to demonstrate this empirically when looking at the export activities of Andean countries in the 20th century, such as tin mining in Bolivia, bananas in Ecuador, and cotton in Peru. He finds results that corroborate this theory. Referring to Hans Singer, Reinert also notes that technological change does not help this situation, as technological advancement in primary commodity production tends to cause lower rather than higher export prices. In other words, it acts to lower costs rather than increase the overall value-added of a commodity.

With this in mind, Reinert (2007) also makes a distinction between “good” and “bad” forms of protection with relation to a nation’s development. To do so, he contrasts the East Asian and Latin American experiences in order to make a useful generalization.

Good protectionism, on this measure, works to temporarily protect new industries for the global market, leveraging very steep learning curves compared to other nations. Furthermore, it is based on a Schumpeterian view of the world (“creative-destruction”), with domestic competition maintained and the core technologies of production locally controlled. Profits here are created through a dynamic Schumpeterian rent-seeking. Massive state investments into

education and industrial policy will also create a demand for educated workers, which has to be met in terms of supply. An equitable distribution of land and incomes is favorable to this development as well. Finally, there has to be intense cooperation between producers and local suppliers (backward and forward linkages), as well as regulation of technology transfer which is oriented towards maximizing the knowledge transferred. Such approaches are those found commonly amongst the rapidly growing East Asian economies and is notably *not* a liberal path towards development.

On the other hand, bad protectionism often offers permanent protection of mature industries for the domestic market, with a learning curve that lags behind the rest of the world. Domestically competition is generally weak, and the core technology of use is typically imported from abroad or assembled abroad, creating an industrialization reliant on intermediate industrial imports – what Reinert refers to as a "superficial industrialization." Compared to good protectionism, there is significantly less emphasis on education and the industries protected do not produce a huge demand for educated workers. Hence, investment in education tends to feed into emigration creating a brain drain from the country. Institutionally speaking, nepotism also tends to be the norm rather than some form of meritocracy. Land and incomes tend to be highly inequal. Finally, profits are created through a static form of rent-seeking, along with confrontational relationships between producers and local suppliers. Such a situation is and was typical in the Latin American experience, and points to the difficulties that arose with the regions earlier import substitution industrialization policies.

As should be apparent by now, Reinert (2007) see's trade protectionism as a useful but context sensitive tool. In some instances, protectionism can be a good thing for a nation, while in others it may be limiting its overall development. On this metric, tariffs are neither good or bad *per se*. What they are is a vital policy tool available to developing and developed nations, dependent on the particular context of the country in mind. Referencing Friedrich List, he explains that the practical implication of this view is that free trade is good for some nations while it is devastating for others. The Listian approach would be to develop a theory of stages, in which infant industry protection is good up to the point of maturation, where equal economic trading partners can then open up to free trade in order to gain from trade. Such an approach would call for the steady development of economic regions and their integration overtime, utilizing trade

protection in order to bring some regions up to par with others, prior to opening markets fully. Thus, there is a Listian argument for free trade, but it comes *after* one has developed their nations industry and captured a chunk of global value chains to support their own growth. Such a view is not too dissimilar to Keynes, as will be explained below.

Another alternative contribution to trade theory in contrast to the neoclassical schools of thought is what is now called Post-Keynesianism - economists who see themselves as continuing the tradition of John Maynard Keynes and rejecting Samuelson's synthesis. One voice here is Paul Davidson (2002), who looks at the important contributions coming from Keynes's theory of money and international trade on the matter of globalization. For Davidson, Keynes gives us three clear takeaways: 1) that trade can modify the magnitude of the domestic employment multiplier, 2) reductions in money wages will worsen the terms of trade and reduce real incomes, and 3) stimulating domestic or foreign investment can increase domestic employment growth. Within this framework, Davidson argues that a Post-Keynesian analysis tells us that the traditional approach of lowering the cost of labor or depreciating the exchange rate will only foster economic stagnation. To the contrary, Keynes apparently argues that unless all nations actively pursue domestic investment policies, the free movement of capital and export-led strategies are an injury to all (e.g., the East Asian currency crisis of 1997 is given as an example). Keynes had warned that "the law of comparative advantage is only applicable after all nations have domestic demand management policies ensuring full employment." It's the dangers of unfettered capital flows which create serious international payment problems for nations which otherwise would be stable. The typical Post-Keynesian response then is to advocate for a new international monetary arrangement, such as in Davidson's (1992-3) case for a fixed-exchange rate regime akin to Keynes's *bancour* system, which would allow all nations to pursue full employment policies.

Such a view is strikingly similar to that expressed just moments ago as the Listian approach, as explained by Reinert (2007). Absent the reforms of the international system suggested by Davidson à la Keynes, it would appear that aggressively pursuing export-led growth strategies is a zero-sum game, with free trade of merchandise and capital flows making it worst. Arslan Razmi (2007) has provided some evidence that there may be crowding out effects when the developing world increases their exports because of a demand constraint from the developed

world (i.e., if the developed world's demand does not grow as fast as the exports of developing countries there will be intense competition amongst exporters with resultant losers). Looking at a group of 22 developed countries and analyzing the composition of their exports, Razmi shows statistically significant results indicating that there is indeed a crowding out effect – an effect which is reduced and even reversed when China is dropped from the grouping of economies. Therefore, it would seem that the rise of China has crowded out other developing nations in terms of their ability to export.

As an aside, "war by other means" in terms of trade and exports is not an uncommon theme in earlier theories of trade and imperialism. As Lance Taylor (1983) points out in his model on trade patterns and developing economies growth, developed economies are stimulated by higher net exports because it leads to faster growth, higher profits, and more capacity to use. Such a view was stressed by John Hobson (1901) and Rosa Luxemburg (1921) earlier on. Therefore, to take Razmi's findings from a different perspective and to make more sense of Keynes' zero-sum explanation, the evidence of crowding out effects would suggest exactly that. Not only is such a constraint binding on the developing world, it may help to explain tensions between the industrialized nations of the world and as to why some nations lag behind others – primarily because of the lack of new markets to access and "conquer" with their own exports. Without global coordination and reform of the international system, such an anarchic, dog-eat-dog reality is the brute fact of the global economy as each nation pivots to position themselves best to capture economic rents and market share in increasingly globalized value-production chains.

Earlier Post-Keynesian developments were also explored by Paul Davidson (1990-91), such as the concept of Thirlwall's Law. Developed by Anthony Thirlwall, the model transforms Harrod's trade multiplier mechanism into a demand-driven model that expresses a simple relationship indicative of the rate of growth a nation can achieve without running into a balance of payments constraint or a deterioration of the trade balance. The exports and imports of a country can be expressed as:

$$X_a = \left(\frac{P_d}{P_f}\right)^{zye_{rw}z}$$

$$M_a = \left(\frac{P_d}{P_f}\right)^{uye_a}$$

where z is the price elasticity of demand for country A's exports, u is A's price elasticity of demand for imports, e_a is A's income elasticity of demand for imports, and e_{rw} is the rest of the world's income elasticity. Thirlwall's Law of growth with a consistent unchanged balance is the natural log of the above. Therefore:

$$y_a = \frac{x}{e_a}$$

$$x = (e_{rw})(y_{rw})$$

$$y_a = \frac{(e_{rw})(y_{rw})}{e_a}$$

From this we can see that the rate of growth that a nation can maintain without a balance of payments problem rest on the world's real economic growth and relevant income elasticities. If $(e_{rw})(y_{rw}) = (y_a)(e_a)$, then $\left(\frac{y_a}{y_{rw}}\right) = \left(\frac{e_{rw}}{e_a}\right)$. And, if $\frac{e_{rw}}{e_a}$ is less than one nation A will grow slower than the rest of the world.

By implication, if this last point is true, then lesser developed nations in theory are condemned to relative poverty with increasing global inequality overtime. Or, if it were to become true, a nation would steadily fall behind and sink into relative backwardness. Davidson in this situation calls for policies that would increase the elasticity of demand for lesser developed nation's imports, or a Marshall Plan-type aid rollout and debt forgiveness in order to develop the rest of the world. The conclusions drawn about international trade in the contemporary globalized context are roughly similar to that of Anwar Shaikh or Erik Reinert. Free trade does not guarantee the development of all member-nations of the international economic community. And, in fact, the structures and laws of the economy may make it such that free trade will necessarily bring about the exploitation of weaker economies by the more developed nations of the world. Free trade may only be appropriate for partners on equal footing, because Thirlwall's Law suggests that international financial imbalances can have severe growth consequences and that only Keynes-like demand management policies can combat this inequality.

Just as Davidson helps challenge the notion that lowering the cost of labor can help a nation improve their balance of payments, Hyman Minsky and June Flanders (1956) also challenge conventional wisdom when they examine the effects of exchange rate depreciation, as well as how the terms of trade plays into both the balance of payments and the exchange rate. His theoretical work here shines a unique light on the mechanics of international trade and trade theory in a typical Minskian fashion. Posited earlier by Minsky (1949), Minsky and Flanders (1956) formalize how the balance of payments is affected by the elasticities of imports and exports as well as the exchange ratio. This is defined for a domestic currency as:

$$kp_{xh}q_x\left(\frac{\epsilon_x(\eta_x+1)}{\epsilon_x+\eta_x}\right)+kp_{mh}q_m\left(\frac{\eta_m(\epsilon_m-1)}{\epsilon_m+\eta_m}\right)$$

where k is the rate of change of the exchange ratio, p_{th} is the price of exports or imports of the home country, q_t is the quantity of exports or imports, ϵ_t is the demand elasticity of exports and imports, and η_t is the supply elasticity of exports and imports. Based off this determination, one can predict the conditions required for policy such as exchange rate depreciation to improve the balance of payments. For Minsky, this is indicated in the given formula. If the sum of elasticities of demand is greater than 1, then depreciation could improve the balance of payments, although it need not always do so. If terms of trade are to improve (p_x/p_m), it's necessary and sufficient that the product of the demand elasticities be greater than the product of the supply elasticities. He further formalizes the conditions for a change in the balance of trade and in the terms of trade as follows, respectively:

$$\eta_x\eta_m(\epsilon_x+\epsilon_{m-1})+\epsilon_x\epsilon_m(\eta_x+\eta_{m+1})$$
$$\epsilon_x\epsilon_m-\eta_x\eta_m$$

From all of these formulations, Minsky is able to identify the possible range of adjustments that can occur when considering the exchange rate, balance of payments, and terms of trade.

Minsky provides two theorems based off this. First, if the terms of trade improve, or remain unchanged, as a result of depreciation, the balance of trade will improve. Secondly, if the balance of trade deteriorates, or remains unchanged, as a result of depreciation, the term of trade

will depreciate. This can be seen within the confines of a Cartesian plot, with the terms of trade as the y axis and the balance of payments as the x axis. Minsky theorizes that it is possible that we may live in a world where depreciation results in a deterioration of both terms of trade and the balance of payments. For such a reality to be maintained requires at least one country that can appreciate their currency while still being accepted as a currency by all other surplus nations.

Much later, Minsky (1979) began to theorize on what sound policy for a nation that acts as the international reserve currency, such as the United States, should pursue in order to maintain that status. Again, Minsky suggests that the international reserve nation should appreciate their currency relative to others as well as retain the ability to make their currency scarce if need be. The main example he gives is the Bank of England under the gold standard. To quote Minsky at length, "[whereas] the demand for non-central currency in the international monetary system is almost entirely determined by the competitive posture the international market places on the country's output, a large portion of total demand for the currency that is central… is determined by financial flows due to outstanding financial instruments and the buying and selling of financial instruments."

It is in this sense that Minsky warns of America's new (at the time) trade deficit and the implication it had for the scarcity of U.S. dollars. Furthermore, he warns that there must be a "strategy which resists efforts of others to switch from dollars to other currency-denominated obligations… to prevent depreciation of massive dollar assets." It is strange to read Minsky's work here and realize that the United States still runs a trade deficit, has continually depreciated the value of the dollar at least since 2002, and has still somehow maintained its status of the reserve currency. Of course, geopolitical considerations abound on this topic. Nonetheless, Minsky provides a needed perspective as to why countries that do *not* issue the international reserve currency face serious economic difficulty if they continue to run a trade deficit.

The theory of trade we hold, of course, effects how we go about modeling the economy and what we expect to see happen. As has already been discussed, many of the model assumptions necessary to find gains in trade from further liberalization come from the tradition of David Ricardo and its marginalist, neoclassical additions and tweaks from over the years (what some

would call it's added "bells and whistles"). While this paper does not seek to be a flat-out rejection of all of these theoretical assumptions, what has been sought after is an expansion of our understanding concerning the mechanics of trade and development beyond the conception of comparative advantage. This knowledge, then, can be used to build better and more realistic models concerning the effects of trade, as well as models that are better geared to answer specific questions. Furthermore, the Post-Keynesian contributions of Wynne Godley and Marc Lavoie (2012) are to be utilized in constructing a macroeconomic model in place of the popular CGE approach.

In sum, while comparative advantage may be true in some conditions, there is ample evidence and theoretical argument to suggest that there is no reason to believe that comparative advantage is the general law. Absolute advantage, arising from differences in prices of production, profit rates of capitals, and technological capabilities, is an often-unavoidable reality when nations open up to trade with one another – especially in the context of trade between developed, industrialized nations and the developing nations of the Global South. Therefore, sounder assumptions about the structures of economies trading with one another, and the effects this trade will have in the long-run, are a necessary component of any aggregative macroeconomic model which attempts to simulate and predict the effects of trade policies and international trade. This would further imply that the assumptions use may vary widely depending on the two nations we attempt to model trade between, and furthermore that a global trade model may be damningly complex and difficult to interpret appropriately. Nonetheless, in a simple theoretical arrangement, this paper will explore the possibilities of alternative modeling techniques to the commonly used CGE models for open economy contexts.

METHODOLOGY & SFC MODELING

Traditionally, the model of choice when it comes to trade policy has been CGE modeling. Many World Bank reports on trade liberalization used such modeling techniques, as indicated by Weisbrot and Baker (2003) and Ackerman and Gallagher (2008). Lance Taylor has pioneered heterodox methodologies using CGE modeling as well, showing how different closures can be used for various applications. However, the shortcomings of such an approach are apparent when it comes to studying the impacts of financial markets on real markets, and vice versa. The stock-flow-consistent (SFC) modeling approach of Wynne Godley and Marc Lavoie (2012) provides a rigorous alternative to the traditional CGE trade models, and even Lance Taylor has played in developing his own variant. As indicated by Sebastián Valdecantos (2012), such a modeling technique can be combined with the Structuralist insights of scholars such as Taylor's when it comes to modeling developing economies in the Third World.

The seminal work here is from Lance Taylor (1983, 1990, 2004), and his many books on the subject. In his *Socially Relevant Policy Analysis*, Taylor (1990) goes over the general assumptions and construction of Structuralist CGE models. These approaches typically model the economically relevant set of agents and institutions, which are specified and fitted to the data by creating an extended functional distribution. Furthermore, these models are not "real" but nominal and in money terms, as agents work with and react to the latter. Prices are under varying degrees of control by certain groups, and these money accounts make it easy to link good-producing and financial sectors through flows of funds. Questions of how much economic rationality and price-mediated substitution to include in the model is relevant to the specific question at hand and the economy in question. Finally, a selected adjustment mechanism has to be built into the equations – meaning that the model's closure has to be chosen and justified on the basis of empirical and institutional analysis of the economy at hand.

Often, as Taylor points out, the main distinctions between neoclassical and heterodox CGE models has to do with the choice of closure in the model. Originally identified as fundamental to the behavior of a model, Lance Taylor and Frank Lysy (1979) demonstrated with a compact, one-sector income-distribution model how differing closure assumptions can lead to wildly different results in the price level variation and wage-profit shares. Interestingly, in their

experiment the level of real GDP and inequality measures did not radically change much when they shocked different exogenous variables. Nonetheless, their findings suggest that a model's fundamental assumptions and choice of model closure generates the results of the model. In other words, modeler's can predefine the results of their model. Taylor (2004) later on claims that "precisely because [these models] are counterfactual, such thought experiments are irrefutable." For that reason, a model's closure ought to be grounded in theory and an empirical analysis of the economy in question.

Some typical choices of closure given by Taylor (1990) are the use of output adjustment, forced savings, or the determination of investment by saving supply. For example, an output adjustment closure (or the mark up model) allows for a diversity of reactions running from demand injections, in which the neoclassical variant is more constrained. Forced savings assumes full capacity or employment, which can cause problems with the neoclassical model. Other closure choices can be the addition of endogenous variables, a loanable funds theory of interest rate effects, the real balance effect, and positive effects of inflation on demand.

Working with open economy models, Taylor (1990) notes that there are two main ways to close them. First, one method of closure is done with imports being determined by demand and the trade balance is endogenously determined. Secondly, another method of closure makes the trade balance exogenously determined as a binding constraint. Taylor explains that output expansion is likely in a model with high values of its export elasticity, worker's savings propensity, and the ratio of exports to imports. If the world demand elasticity and worker's savings propensity is low or the trade deficit is large, then output contraction after devolution is likely as a result. Such responses are shown econometrically in many developing economies and structuralist CGE models, according to Taylor.

Considerations of models with basic and complex sectoral breakdowns are provided as well, with Taylor (1990) explaining various techniques at finding input-output coefficients, capital coefficients, and other parameters such as consumer demand functions. Additionally, each sector has various specifications that are required. Each sector's value added must be broken down into income flows that fit the issues the model is trying to address, as well as the functional relationship upon which these flows are determined from the output level and input

prices. Rules have to be specified for mapping input costs into price formation, such as a mark-up function or a neoclassical cost function. The model also needs rules for mapping each sectors value flows into real demands for output from itself and other sectors, all in order to establish a circular flow. Finally, there has to be specification of each sectors rules for quantity adjustment, obeying whatever social accounting matrix (SAM) is being used and the necessity that its row identity's value must equal the sum of values of components of demand. Such specificity is also accommodated in Taylor's (2004) later work as well.

In fact, this ability to specify sectoral adjustment caused by macroeconomic policy is one of the key aspects of CGE modeling. Taylor (2016) claims that the modeling technique itself was developed by Leif Johansen and Hollis Chenery for development economics and the purposes of economic planning. (It should be noted that some of the earliest models, though, were developed by economists such as Irma Adelman and Sherman Robinson (1978), with their applied model of Korea being a groundbreaking model for future CGE models). They are macro-accounting exercises at their core, in the Keynesian tradition, and were never meant to be Walrasian general equilibrium exercises. Despite this, many CGE modeling attempts do in fact interpret the models in the neoclassical fold. For example, Irene Trela *et al.* (1987) develop a CGE model looking at the international trade in grains and the effect of trade liberalization in grains on domestic prices and trade, finding no welfare losses despite an 11% price increase. Such models incorporate assumptions such as Say's Law, despite that it is "not a good description of how developing country macroeconomics operates" (Taylor 2016). Interpreting such exercises as representing how an economy works is to project general equilibrium assumptions that do not cash out in the real world. Nonetheless, this doesn't discount CGE modeling as a method in its own right but brings more attention to the importance of modeling assumptions in the first place, as well as proper understanding of what a model's limitations are.

More recently, CGE modeling has incorporated assumptions such as imperfect competition, product variation, and New Trade Theory ideas such as increasing returns to scale. Roberto De Santis (2002) developed such a model, showing welfare gains that could be obtained by reducing firm collusion, specifically in the U.S.'s domestic sector. Peter Dixson (2008) forcefully argues, from the perspective of CGE modeling's success in Australia, that the approach should be used widely for specific policy questions such as trade and development.

However, Dixon breaks with Taylor in his interpretation of the origins of CGE modeling, and places much more emphasis on the incorporation of Arrow's general equilibrium properties into the model by H.E. Scarf (1967, 1973). This tradition, contrary to what Lance Taylor has done, is what lead to the current state of CGE modeling as described above by Taylor (2016), Weisbrot and Baker (2003), and Ackerman and Gallagher (2008). However, it is still evident that CGE modeling is considered the main tool at hand for policy makers and government officials.

While most trade literature over the past few decades focused on CGE modeling, more recently some attention has been given to the SFC modeling approach of Wynne Godley and Marc Lavoie (2012). Taylor (2004), in his *Reconstructing Macroeconomics*, makes this connection explicitly and demonstrates how a SAM can easily be constructed along the principles of stock-flow consistency. Even the *Journal of Economic Integration* with a piece by Jan Jonáš and Ondřej Komínek (2017) has called for its use via SNA and NIPA accounting systems, allowing for a more in-depth and rigorous analysis of balance of payment issues between the core and the periphery, as well as the effects of dollarization or euroization on small open economies. That the *Journal of Economic Integration* would humor the development of other modeling approaches outside of their norm – CGE models – is indicative of the increasingly apparent limits of CGE modeling, as well as the added benefits of SFC modeling. Fortunately, SFC modeling also incorporates what is good about CGE modeling, such as the ability to utilize more complete data sets and work with complicated sectoral breakdowns that can more readily identify who bears the burden of adjustment to macroeconomic policy changes. For example, Jonáš and Komínek use SFC modeling techniques to explain the possibilities in exploring the eurozone's balance of payment issues in where some member nations have chronic trade deficits.

Two recent reviews of the SFC literature have been given by Eugenio Caverzassi and Antoine Godin (2015) and Michalis Nikiforos and Gennaro Zezza (2017). Nikiforos and Zezza provide a good overview of the reasons one would pick an SFC model over other approaches, noting that the choice between a transaction-flow matrix and a SAM is often a matter of taste since both can be constructed to convey the same information and accounting consistency in a model. Regardless, they all rely on sets of behavioral equations for $n - k$ equations, with n endogenous variables and k independent accounting identities. These equations typically pertain to agent

expenditure, agent financing and borrowing positions, agent allocation of wealth, specifications of productivity growth, wages, and inflation, and assumptions about the behavior of the financial system.

Most of the work done with this methodology has been with closed-economy SFC models, rather than with open-economy SFC models. Of those that do deal with open economies, Wynne Godley and Marc Lavoie's (2012) introductory model in chapters 6 and 12 of their work is still seen as the "center of gravity of the open-economy SFC literature" (Nikiforos and Zezza 2017). Generally built on the same foundations as Godley and Lavoie's open-economy SFC model, other models have been developed to deal with questions of trade policy, exchange rate regimes and expectations, the effects of dollarization, and reforming the international payment system.

Wynne Godley and Marc Lavoie (2005-6) also provide a model of exchange rates with endogenous sterilization or flexible exchange rates. First, they give a simple model, which assumes the central bank is targeting a fixed interest rate. Money supply is endogenously determined as it responds to money demand, the trade surplus or deficit, and agent's portfolio choices. Within this simple model, Godley and Lavoie show that there is no internal mechanism to stop foreign reserve accumulation (trade surplus) or austerity policy (trade deficit), which implies that there is no specie-flow mechanism that will correct for persistent surpluses or deficits – something that seems to invoke Shaikh's (1980b) critique of comparative advantage. Their more complex model is developed with two countries and their two corresponding currencies, $ and #. This model then incorporates exchange rates and international bond markets into its structure. Imports and exports become endogenously determined as well. Exchange rates act as the mechanism that helps "clear" the system, from country to country. Running two experiments, they find that increasing government expenditure means the exchange rate has to depreciate to allow for the deficit spending, and that raising interest rates leads to a slowdown of that countries own economy through the exchange rate channel, albeit only temporarily. A new steady state is achieved after adjustments to the higher rates, with more public and foreign debt. Godley and Lavoie conclude that a fixed exchange rate can draw similar conclusions in their simple model form, and that fiscal policy can play an important role with exchange rates, although a new steady state is achieved via long term effects and trade feedbacks.

Marc Lavoie and Gauthier Daigle (2011) develop another model dealing with exchange rates, except this time they try to work with the concept of exchange rate expectations as the driver of real rates. They do this by modeling two kinds of expectations: chartists and conventionalists. Although an earlier model by Godley and Lavoie (2012) suggests a flexible exchange rate would display persistent properties, this model does not demonstrate hysteresis as being present within the model. Instead, a flexible exchange rate regime where import and export elasticities with respect to relative prices are sufficiently high compared with the elasticity of terms of trade will continue to provide stabilizing properties as long as the proportion of chartists to conventionalists is not overly large. Lavoie and Daigle conclude that any attempt to model exchange rate behavior as moving towards some underlying rate which conforms to fundamentals is likely doomed to failure.

Sebastián Valdecantos (2012) develops a very interesting SFC model for Argentina, adding Structuralist insights from the work of Lance Taylor. His model is a two-country open model with a three-sector firm structure for both countries. These sectors are agriculture, non-agriculture, and intermediate goods. Equations to determine the price of trade flows and the conditions for market clearance, as well as input factors and their proportional requirement for production, are given – all in line with the specifications provided by Taylor (1990) above for sectoral work. In order to specifically model a developing economy, Valdecantos incorporates the idea of credit rationing into the Argentinian economy because "it is reasonable to think that [entrepreneurs] do not have access to as much credit as would be necessary to finance their investment projects." Furthermore, the Argentinian government is assumed to maintain an exchange rate peg to the dollar, and that foreign reserve holdings are maintained to defend this peg. Thus, Valdecantos is able to develop a model that incorporates Structuralist assumptions about developing economies and demonstrates a balance of payments constrained growth model with the fixed exchange rate. Finally, he brings attention to the importance of developing important features of developing economies beyond the scope of his model, such as additional credit constraints, high import elasticities, agricultural-based export-led growth, strategic lack of trust in domestic currency, and external debt in foreign currency. All of these aspects give important insight into how to model developing economies appropriately within an SFC framework.

Looking at world imbalances and macroeconomic adjustments, Jacques Maizer and Gnanonobodom Tiou-Tagba Aliti (2012) develop an interesting three-country trade model, investigating the effects of supply shocks on exchange rates and current account balances – specifically with weakened US competition simulated through an increase in the relevant propensities to import. The three-countries modeled here are the US, China, and the EU bloc. With a fixed dollar-yuan parity, their model sees a decline in US GDP with an increase in Chinese GDP, and a growing US deficit and Chinese surplus. Chinese diversification of foreign reserves maintains these results, but also brings down the EU's GDP and grows the EU deficit. With floating or managed dollar-yuan parity and foreign reserve targets or current account targets, their model demonstrates a mechanism for netting out these imbalances in the long-run. With flexible rather than fixed prices, the results are largely the same. However, flexible prices and a floating yuan parity creates a slowdown in Chinese GDP due to strong dollar depreciation against the euro. The current account balances are reduced by both accounts. In conclusion, China diversifying their portfolio away from dollars can have a negative effect on the EU, but a floating yuan could address many of these global imbalances.

Matthew Greenwood-Nimmo (2014) has another model which looks at the effectiveness of inflation targeting monetary and fiscal policies in a two-country SFC model. Specifically, the model is structured to test the effectiveness of stabilization policy under conditions of inflation. Three shocks are looked at, with a steep decrease in real exports from the other country, an increase in the autonomous component of the target real wage in the other country, and an expansionary decrease in the rate of income tax in the reference country. Possible policy responses within the model are a mix of inflation-targeting, follow the leader rate setting, and countercyclical fiscal policy. Greenwood-Nimmo finds that neither monetary or fiscal policy work well in isolation, and that "follow the leader" policy beats inflation targeting in terms of stability. The effect of a counter-cyclical interest rate hike depends on the strength of the rentier effect and saving behavior as well. An autonomous inflation targeting policy can also lead to excessive exchange rate volatility. This suggests to Greenwood-Nimmo that "the nature of monetary and fiscal policy making in an open economy is quite different from the closed economy case."

Finally, and most recently, Sebastián Valdecantos and Gennaro Zezza (2015) have developed an SFC model that works with the idea of reforming the international monetary system. This is done in the context of an international system with growing US deficits since 1971, growing surpluses for China, Germany, and other oil exporters, and all the while a US dollar that doesn't depreciate because of international demand for US dollar assets. Three models are laid out, one with an international dollar reserve system, a modified variant using special drawing rights (SDR) as reserves, and a model based on Keynes' *bancour* system. The first two are shown to be fundamentally the same as "non-systems" with no real adjustment mechanism, footing the pressure almost entirely on debtor countries to make adjustments in the face of persistent imbalances. On the other hand, the bancour system is shown to allow for long term adjustments, reducing the Triffin effect in the long run. Valdecantos and Zezza conclude that a monetary reform that does not question the necessity for surplus countries to shore the costs of readjustment will not have any significant influence. Furthermore, under current conditions, a restrictive monetary policy in the country issuing the international currency (the United States) will have global recessionary effects. Therefore, the structure of the international monetary system can have significant effects on trade imbalances and national policy.

As far as SFC modeling goes, no open-economy model so far has dealt explicitly with the issue of trade liberalization. More specifically, issues concerning tariff rates, export subsidies, and capital controls could all be explored within the context of an SFC open-economy model. Looking to Valdecantos (2012) we can take inspiration as to how such a modeling exercise for a developing economy should go. Additionally, the sectoral breakdown done with Valdecantos (2012) and as shown by Taylor (1990), can be explicitly utilized to analyze the differing effects of protection in different sectors. More complex models could further decompose sectors into actual goods that are traded. All that being said, the SFC literature as it stands has overwhelmingly focused on developed nations within the OECD. Thus, some assumptions used in the SFC literature may not be appropriate for developing economies, although this paper makes the assumption that the monetary theory of Godley and Lavoie (2012) is transferable to developing economies – if only in the sense that finance has an international character, and the monetary and fiscal policies of the developed world do interplay with the Global South.

Turning then specifically to Ghana, we will have to determine the sectoral balances of the Ghanaian economy, the sectoral structure of their economy, and what modeling has been done in the past. Particular attention will have to be paid around what makes Ghana a developing economy and what possible limitations this imposes (such as credit constraints or informal production). Such a model would seek to do two things: 1) expand on the SFC literature that works with open-economy models and looks at trade policy effects, and 2) begin building SFC models specifically to be used for developing economics in the Third World such as in Sub-Saharan Africa. Since no SFC literature outside of Valdecantos (2012) deals with developing economies, and no model deals directly with the issue of protectionism, this paper presents an attempt at modeling trade protection via tariff rates, providing a model that is potentially fruitful for sounder economic policy concerning international trade and issues of sectoral development and economic growth.

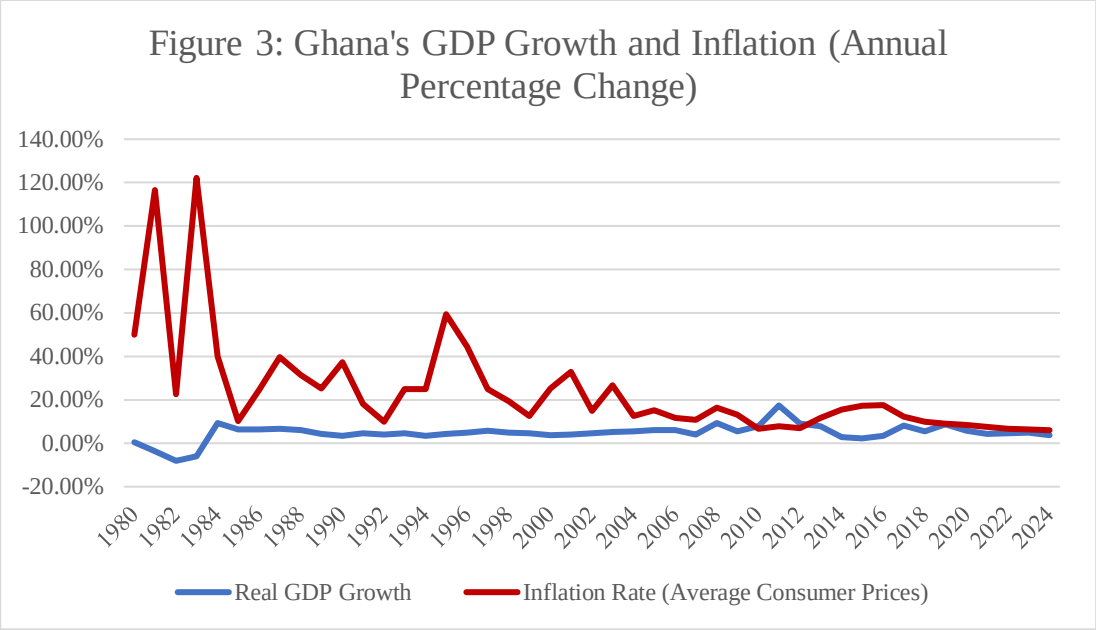
GHANAIAN ECONOMIC & POLITICAL HISTORY

As the first British colony in Africa to achieve majority-rule independence, Ghana took centerstage in 1957 as the whole world watched to see what this newly formed nation would be able to achieve. Lead by Kwame Nkrumah – a Marxist visionary, Ghanaian nationalist, and founder of the Convention People's Party (CCP) – the country pursued social and economic policies with the aim of industrializing and developing the nation, as well as leading other African nations towards post-independence by serving as an example for the continent. With Soviet-esque policies, President Nkrumah introduced plans to build factories, increase production, provide public funding for the building of roads and schools, the construction of dams and the introduction of hydro-electric power, as well as state provided free healthcare and education. He defined this new path as Nkrumaism, which he saw as "[the] ideology of the New Africa, independent and absolutely free from imperialism, organized on a continental scale, founded upon the conception of a one and united Africa, drawing its strength from modern science and technology and from the traditional African belief that the free development of each is the condition for the free development of all" (Peter Omari, 1970). Showing initial success and further promise, Nkrumah's development of the nation seemed to be working as it pursued scientific and industrial development, but without the aid of foreign capital and their former colonial rulers.

This of course was not without difficulty. Nkrumah was unable to "alter Ghana's reliance on a single crop, cocoa, at a time when world cocoas prices were falling," and despite his alleged egalitarianism, the leadership of his CCP developed a "tendency toward top-down leadership, foundered in a 'sea of intrigue,'" with Nkrumah at one point even condemning striking workers (Smith Curtis, 1991). Much of this was driven by the tensions created around Nkrumah's secularism and drive towards modernization over and against the traditional land-holding chiefs, predominately positioned in the north of the country. As Nkrumah pushed to centralize and create a unitary state to allow for Ghana's development, this necessarily took away from the power-sharing that had been developed between the colonial state and the chiefdoms. This tension would plague Nkrumah's tenure, and was even a theme in his political career prior to Ghanaian independence.

Tragically and unsurprisingly, his plans were cut short with a reactionary *putsch* during his absence from the nation in 1966, as national military and police forces overthrew his government and installed a military junta, which lasted for three years. The nation was realigned away from the Soviet Union and back towards the Atlanticist bloc, with significant re-privatization of the economy and the signing of an IMF deal that same year. It's with this sudden regime change that Ghana's unique revolutionary independence moment was dashed, and the country has remained a lower income nation since, only with its recent status being upgraded to a low-middle income country in 2007 when its per capita income rose above ¢1,000, or one thousand *cedis*. Despite this recent growth, it's true to say that Ghana's development has not been wrestled free from the developed Anglo-American world as Nkrumah had once envisioned.

Within the new millennium, Ghana has enjoyed good to superb GDP growth. Most recent estimates for the years 2005 to 2013 show annual percentage growth ranging from 4 to 15 percent, placing the annual average growth rate at 7.8 percent. From 2010 to 2013, this increased to an annual average growth rate of 9.7 percent, making Ghana one of the fastest growing economies in the world, with a high rate of 17.40 percent in 2011 (Ghana Statistical Service, 2014). More recently, from 2014 to 2018, Ghana has averaged in growth at about 5 percent, showing signs of slowing down as the decade comes to a close. Over the years, Ghana has seen greater and greater price stability as well, with inflation averaging 11.73 percent since the beginning of this decade. Compared to previous years, which would reach as high as 122 percent, this can be seen as a significant improvement. Updated GDP and inflation figures, with projections going out to 2024, are given in Figure 3 below using recent data provided by the IMF (2019).

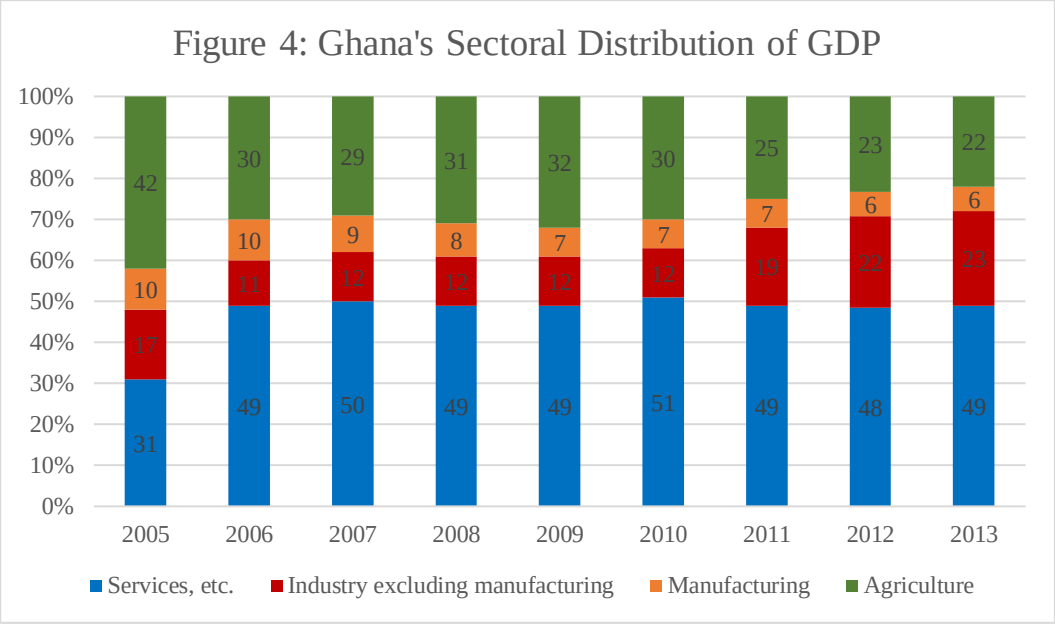


Source: IMF (2019)

This recent growth has been driven primarily by the development of the services sector, growing from 31 percent of the economy in 2005 to 49 percent in 2013. Additionally, significant growth in an increasing non-manufacturing industrial sector which consist of products such as mineral exports and crude oil has grown from 17 percent in 2005 to 23 percent in 2013, after an initial drop to 11 percent in 2006. Manufacturing has shrunk from 10 to 6 percent and Agriculture from a significant 43 to 22 percent over the same time period, despite some evidence that industries such as the oil palm industry have been creating jobs for the country (Huddleston and Tonts, 2007). This change can be seen overtime below in Figure 4. Although Ghana has been able to diversify out of being primarily an exporter of cocoa crop and gold, it should be noted that much of the expansion described above has been in primary commodity production and extractive industries, rather than valued-added, manufacturing or technology industries.

Focusing on Ghana's discovery of oil is important, as it has been a boon for the nation's recent spike in rates of growth. According to Dominik Kopiński, *et al*. (2013), Ghanaian oil reserves are estimated at about four billion barrels of crude oil, along with natural gas discoveries. With these natural resource endowments, Ghana is the sixth largest crude oil and second largest natural gas holding country on the continent. Extracting these resources will allow for an IMF estimated expected revenue source of $20 billion from 2012 to 2030. Because of the lack of

forward and backward linkages between this emerging industry and the rest of the Ghanaian economy, it is also predicted that the nation's government will only capture about 38 percent of this flow. Consequently, Kopiński, *et al*. stress the need for Ghana to develop more robust tax collecting and administrative bodies in order to direct these gains toward development, rather than leaking out of the country.



Source: Ghana Statistical Service (2014)

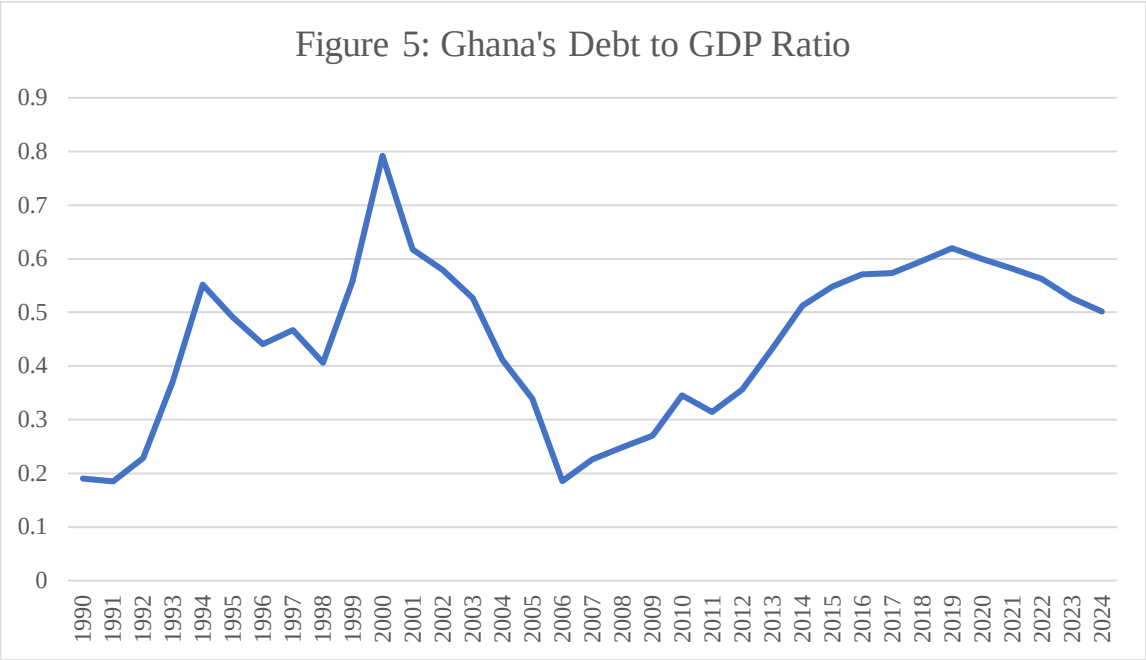
As Peter Arthur and Emmanuel Arthur (2014) also point out, Ghana passed a local content law in 2013 requiring certain portions of inputs for the petroleum industry to be purchased from domestic firms, along with required local employment proportions. The law requires both of these measures to reach as high as 90 percent within ten years of its passing. This should in theory aid in encouraging value-added spill overs into the domestic economy. But Emmanuel and Emmanuel also warn that the current reality is that most small to medium sized enterprises in the country are not competitive and are usually unable to meet international industry standards, companies tend to hire educated expatriates, and there is a lack of credit access for these smaller firms to develop these linkages. This would indicate that Ghana needs to continue working on developing the skills and educational level of the country, as well as developing its financial markets – perhaps through the public sector.

Finally, a recent Fondazione Eni Enrico Mattei (2017), or FEEM, report has explored the possible linkages and sources of demand for domestic production of gas within Ghana. They identify methanol and urie as two possible export industries that could be developed around the petroleum industries extraction sites and near its pipeline infrastructure. They also argue that Ghana can save by exporting its oil production for a higher price and buy cheaper oil imports from the local West African market, allowing it to divert these savings into developing the natural gas industry within the nation and switching away from crude oil to natural gas for its electricity needs. Interestingly, within this whole discussion (as well as within the previously mentioned papers), there is no real discussion of climate change and the impacts it may have on Ghana's development plan – especially in the context of whether or not it is wise to develop an infrastructure situated around fossil fuels and along the nation's coast. It is also arguable that Ghana would not be able to rely on oil exports as a source of revenue for development *if* the industrialized world transitions off of fossil fuel use. Whether this will occur at this point in time is speculative at best but does pose a potential economic and ecological challenge for Ghana over the rest of the century.

All in all, Ghana's growth can be said to have been partially export-led with a heavy reliance on primary commodities – low value-added goods. The bulk of Ghana's import composition consists of the importation of manufactured goods, capital equipment, and consumer agricultural products. The remainder of the economy's growth is attributable to its services sector, although this sector of the economy is mostly omitted from this paper due to the difficulty of modeling international trade in services, as well as the use of quotas over tariffs.

Looking to the state of Ghana, the government's expenditure in nominal terms, as well as the nation's current account deficit, have catapulted upwards from 2005-2013, jumping from ¢2,970.62 million to ¢26,277.17 million and US$0.08 billion to US$4.92 billion, respectively. While much of the increase in the current account deficit has come from the purchase of manufactured, industrial, and capital goods, the increase in public expenditures can also be partially explained by the plethora of new social programs over the past two decades. These include the Livelihood Empowerment Against Poverty (LEAP), Capitation Grant, and School Feeding Programme, as well as free distribution of school uniforms and books. There has also been the development of Community-based Health Planning Services (CHPS), along with other

projects aimed at improving health care – such as national immunization and measures against malaria (Ghana Statistical Service, 2014).

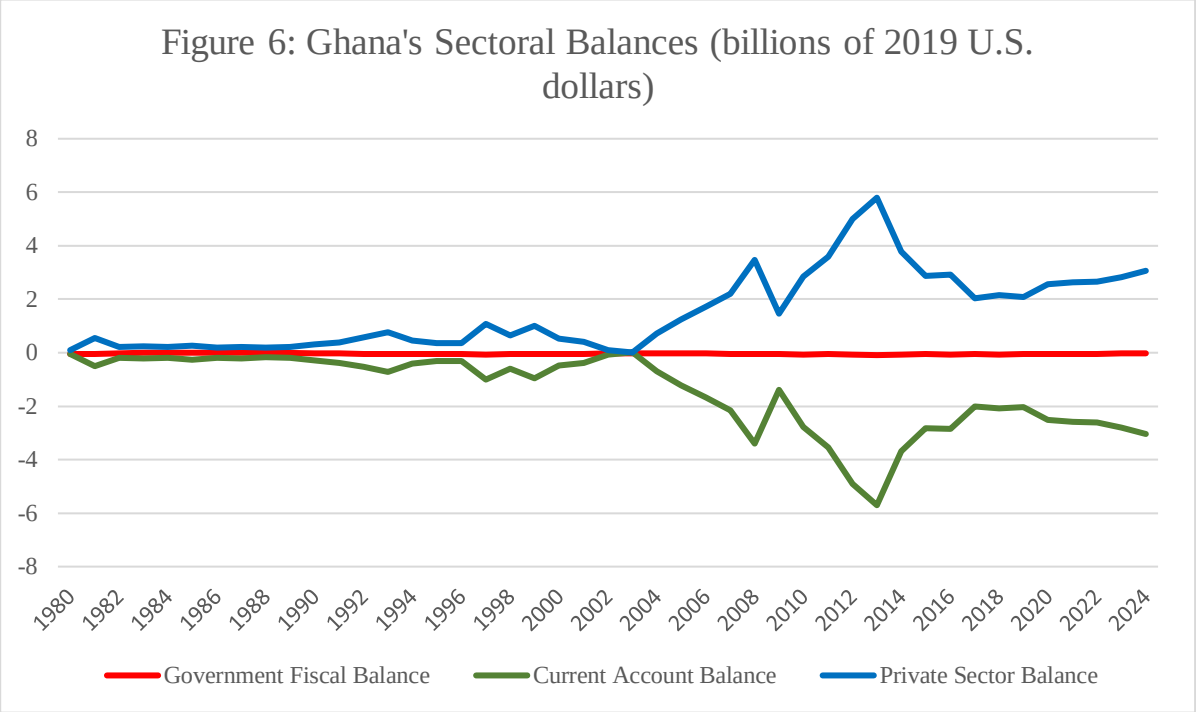


Source: IMF (2019)

More recent figures from the IMF (2019) show that the current account balance has fallen to US$2.03 billion. Since 2013, Ghana's debt to GDP ratio has continued to grow. Looking at Figure 5, we can see the development of Ghana's debt to GDP ratio since 1990, along with forward projections given by the IMF. Figure 6 shows the sectoral balances of the nation since 1980 to 2024, which also utilizes projections given by the IMF. This is simply the sectoral accounting of the Ghanaian economy, given as $(S - I) = (G - T) + (EX - IM)$. Looking at the economy this way helps us see how differences in sectoral positions are equal to changes in their financial wealth and must flow from or go to somewhere. Under this relation, if Ghana were to obtain a current account surplus they would require the government to a run a deficit in order for the private sector to continue to save. This provides useful information about the development of the economy and what we can expect to happen to other sectors if we shock one or the other.

Ghana presents a problem concerning the accounting of sectoral balances when one takes into account the preponderance of capital flight from the country though. According to Léonce

Ndikumana and James K. Boyce (2011) and Léonce Ndikumana (2014), since the 1970s there has been an estimated trillion dollars in capital flight from the continent. Specifically, for Ghana, 2004 numbers are given, with $8,503.7 million in real capital flight, a capital flight to GDP percentage of 98.7, and a capital flight to debt percentage of 159.3. Léonce Ndikumana (2014) further argues that lower rates of domestic savings can be explained in large part because of this phenomena, and that this greatly affects the ability of Sub-Saharan African countries to develop. He points to studies that also show that firms rely on internal financing of investment in the continent at higher rates than elsewhere, possibly suggesting another constraint on development. This suggests the possibility of developing an SFC model which can take into account large outflows of capital flight from the private sector, and possibly through government embezzlement, into another economy. Consequently, the private sector balance in Figure 6 may be overstated, as well as the trade balance being understated.



Source: IMF (2019)

Much has changed when it comes to Ghana's economic policies from the time of independence and Nkrumah, through various military and provisional governments, to today's democratic government. As Alexander Bilson Darku (2012) explains, Ghana had originally embarked on its Economic Recovery Program (ERP) in 1983 to help stabilize the economy and resume income

growth, moving away from what Darku has characterized as Ghana's controlled economic period. The ERP consisted of fiscal, monetary, and exchange rate reforms which aimed at stimulating domestic supply by realigning prices in favor of productive sectors. Moves to liberalize trade further occurred by 1987, with significant tariff reductions, the removal of import licenses and other barriers, as well as the promotion of non-traditional exports. By 1990 the Ghanaian government had finished its transition into a liberal trade regime. As Huddleston and Tonts (2007) claim, Ghana was a pioneer when it came to implementing the newly established neoliberal consensus of the Washington institutions. Darku (2012) explains further that a new government by 2001 began to formulate and implement its new Trade Sector Support Program, fully applied by 2004. This latest program brought about export led industrialization in agro-processing and other manufacturing, along with import substitution policies for processed food and agricultural products.

In terms of Ghana's financial sector, there is evidence of overconcentration and a lack of loan supply to loan demand when it comes to Ghana's small and medium sized enterprises, as already suggested previously. Joshua Abor and Nicholas Biekpe (2007) found that, of 105 firms from 1998 to 2003, only about a quarter of their operations are financed by bank debt. Anthony Q. Q. Aboagye (2012), looking at the Ghanaian banking sector from 2000 to 2008, finds that the number of banks in Ghana has grown from 17 to 26, although industry concentration has also increased. Furthermore, the interest rate spread of Ghanaian banks is interestingly large, with an average of 23 percent – compared to other African countries, such as Botswana or Kenya, which have spreads of 6.29 and 10.8 percent, respectively. Such data provides *prima facie* evidence that Ghana may suffer from credit restraints as well as overly expensive domestic financing.

Of CGE models that deal with the Ghanaian economy directly, there have been a few and they have predominately tackled the question of trade liberalization and its effects on growth, poverty, and income distribution. Utilizing the SAM's constructed by the International Food Policy Institute (IFPRI) for Ghana, most model their own Ghanaian CGE's off of Vijay Bhasin's and Samuel K. Annim's (2005) original model which looked into the effects of trade liberalization and income distribution, primarily using Foster-Greer-Thorbecke indices as the main method for analyzing the results. Bhasin and Annim (2005) run two scenarios using an updated 1999 Ghana SAM, stimulating the removal of import tariffs and its replacement with a

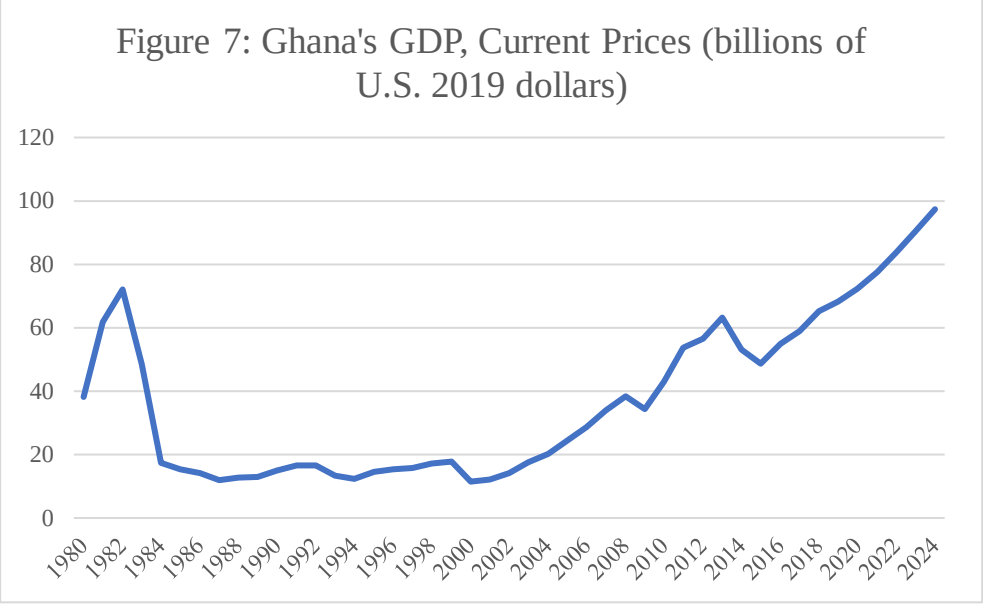
lump-sum tax increase in the VAT by 100 percent, and the removal of export duties with an identical increase in the VAT. They find that the count, depth, and severity of poverty improves in the first scenario, while the second scenario saw an overall worsening of these same FGT measures. Arguably, one should be critical of these results though, as many of the assumptions utilized by Bhasin and Annim are those heavily criticized by Weisbrot and Baker (2003) and Ackerman and Gallagher (2008). In fact, it seems that Bhasin and Annim mistook Weisbrot and Bakers criticisms as suggestions (i.e., they cite Weisbrot and Baker as the reason as to *why* they have chosen to use lump-sum taxes to replace tariff revenue, despite the fact that Weisbrot and Baker bring this up because it is not possible to implement lump-sum taxes and it is doubtful that developing economies have the institutional capacity to effectively gather revenue).

Other CGE models have been built off of Bhasin and Annim, such as a model by Peter Quartey, Patricia Aidam, and C.K. Obeng (2007). They update the model by using an adjusted version of the 2003 SAM for Ghana, as well as specifying the model closure so that total savings determine total investment in the economy. They also use an FGT index to examine the incidence, depth, and severity of poverty of households, broken into five categories: farmers, private sector workers, public sector workers, non-farm self-employed, and the unemployed. This model also runs two scenarios, testing for import and export liberalization. Both scenarios find results stating that there is an improvement for most households, with a few exceptions. Interestingly, Quartey, Aidam, and Obeng warn against over-liberalization, because it may lead to dumping of developed world subsidized product onto the Ghanaian market, as well as increased competition and crowding out of local manufactures by more competitive international products. Thus, although liberalization may provide short-run welfare gains there are still concerns about sectoral development in the long-run.

C.K. Obeng (2015) develops a third CGE model for Ghana along the same lines as the 2007 model just discussed. Using the 2005 Ghana SAM, Obeng runs a dynamic model from 2005 to 2020. FGT indices are utilized again to observe policy effects on the poor. The difference with this third model is the choice to gradually reduce tariffs by 6 percent for each period of the simulation, rather than a one-off shock. His results suggest that trade liberalization would continue to be welfare improving for poor households, although the effect on urban households is much larger compared to rural households. This leads Obeng to conclude that liberalization

combined with poverty alleviation programs in rural communities within Ghana is the best policy approach going forward for the nation.

Clemens Breisinger, Xinshen Diao, and James Thurlow (2009) have also presented an analysis of Ghana's economy, asking the question as to what it would take for Ghana to reach the middle-income status by 2015. They run simulations to see where growth has to occur sectorally in the country to meet these goals, finding that only by accelerating growth in all four sectors will Ghana be able to achieve its long-term growth roles concerning the Millennium Development Goals. They argue that primarily because of linkages affects that the agricultural sector will have to be one of the main drivers, although alone it will not be sufficient. Furthermore, they state that increasing Ghana's export variety would be a vital condition for achieving this goal. Evidently, this kind of growth is not what has happened since 2009, and the economy's growth would seem to have primarily been led by the services and industrial sectors. Looking at Figure 7, we can see that the Ghanaian economy was not able to double its GDP over this timeframe. Of course, Breisinger, Diao, and Thurlow may argue this was due to the poor growth performance of the agricultural sector in comparison.



Source: IMF (2019)

Other models have looked explicitly at the possibility of balance of payment constrained growth, as well as the effects of liberalizing capital controls and consumption smoothing.

Alexander Bilson Darku (2010) uses a present value model of the current account to examine Ghana, positing that the model could predict the dynamics of the actual current account if it is appropriately adjusted for the nature of capital mobility and exchange rate policies. Additionally, Darku goes about a comparison of the pre-1983 controlled regime and the post-1983 liberalized regime to see if any effect on the ability of Ghanaian consumers to engage in consumption smoothing occurs. Overall, Darku finds that this basic model only works when extensions are made that, as said above, take into account external shocks, exchange rates, interest rates, and capital flow asymmetries. He finds evidence that Ghana was able to engage in consumption smoothing, but that the current account deficit has remained during both economic regimes. This brings into question the rationale of such a persistent deficit and if it is even sustainable for a developing economy such as Ghana.

Darku (2012) later develops another model for Ghana based on Thirlwall's demand-orientated balance of payments constrained model approach. Since previous models have found that this approach is a poor fit for developing nations, as compared to the industrialized, developed nations, Darku attempts the model with Ghana. He finds a positive long run relationship between exports, capital flows, and relative prices to income growth. His findings also demonstrate that Ghana has not experienced any significant increase in growth from trade liberalization (something at odds with the mainstream literature on the topic), with imports growing faster than exports post-liberalization and contributing to Ghana's already chronic trade deficit. While Ghana's liberalization may have been a response to the massive declines in manufacturing output that were experienced near the end of Ghana's controlled economic regime pre-1983 – and these declines have in fact stabilized – Darku finds that there is not significant evidence to argue that liberalization helped significantly expand the economy either.

Darku (2012) effectively argues from his findings that the balance of payments constrained growth model does fit developing nations, primarily because of their reliance on exports, favorable exchange rates, and capital flows to develop quickly. He concludes with two points for Ghana: 1) that an increase in the growth rate of exports, capital flows, and real exchange rates can lead to an increase in the growth rate of incomes, and 2) that liberalization most effectively increased the rate of growth of imports, rather than exports. Therefore, for Darku, sound economic policy for Ghana has more to do with the efficient management of capital

inflows and the productivity of those capital inflows – meaning that they are utilized to increase the productivity of export sectors and increase export capacity, rather than be used merely for domestic consumption. Such a conclusion falls in line with the consensus identified by Chang (2004, 2008) and Weisbrot and Baker (2003) presented earlier in this paper.

Overall, the Ghanaian economy has grown significantly since its independence. The economy's structure has also gradually changed overtime, although manufacturing has played an increasingly smaller role. The reliance on capital and industrial imports creates a "superficial industrialization," as stated by Reinert (2007), with a persistent trade deficit because imports outpace export growth. Further, the recent oil developments, while a temporary boon, has not yet created the linkages necessary into the domestic economy and likely will not develop significant technology transfer because of this lack of cooperation between producers and domestic suppliers. Nonetheless, Ghana does have real potential here, given appropriate industrial policy for their economic situation. Hopefully recent IMF (2019) negotiations do not jeopardize Ghana's potential by increasing austere government fiscal policy as an attempt to reduce its overall debt-to-GDP, but that remains to be seen.

A GHANAIAN OPEN-ECONOMY SFC MODEL

A stock-flow-consistent modeling approach can be taken to model the Ghanaian economy, starting with the more advanced variant of an open-economy model provided by Godley and Lavoie (2012) in the 12th chapter of their book. This approach develops a two-economy trade model, with both economies having their own central bank and currency. In this instance, we will model the two economies as the Ghanaian and US economy – primarily to stick to the realism of dollar hegemony, although it should be noted that Ghana's most extensive trading partners are on the African continent and with the EU. To add to this approach, a sectoral breakdown is provided by identifying an agricultural, manufacturing, and a non-manufacturing industrial sector. Furthermore, tariff rates are added to the imports of these sectors and act as a revenue source for each respective government's financing of their expenditures (much in the same way regular taxes operate in an SFC model). These tariff rates then also act on the import and export prices of the respective goods effected, allowing for changes in the patterns of trade and terms of trade due to changes in prices.

A balance sheet matrix and transaction-flow matrix are given below. Within these matrices a negative sign indicates that the entry acts as a use of funds for the given column, while a positive sign indicates that it is a source of funds for the given column. These matrices are broken down to represent both nations within the model, as well as both nation's households, firms by sector, governments, and central banks. A middle column provides the exchange rate to allow row sums to equal to zero, despite entries being logged in both dollars and cedis. The balance sheet represents the stocks of each sector, while the transaction-flow matrix shows us how flows from stocks move around both economies.

This approach is in-line with the SFC modeling approach as given by Godley and Lavoie (2012), although this is not dissimilar to some approaches explained by Lance Taylor (1990, 2004) within CGE modeling. The transaction-flow matrix here is essentially the SAM that is being used in the model. Explanations of the notation found in these matrices is given below. Note that, per SFC principles, rows will sum to zero as do columns. This guarantees the accounting consistency of the system, making sure that there are no "black boxes" from which

flows go to or come from. This realism helps reflect the system of financial accounts that create the real economy by organizing it in nominal/financial terms.

To begin, we must establish the various accounting identities of both nations. A superscript of ¢ (cedis) designates accounting identities for Ghana and a superscript of $ (dollars) designates it for the US. In terms of bills and cash money, this designates who issues the financial instrument, while a subscript designates who is holding the instrument. Starting with equations for disposable income YD, we have two distinct formulations: regular disposable income YD_r and Haig-Simons income YD_{hs}. Regular disposable income is given as the aggregate of today's income Y plus the interest income of own bill holdings $\left(r_{-1}^{¢} B_{¢s-1}^{¢}\right)$ and the interest income of foreign bill holdings times the exchange rate $\left(xr^{\$} r_{-1}^{\$} B_{¢s-1}^{\$}\right)$. This total is discounted by $1 - \theta$ to account for taxes, where θ is the tax rate of each nation. Haig-Simons disposable income accounts for income plus the change in total wealth or capital gains $\left(\Delta xr^{\$} B_{¢s-1}^{\$}\right)$. The nations change in wealth V then is also given as last periods wealth plus this period's disposable income minus consumption C.

$$YD_r^{¢} = \left(Y^{¢} + r_{-1}^{¢} B_{¢s-1}^{¢} + xr^{\$} r_{-1}^{\$} B_{¢s-1}^{\$}\right)\left(1 - \theta^{¢}\right) \quad (1)$$

$$YD_{hs}^{¢} = YD_r^{¢} + \Delta xr^{\$} B_{¢s-1}^{\$} \quad (2)$$

$$\Delta V^{¢} = V_{-1}^{¢} + YD_r^{¢} - C^{¢} \quad (3)$$

Identical equations are given for the US economy, where only the sub- and superscripts vary. The general accounting ideas here for both nations are the same though.

$$YD_r^{\$} = \left(Y^{\$} + r_{-1}^{\$} B_{\$s-1}^{\$} + xr^{¢} r_{-1}^{¢} B_{\$s-1}^{¢}\right)\left(1 - \theta^{\$}\right) \quad (4)$$

$$YD_{hs}^{\$} = YD_r^{\$} + \Delta xr^{¢} B_{\$s-1}^{¢} \quad (5)$$

$$\Delta V^{\$} = V_{-1}^{\$} + YD_r^{\$} - C^{\$} \quad (6)$$

TABLE 4.1 BALANCE SHEET OF GHANAIAN AND US ECONOMIES

	HOUSEHOLDS	FIRMS	GOV'T	CB		HOUSEHOLDS	FIRMS	GOV'T	CB	
	GH (¢ COUNTRY)				EXCH. RATE	US ($ COUNTRY)				SUM
MONEY	$+H^{¢}$			$-H^{¢}$		$+H^{\$}$			$-H^{\$}$	0
¢ BILLS	$+B^{¢}_{¢}$		$-B^{¢}$	$+B^{¢}_{cb¢}$	$\cdot xr^{¢}$	$+B^{¢}_{\$} \cdot xr^{¢}$				0
$ BILLS	$+B^{\$}_{¢} \cdot xr^{\$}$			$+B^{\$}_{cb¢} \cdot xr^{\$}$	$\cdot xr^{¢}$	$+B^{\$}_{\$}$		$-B^{\$}$	$+B^{\$}_{cb\$}$	0
GOLD				$+or^{¢} \cdot p^{¢}_{g}$	$\cdot xr^{¢}$				$+or^{\$} \cdot p^{\$}_{g}$	$\sum or \cdot p^{\$}_{g}$
BALANCE	$-V^{¢}$		$-NW^{¢}_{g}$	$-NW^{¢}_{cb}$	$\cdot xr^{¢}$	$-V^{\$}$		$-NW^{\$}_{g}$	0	$-\sum or \cdot p^{\$}_{g}$
SUM	0	0	0	0	$\cdot xr^{¢}$	0	0	0	0	0

TABLE 4.2 TRANSACTION-FLOW MATRIX OF GHANAIAN AND US ECONOMIES

	HOUSEHOLDS	FIRMS			GOV'T	CB		HOUSEHOLDS	FIRMS			GOV'T	CB	
	GH (₵ COUNTRY)	A	M	I			EXCH. RATE	US ($ COUNTRY)	A	M	I			SUM
CONSUMPTION	$-C^{₵}$	$+C_a^{₵}$	$+C_m^{₵}$	$+C_i^{₵}$				$-C^{\$}$	$+C_a^{\$}$	$+C_m^{\$}$	$+C_i^{\$}$			0
GOVT. EXP.		$+G_a^{₵}$	$+G_m^{₵}$	$+G_i^{₵}$	$-G^{₵}$				$+G_a^{\$}$	$+G_m^{\$}$	$+G_i^{\$}$	$-G^{\$}$		0
TRADE		$-IM_a^{₵}$	$-IM_m^{₵}$	$-IM_i^{₵}$			$\cdot xr^{₵}$		$+X_a^{\$}$	$+X_m^{\$}$	$+X_i^{\$}$			0
		$+X_a^{₵}$	$+X_m^{₵}$	$+X_i^{₵}$			$\cdot xr^{₵}$		$-IM_a^{\$}$	$-IM_m^{\$}$	$-IM_i^{\$}$			0
GDP	$+Y^{₵}$	$-Y_a^{₵}$	$-Y_m^{₵}$	$-Y_i^{₵}$				$+Y^{\$}$	$-Y_a^{\$}$	$-Y_m^{\$}$	$-Y_i^{\$}$			0
TAXES	$-T^{₵}$				$+T^{₵}$			$-T^{\$}$				$+T^{\$}$		0
TARIFFS		$-\tau_a^{₵}$	$-\tau_m^{₵}$	$-\tau_i^{₵}$	$+\tau^{₵}$				$-\tau_a^{\$}$	$-\tau_m^{\$}$	$-\tau_i^{\$}$	$+\tau^{\$}$		0
INTEREST PAYMENTS	$+r^{₵} \cdot B_{₵}^{₵}$				$-r^{₵} \cdot B^{₵}$	$+r^{₵} \cdot B_{cb₵}^{₵}$	$\cdot xr^{₵}$	$+r^{₵} \cdot B_{\$}^{₵} \cdot xr^{₵}$						0
	$+r^{\$} \cdot B_{₵}^{\$} \cdot xr^{\$}$					$+r^{\$} \cdot B_{cb₵}^{\$} \cdot xr^{\$}$	$\cdot xr^{₵}$	$+r^{\$} \cdot B_{\$}^{\$}$				$+r^{\$} \cdot B^{\$}$	$+r^{\$} \cdot B_{cb\$}^{\$}$	0
CB PROFITS					$+F_{cb}^{₵}$	$-F_{cb}^{₵}$						$+F_{cb}^{\$}$	$-F_{cb}^{\$}$	0
CHANGES IN:														0
MONEY	$-\Delta H^{₵}$					$+\Delta H^{₵}$		$-\Delta H^{\$}$					$+\Delta H^{\$}$	0
₵ BILLS	$-\Delta B_{₵}^{₵}$				$+\Delta B^{₵}$	$-\Delta B_{cb₵}^{₵}$	$\cdot xr^{₵}$	$-\Delta B_{\$}^{₵} \cdot xr^{₵}$						0
$ BILLS	$-\Delta B_{₵}^{\$} \cdot xr^{\$}$					$-\Delta B_{cb₵}^{\$} \cdot xr^{₵}$	$\cdot xr^{₵}$	$-\Delta B_{\$}^{\$}$				$+\Delta B^{\$}$	$-\Delta B_{cb\$}^{\$}$	0
GOLD						$-\Delta or^{₵} \cdot p_g^{₵}$	$\cdot xr^{₵}$						$-\Delta or^{₵} \cdot p_g^{₵}$	0
SUM	0	0	0	0	0	0	$\cdot xr^{₵}$	0	0	0	0	0	0	0

Government revenue is decomposed into two different categories – taxation T as a function of total income and tariff revenue τ as a function of total imports. For both nations this is given in the following four equations. The tax equations 7 and 8 here should be familiar, as they are identical to what was defined in equations 1 and 4. Tariff revenue, however, can be decomposed into three separate tariff rates τ_a, τ_m, and τ_i for all three sectors of the economy – agriculture, manufacturing, and non-manufacturing industry (primarily extractive industries and intermediate goods). Tariff revenue is generated as a percentage of the total imports IM of each sector. Later extensions could be added here in order to also generate revenue from export duties, although this is omitted in the current model.

$$T^{¢} = \theta^{¢}\left(Y^{¢} + r_{-1}^{¢}B_{¢s-1}^{¢} + r_{-1}^{\$}B_{¢s-1}^{\$}xr^{\$}\right) \tag{7}$$

$$T^{\$} = \theta^{\$}\left(Y^{\$} + r_{-1}^{\$}B_{\$s-1}^{\$} + r_{-1}^{¢}B_{\$s-1}^{¢}xr^{¢}\right) \tag{8}$$

$$\tau^{¢} = \tau_a^{¢}IM_a^{¢} + \tau_m^{¢}IM_m^{¢} + \tau_i^{¢}IM_i^{¢} \tag{9}$$

$$\tau^{\$} = \tau_a^{\$}IM_a^{\$} + \tau_m^{\$}IM_m^{\$} + \tau_i^{\$}IM_i^{\$} \tag{10}$$

Moving on to the central bank's profits for each nation, as well as the supply of bills necessary to finance the governments expenditure, we can establish the three reductions that help "pay" for government expenditure. Central banks' profits F is composed of the interest revenue earned by the central banks' holdings of own and foreign bills. Total bill supply, then, is given by last periods bill supply plus government expenditure G and interest on own bills, minus taxes, tariffs, and central banks profits. These last three reductions then act to compensate government expenditure if they grow faster and are larger than government expenditure for each period. In this way, tariff revenue is no different from the tax revenue generated from a nations private sector (with the exception of its effect on prices, which will be shown below).

$$F_{cb}^{¢} = r_{-1}^{¢}B_{¢s-1}^{¢} + r_{-1}^{\$}B_{¢s-1}^{\$}xr^{\$} \tag{11}$$

$$F_{cb}^{\$} = r_{-1}^{\$}B_{\$s-1}^{\$} \tag{12}$$

$$B_s^{¢} = B_{s-1}^{¢} + G^{¢} + r_{-1}^{¢}B_{s-1}^{¢} - T^{¢} - \tau^{¢} - F_{cb}^{¢} \tag{13}$$

$$B_s^{\$} = B_{s-1}^{\$} + G^{\$} + r_{-1}^{\$}B_{s-1}^{\$} - T^{\$} - \tau^{\$} - F_{cb}^{\$} \tag{14}$$

Finally, we must establish each nation's current account balance CAB, capital account balance KAB, and capital account balance net of official transfers KAB_p. The current account is given as the difference between the nation's exports – also decomposed in the three sectors X_a, X_m, and X_i – and it's imports, plus interest income on foreign bills held by the private sector and the central bank, minus interest paid on bills held by foreigners abroad. The capital account balance net of official transfers is simply the change in holdings of foreign bills plus the change in foreign holdings of own bills. The capital account then is this definition minus the change in holdings of foreign bills plus the change in holdings of gold times the nations price of gold $p_g^{¢}\Delta or^{¢}$. While gold doesn't act as each nation's currency, it acts as a means of international payment between each nation's central bank. This is all given in the following six equations.

$$CAB^{¢} = \left(X_a^{¢} + X_m^{¢} + X_i^{¢}\right) - \left(IM_a^{¢} + IM_m^{¢} + IM_i^{¢}\right) + xr^{\$} r_{-1}^{\$} B_{¢s-1}^{\$} - r_{-1}^{¢} B_{\$s-1}^{¢} + r_{-1}^{\$} B_{cb¢s-1}^{\$} xr^{\$} \tag{15}$$

$$KAB^{¢} = KAB_p^{¢} - \left(xr^{\$}\Delta B_{¢s-1}^{\$}\right) + p_g^{¢}\Delta or^{¢} \tag{16}$$

$$CAB^{\$} = \left(X_a^{\$} + X_m^{\$} + X_i^{\$}\right) - \left(IM_a^{\$} + IM_m^{\$} + IM_i^{\$}\right) + xr^{¢} r_{-1}^{¢} B_{\$s-1}^{¢} - r_{-1}^{\$} B_{¢s-1}^{\$} - r_{-1}^{\$} B_{cb¢s-1}^{\$} \tag{17}$$

$$KAB^{\$} = KAB_p^{\$} + \Delta B_{cb¢s-1}^{\$} - p_g^{\$}\Delta or^{\$} \tag{18}$$

$$KAB_p^{¢} = -\Delta B_{¢s-1}^{\$} xr^{\$} + \Delta B_{\$s-1}^{¢} \tag{19}$$

$$KAB_p^{\$} = -\Delta B_{\$s-1}^{¢} xr^{¢} + \Delta B_{¢s-1}^{\$} \tag{20}$$

Secondly, having established our basic accounting identities for the model, we can move on to determine the prices of imports and exports for each nation, as well as the total real volumes of imports and exports of each sector, and total imports and exports priced in each nations currency. This allows us to define the terms of trade of each nation, as well as determine the effects of changes in prices on the patterns of trade between the two nations in the model.

The prices of imports and exports for Ghana are given in a formulation that should be familiar to those knowledgeable with international trade literature. Prices are given for each sectors imports and exports as well, shown as p_{ma}, p_{mm}, and p_{mi} for imports and p_{xa}, p_{xm}, and p_{xi} for exports.

These prices are based off various propensities v_0 and v_1 for imports, and u_0 and u_1 for exports. These propensities interact with the exchange rate, as well as domestic and foreign prices p_y. Furthermore, tariff rates are added into our price equations for imports in order to allow tariff policy to affect the price of goods. Note here that variables that are bolded indicates that we are using the natural log of this variable.

$$\boldsymbol{p}_{\boldsymbol{ma}}^{¢} = \left(v_{0a} - v_{1a}\boldsymbol{xr}^{¢} + (1 - v_{1a})\boldsymbol{p}_{\boldsymbol{y}}^{¢} + v_{1a}\boldsymbol{p}_{\boldsymbol{y}}^{\$}\right) \cdot \left(1 + \tau_a^{¢}\right) \tag{21}$$

$$\boldsymbol{p}_{\boldsymbol{mm}}^{¢} = \left(v_{0m} - v_{1m}\boldsymbol{xr}^{¢} + (1 - v_{1m})\boldsymbol{p}_{\boldsymbol{y}}^{¢} + v_{1m}\boldsymbol{p}_{\boldsymbol{y}}^{\$}\right) \cdot \left(1 + \tau_m^{¢}\right) \tag{22}$$

$$\boldsymbol{p}_{\boldsymbol{mi}}^{¢} = \left(v_{0i} - v_{1i}\boldsymbol{xr}^{¢} + (1 - v_{1i})\boldsymbol{p}_{\boldsymbol{y}}^{¢} + v_{1i}\boldsymbol{p}_{\boldsymbol{y}}^{\$}\right) \cdot \left(1 + \tau_i^{¢}\right) \tag{23}$$

$$\boldsymbol{p}_{\boldsymbol{xa}}^{¢} = u_{0a} - u_{1a}\boldsymbol{xr}^{¢} + (1 - u_{1a})\boldsymbol{p}_{\boldsymbol{y}}^{¢} + u_{1a}\boldsymbol{p}_{\boldsymbol{y}}^{\$} \tag{24}$$

$$\boldsymbol{p}_{\boldsymbol{xm}}^{¢} = u_{0m} - u_{1m}\boldsymbol{xr}^{¢} + (1 - u_{1m})\boldsymbol{p}_{\boldsymbol{y}}^{¢} + u_{1m}\boldsymbol{p}_{\boldsymbol{y}}^{\$} \tag{25}$$

$$\boldsymbol{p}_{\boldsymbol{xi}}^{¢} = u_{0i} - u_{1i}\boldsymbol{xr}^{¢} + (1 - u_{1i})\boldsymbol{p}_{\boldsymbol{y}}^{¢} + u_{1i}\boldsymbol{p}_{\boldsymbol{y}}^{\$} \tag{26}$$

In order to define prices for the US economy, we simply fix it to the prices in Ghana times the exchange rate, making US prices in this model dependent primarily on what the Ghanaian economy does as well as variations with the Ghanaian exchange rate. This is given in the following six equations.

$$p_{xa}^{\$} = p_{ma}^{¢} xr^{¢} \tag{27}$$

$$p_{xm}^{\$} = p_{mm}^{¢} xr^{¢} \tag{28}$$

$$p_{xi}^{\$} = p_{mi}^{¢} xr^{¢} \tag{29}$$

$$p_{ma}^{\$} = p_{xa}^{¢} xr^{¢} \tag{30}$$

$$p_{mm}^{\$} = p_{xm}^{¢} xr^{¢} \tag{31}$$

$$p_{mi}^{\$} = p_{xi}^{¢} xr^{¢} \tag{32}$$

Next, we must determine the real volumes of exports (x_a, x_m, and x_i) and imports (im_a, im_m, and im_i) for each sector in Ghana, which is given as a function of elasticities (ε_0, ε_1, and ε_2 for exports and μ_0, μ_1, and μ_2 for imports) in response to changes in foreign prices relative to the foreign nation's domestic prices and an elasticity relative to total real output y of the other nation. In this

way, real flows of imports and exports are determined as reactions to prices on the other end – e.g., the export prices of Ghana are primarily affected by the import prices and domestic prices of the US. Again, bolded variables indicate that we are working with the natural log of that variable.

$$\boldsymbol{x_a^{¢}} = \varepsilon_{0a} - \varepsilon_{1a}\left(\boldsymbol{p_{ma-1}^{\$}} - \boldsymbol{p_{y-1}^{\$}}\right) + \varepsilon_{2a}\boldsymbol{y^{\$}} \tag{33}$$

$$\boldsymbol{x_m^{¢}} = \varepsilon_{0m} - \varepsilon_{1m}\left(\boldsymbol{p_{mm-1}^{\$}} - \boldsymbol{p_{y-1}^{\$}}\right) + \varepsilon_{2m}\boldsymbol{y^{\$}} \tag{34}$$

$$\boldsymbol{x_i^{¢}} = \varepsilon_{0i} - \varepsilon_{1i}\left(\boldsymbol{p_{mi-1}^{\$}} - \boldsymbol{p_{y-1}^{\$}}\right) + \varepsilon_{2i}\boldsymbol{y^{\$}} \tag{35}$$

$$\boldsymbol{im_a^{¢}} = \mu_{0a} - \mu_{1a}\left(\boldsymbol{p_{ma-1}^{¢}} - \boldsymbol{p_{y-1}^{¢}}\right) + \mu_{2a}\boldsymbol{y^{¢}} \tag{36}$$

$$\boldsymbol{im_m^{¢}} = \mu_{0m} - \mu_{1m}\left(\boldsymbol{p_{mm-1}^{¢}} - \boldsymbol{p_{y-1}^{¢}}\right) + \mu_{2m}\boldsymbol{y^{¢}} \tag{37}$$

$$\boldsymbol{im_i^{¢}} = \mu_{0i} - \mu_{1i}\left(\boldsymbol{p_{mi-1}^{¢}} - \boldsymbol{p_{y-1}^{¢}}\right) + \mu_{2i}\boldsymbol{y^{¢}} \tag{38}$$

In a similar manner to prices, and with a more intuitive logic, we can establish the imports of one nation as the exports of the other.

$$x_a^{\$} = im_a^{¢} \tag{39}$$

$$x_m^{\$} = im_m^{¢} \tag{40}$$

$$x_i^{\$} = im_i^{¢} \tag{41}$$

$$im_a^{\$} = x_a^{¢} \tag{42}$$

$$im_m^{\$} = x_m^{¢} \tag{43}$$

$$im_i^{\$} = x_i^{¢} \tag{44}$$

The final step here then is to translate all export and import volumes into nominal prices by taking the product of real values and the price of those goods for all exports of imports of both nations. Having done so completes the equations necessary to specify both the prices of exports and imports, as well as the patterns of trade between the two nations. The following twelve equations, while tedious, complete this process.

$$X_a^{¢} = x_a^{¢} p_{xa}^{¢} \tag{45}$$

$$X_m^{¢} = x_m^{¢} p_{xm}^{¢} \tag{46}$$

$$X_i^{¢} = x_i^{¢} p_{xi}^{¢} \tag{47}$$

$$X_a^{\$} = x_a^{\$} p_{xa}^{\$} \tag{48}$$

$$X_m^{\$} = x_m^{\$} p_{xm}^{\$} \tag{49}$$

$$X_i^{\$} = x_i^{\$} p_{xi}^{\$} \tag{50}$$

$$IM_a^{¢} = im_a^{¢} p_{ma}^{¢} \tag{51}$$

$$IM_m^{¢} = im_m^{¢} p_{mm}^{¢} \tag{52}$$

$$IM_i^{¢} = im_i^{¢} p_{mi}^{¢} \tag{53}$$

$$IM_a^{\$} = im_a^{\$} p_{ma}^{\$} \tag{54}$$

$$IM_m^{\$} = im_m^{\$} p_{mm}^{\$} \tag{55}$$

$$IM_i^{\$} = im_i^{\$} p_{mi}^{\$} \tag{56}$$

Thirdly, we must specify income and expenditure within the model both in nominal and real terms. Beginning in real terms, we can identify the real wealth of households v by dividing our earlier wealth equation V by the price of domestic sales p_{ds}. Having done this, we can then determine the real level of Haig-Simons income yd_{hs} in each economy. Additionally, we can express real consumption c in terms of both real wealth and expected real disposable income yd_{hse} (defined as the average between two periods in equations 63 and 64), and then define total real sales s as the aggregation of real consumption, government expenditure, and total exports.

$$v^{¢} = \frac{V^{¢}}{p_{ds}^{¢}} \tag{57}$$

$$v^{\$} = \frac{V^{\$}}{p_{ds}^{\$}} \tag{58}$$

$$yd_{hs}^{¢} = \left(\frac{YD_{hs}^{¢}}{p_{ds}^{¢}}\right) - v_{-1}^{¢}\left(\frac{\Delta p_{ds}^{¢}}{p_{ds}^{¢}}\right) \tag{59}$$

$$yd_{hs}^{\$} = \left(\frac{YD_{hs}^{\$}}{p_{ds}^{\$}}\right) - v_{-1}^{\$}\left(\frac{\Delta p_{ds}^{\$}}{p_{ds}^{\$}}\right) \tag{60}$$

$$c^{¢} = \alpha_1^{¢} yd_{hse}^{¢} + \alpha_2^{¢} v_{-1}^{¢} \tag{61}$$

$$c^{\$} = \alpha_1^{\$} yd_{hse}^{\$} + \alpha_2^{\$} v_{-1}^{\$} \tag{62}$$

$$yd_{hse}^{¢} = \frac{\left(yd_{hse}^{¢} + yd_{hse-1}^{¢}\right)}{2} \tag{63}$$

$$yd_{hse}^{\$} = \frac{\left(yd_{hse}^{\$} + yd_{hse-1}^{\$}\right)}{2} \tag{64}$$

$$s^{¢} = c^{¢} + g^{¢} + \left(x_a^{¢} + x_m^{¢} + x_i^{¢}\right) \tag{65}$$

$$s^{\$} = c^{\$} + g^{\$} + \left(x_a^{\$} + x_m^{\$} + x_i^{\$}\right) \tag{66}$$

From here we can calculate nominal sales S, the price of sales p_s, the price of domestic sales, nominal domestic sales DS, and real domestic sales ds. Nominal sales are found by taking the product of real sales and the price of sales. The price of sales introduces new terms and is determined via a mark-up $(1 + \varphi)$ times the wage rate W, number of employed workers N, and the total value of imports, all divided by total real sales. The price of domestic sales then is the ratio of nominal sales minus total nominal exports over real sales minus total real exports. Nominal domestic sales are just the numerator of our domestic sales price equation, and real domestic sales is found by combing real consumption and real government expenditure.

$$S^{¢} = s^{¢} p_s^{¢} \tag{67}$$

$$S^{\$} = s^{\$} p_s^{\$} \tag{68}$$

$$p_s^{¢} = \frac{\left[\left(1 + \varphi^{¢}\right)\left(W^{¢} N^{¢} + \left(IM_a^{¢} + IM_m^{¢} + IM_i^{¢}\right)\right)\right]}{s^{¢}} \tag{69}$$

$$p_s^{\$} = \frac{\left[\left(1 + \varphi^{\$}\right)\left(W^{\$} N^{\$} + \left(IM_a^{\$} + IM_m^{\$} + IM_i^{\$}\right)\right)\right]}{s^{\$}} \tag{70}$$

$$p_{ds}^{¢} = \frac{\left(S^{¢} - \left(X_a^{¢} + X_m^{¢} + X_i^{¢}\right)\right)}{\left(s^{¢} - \left(x_a^{¢} + x_m^{¢} + x_i^{¢}\right)\right)} \tag{71}$$

$$p_{ds}^{\$} = \frac{\left(S^{\$} - \left(X_a^{\$} + X_m^{\$} + X_i^{\$}\right)\right)}{\left(s^{\$} - \left(x_a^{\$} + x_m^{\$} + x_i^{\$}\right)\right)} \tag{72}$$

$$DS^{¢} = S^{¢} - \left(X_a^{¢} + X_m^{¢} + X_i^{¢}\right) \tag{73}$$

$$DS^{\$} = S^{\$} - \left(X_a^{\$} + X_m^{\$} + X_i^{\$}\right) \tag{74}$$

$$ds^{¢} = c^{¢} + g^{¢} \tag{75}$$

$$ds^{\$} = c^{\$} + g^{\$} \tag{76}$$

To finish up the remainder of our income and expenditure specifications, twelve more equations are given. We can define nominal output Y and real output y (respectively, the numerator and denominator of the domestic prices equations) as the difference between nominal/real sales and total nominal/real imports. The prices of output p_y is given as a ratio of nominal over real output. Nominal consumption C, similarly, is given as the product of real consumption and the price of domestic sales, and nominal government expenditure G is also given as the product of real government expenditure and domestic sales. Finally, the level of employment N is given as real output divided by that nation's productivity pr.

$$Y^{¢} = S^{¢} - \left(IM_a^{¢} + IM_m^{¢} + IM_i^{¢}\right) \tag{77}$$

$$Y^{\$} = S^{\$} - \left(IM_a^{\$} + IM_m^{\$} + IM_i^{\$}\right) \tag{78}$$

$$y^{¢} = s^{¢} - \left(im_a^{¢} + im_m^{¢} + im_i^{¢}\right) \tag{79}$$

$$y^{\$} = s^{\$} - \left(im_a^{¢} + im_m^{¢} + im_i^{¢}\right) \tag{80}$$

$$p_y^{¢} = \frac{Y^{¢}}{y^{¢}} \tag{81}$$

$$p_y^{\$} = \frac{Y^{\$}}{y^{\$}} \tag{82}$$

$$C^{¢} = c^{¢} p_{ds}^{¢} \tag{83}$$

$$C^{\$} = c^{\$} p_{ds}^{\$} \tag{84}$$

$$G^{¢} = g^{¢} p_{ds}^{¢} \tag{85}$$

$$G^{\$} = g^{\$} p_{ds}^{\$} \tag{86}$$

$$N^{¢} = \frac{y^{¢}}{pr^{¢}} \tag{87}$$

$$N^{\$} = \frac{y^{\$}}{pr^{\$}} \tag{88}$$

Moving on to the last steps, we need to specify asset demand and supply for both economies, as well as closing the model within a flexible exchange rate regime. Bill demand is given for both domestic and foreign holdings (e.g., $B_{¢d}^{¢}$ and $B_{¢d}^{\$}$) for bills from both countries, while money cash demand H_d is only specified for domestic holdings since foreign holdings of cash money is precluded within this model – albeit this may not be true with US dollars in the global economy. Bill holdings are determined as a function of total wealth V using various parameters λ interacting with the domestic rate of interest r as well as the foreign rate of interest plus the expected change in the exchange rate xr. Cash money holdings are then determined as a residual once the proportion of total wealth held in bills is determined, as seen in equations 91 and 94.

$$B_{¢d}^{¢} = V^{¢}\left(\lambda_{10} + \lambda_{11}r^{¢} - \lambda_{12}\left(r^{\$} + \Delta xr_e^{\$}\right)\right) \tag{89}$$

$$B_{¢d}^{\$} = V^{¢}\left(\lambda_{20} - \lambda_{21}r^{¢} + \lambda_{22}\left(r^{\$} + \Delta xr_e^{\$}\right)\right) \tag{90}$$

$$H_d^{¢} = V^{¢} - B_{¢d}^{¢} - B_{¢d}^{\$}xr^{\$} \tag{91}$$

$$B_{\$d}^{\$} = V^{\$}\left(\lambda_{40} + \lambda_{41}r^{\$} - \lambda_{42}\left(r^{¢} + \Delta xr_e^{¢}\right)\right) \tag{92}$$

$$B_{\$d}^{¢} = V^{\$}\left(\lambda_{50} - \lambda_{51}r^{\$} + \lambda_{52}\left(r^{¢} + \Delta xr_e^{¢}\right)\right) \tag{93}$$

$$H_d^{\$} = V^{\$} - B_{\$d}^{\$} - B_{\$d}^{¢}xr^{¢} \tag{94}$$

Additionally, the possibility for change in exchange rate expectations is given but omitted within this model for the sake of simplicity. This renders the expected change in exchange rates in our previous equations to be effectively zero, although the capability for expectations is built into the model.

$$\Delta xr_e^{¢} = \frac{\left(xr_e^{¢} - xr_{-1}^{¢}\right)}{xr^{¢}} \tag{95}$$

$$\Delta xr_e^{\$} = \frac{\left(xr_e^{\$} - xr_{-1}^{\$}\right)}{xr^{\$}} \tag{96}$$

Asset supply then is set to asset demand for both bills and cash money, with the bill holdings of each nation's central bank acting as a residual after foreign and domestic holdings are determined.

The demand for domestic bills for each central bank is set to last periods demand plus the change in cash money supply, minus the change in gold reserves and, in the case of Ghana, the change in US bill holdings by the Ghanaian central bank. Within these last equations, specifically equation 102, we can see Godley and Lavoie's (2012) compensation thesis at play, which is also explained succinctly by Lavoie (2014), as the central bank of Ghana stands ready to absorb whatever bills remain after foreign and domestic holdings are subtracted from the total supply, which is determined by the government's deficit position.

$$H_s^{\$} = H_d^{\$} \tag{97}$$

$$B_{\$s}^{\$} = B_{\$d}^{\$} \tag{98}$$

$$B_{cb\$s}^{\$} = B_{cb\$d}^{\$} \tag{99}$$

$$H_s^{¢} = H_d^{¢} \tag{100}$$

$$B_{¢s}^{¢} = B_{¢d}^{¢} \tag{101}$$

$$B_{cb¢s}^{¢} = B_s^{¢} - B_{¢s}^{¢} - B_{\$s}^{¢} \tag{102}$$

$$B_{cb\$d}^{\$} = B_{cb\$d-1}^{\$} + \Delta H_s^{\$} - \Delta or^{\$} p_g^{\$} \tag{103}$$

$$B_{cb¢d}^{¢} = B_{cb¢d-1}^{¢} + \Delta H_s^{¢} - \Delta B_{cb¢s}^{\$} xr^{\$} - \Delta or^{¢} p_g^{¢} \tag{104}$$

Next, the price of gold in Ghana is set to the price of gold in the US divided by the Ghanaian exchange rate. The US exchange rate is set as the reciprocal of the Ghanaian exchange rate. Additionally, the supply of Ghanaian bills held by the US is set to its own demand times the exchange rate, and the demand for US bills by the Ghanaian central bank is set to its supply times the exchange rate.

$$p_g^{¢} = \frac{p_g^{\$}}{xr^{¢}} \tag{105}$$

$$xr^{\$} = \frac{1}{xr^{¢}} \tag{106}$$

$$B_{\$s}^{¢} = B_{\$d}^{¢} xr^{\$} \tag{107}$$

$$B_{cb¢d}^{\$} = B_{cb¢s}^{\$} xr^{\$} \tag{108}$$

At this point, all that is left is to define the exchange rate for Ghana as the ratio of Ghanaian holdings of US bills supply over the Ghanaian holdings of US bills demand. The supply of US bills held by the Ghanaian central bank is also set as the residual of what is left of US bills after all other holdings are accounted for. The redundant, and therefore omitted, final equation of this model sets the supply of US bills held by the Ghanaian central bank as a constant. Importantly, when looking to equation 109, the denominator is determined by equation 90 and the numerator by 110, acting to adjust the Ghanaian exchange rate as the model adjusts overtime.

$$xr^{¢} = \frac{B^{\$}_{¢s}}{B^{\$}_{¢d}} \tag{109}$$

$$B^{\$}_{¢s} = B^{\$}_{s} - B^{\$}_{\$s} - B^{\$}_{cb\$d} - B^{\$}_{cb¢s} \tag{110}$$

$$B^{\$}_{cb¢s} = constant \tag{111}$$

Two additional metrics can be derived from these equations, although they do not directly influence the model. Taken from Godley and Lavoie (2012), in an appendix to chapter 12, a simple way to define the government budget deficit and calculate the net accumulation of financial assets of each nation is provided. Simply put, rather than calculate the total supply of bills as is done in equations 13 and 14, we measure the net change in bills $PSBR$ for each period – effectively measuring the government deficit of each nation. Adding this to the current account balance then gives us a look into what the nations net accumulation of financial assets $NAFA$ is for each period.

$$PSBR^{¢} = \Delta B^{¢}_{s} = G^{¢} + r^{¢}_{-1}B^{¢}_{s-1} - T^{¢} - \tau^{¢} - F^{¢}_{cb} \tag{112}$$

$$PSBR^{\$} = \Delta B^{\$}_{s} = G^{\$} + r^{\$}_{-1}B^{\$}_{s-1} - T^{\$} - \tau^{\$} - F^{\$}_{cb} \tag{113}$$

$$NAFA^{¢} = PSBR^{¢} + CAB^{¢} \tag{114}$$

$$NAFA^{\$} = PSBR^{\$} + CAB^{\$} \tag{115}$$

This concludes the model as presented. Notably, some key features of an open-economy are missing from this model – and this is done for the sake of simplicity for the time being, with these other features being necessary for a more complete model. For now, the results are as follows.

LIBERALIZATION VS. PROTECTIONISM

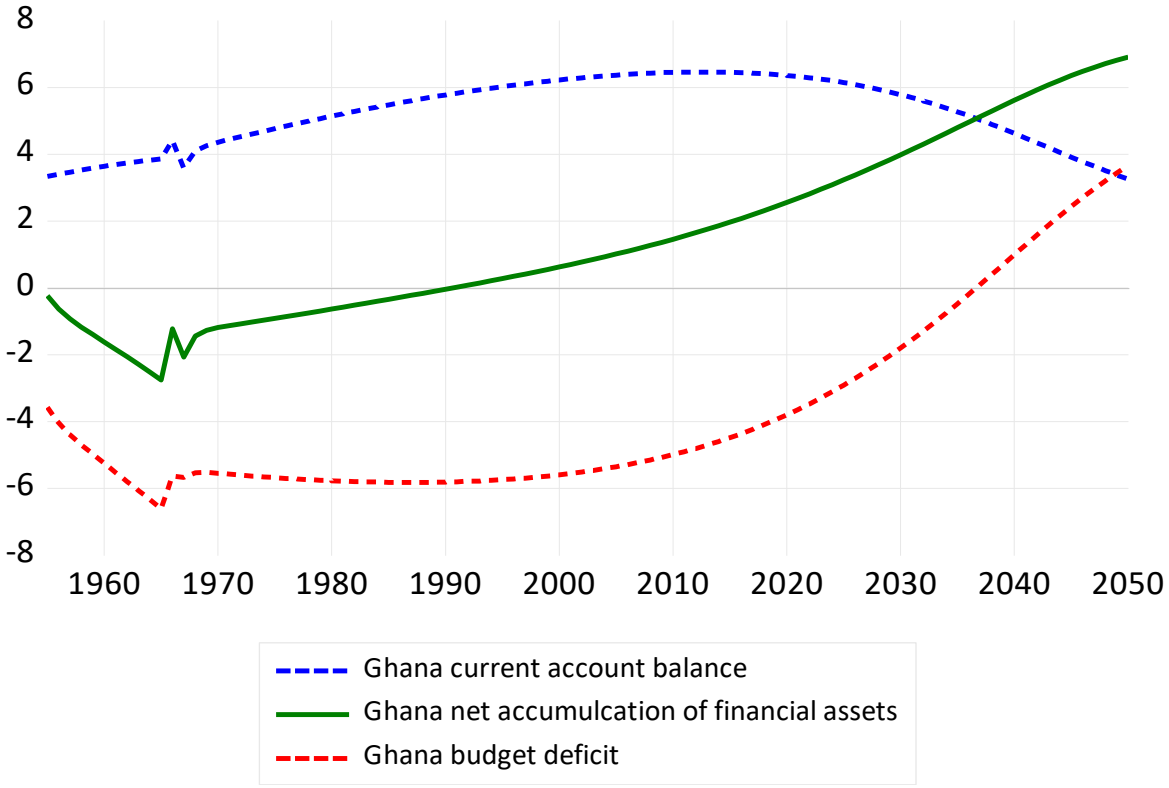
Using this model, three different scenarios are run in order to test the effects of trade liberalization on Ghana's current account balance, government deficit, net accumulation of financial assets, exchange rate, import and export prices, patterns of trade, and GDP. Two scenarios are run to test unilateral trade liberalization and bilateral trade liberalization, with the unilateral scenario meaning that only Ghana lowers their import tariffs. A third scenario is run in which no one lowers their import tariffs, but Ghana raises theirs. The outcomes of these shocks provide some indication as to the possibilities of industrial policy, as well as the long run effects of liberalization on an economy – rather than a static one-off welfare gain that is often portrayed in the CGE models described earlier. Importantly, the outcomes of this model are not necessarily stable, and are therefore taken as indications of the general tendency of such a policy, rather than the actual outcomes of policy. The severity of effect may be overstated in such an exercise. As described by Taylor (2004) earlier, these models are "counterfactual" and therefore "irrefutable." Additionally, trade protection is tested around the agricultural sector here, since this is the sector that Ghana has the highest custom duties as shown by the 2013 SAM data (IFPRI 2017). However, as the model currently stands, we should expect to see similar results for identical shocks to the other sectors in the model.

Scenario One: Unilateral Liberalization

As seen in Figure 8, the immediate and most intuitive effect of a decrease in Ghana's import tariff for agricultural goods is for the Ghanaian government's deficit to grow as it begins to lose tax revenue. Such a process is unsustainable in the long run, especially concerning governments with a large chunk of their revenue coming from tariffs – as is the case in this model. Additionally, while the current account balance experiences a slight improvement in the short-run from such a shock, the long-run tendency is for it to worsen, albeit stay positive. The economy's net accumulation of financial assets here begins to rise, and this is due to Ghana's reliance on bill issuance to finance the growing deficit that the government is running. Thus, from a sectoral balances perspective this means that the loss of revenue for the government does push the private sector to save more, albeit in what is an unsustainable long-run trend. The primary take-away from such a shock is that developing countries reliant on tariff income can quickly find themselves in a fiscal crisis, absent

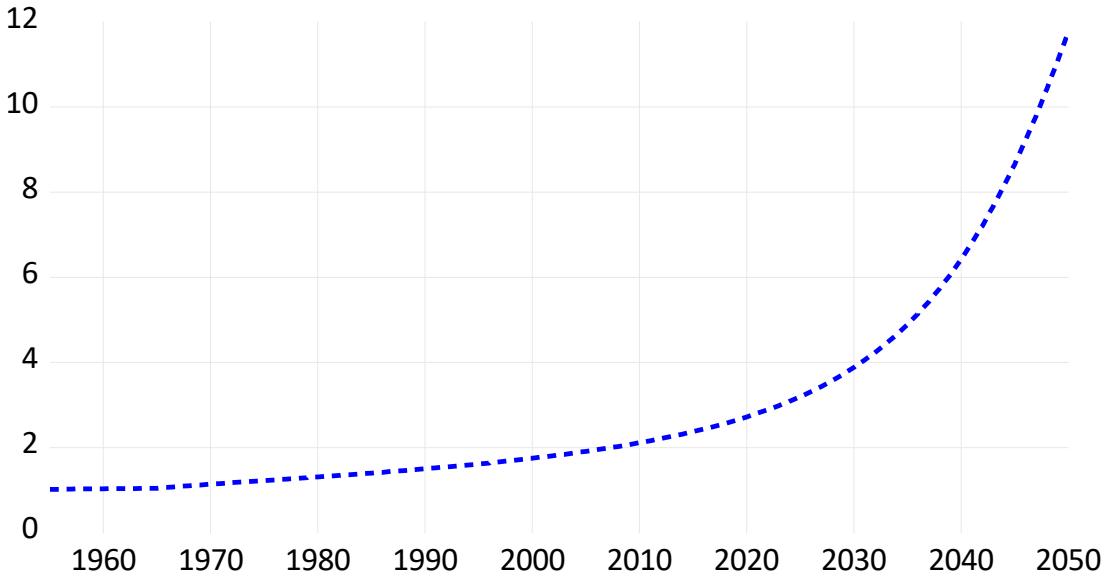
any other source of growing tax bases in other sectors of the economy, which does not occur in this model. Such a crisis may push a government towards requesting IMF help or resorting to other measures on their own, such as austerity policies.

Figure 8: Effect of a decrease in the Ghanaian agricultural tariff on the Ghanaian current account balance, net accumulation of financial assets, and government deficit.



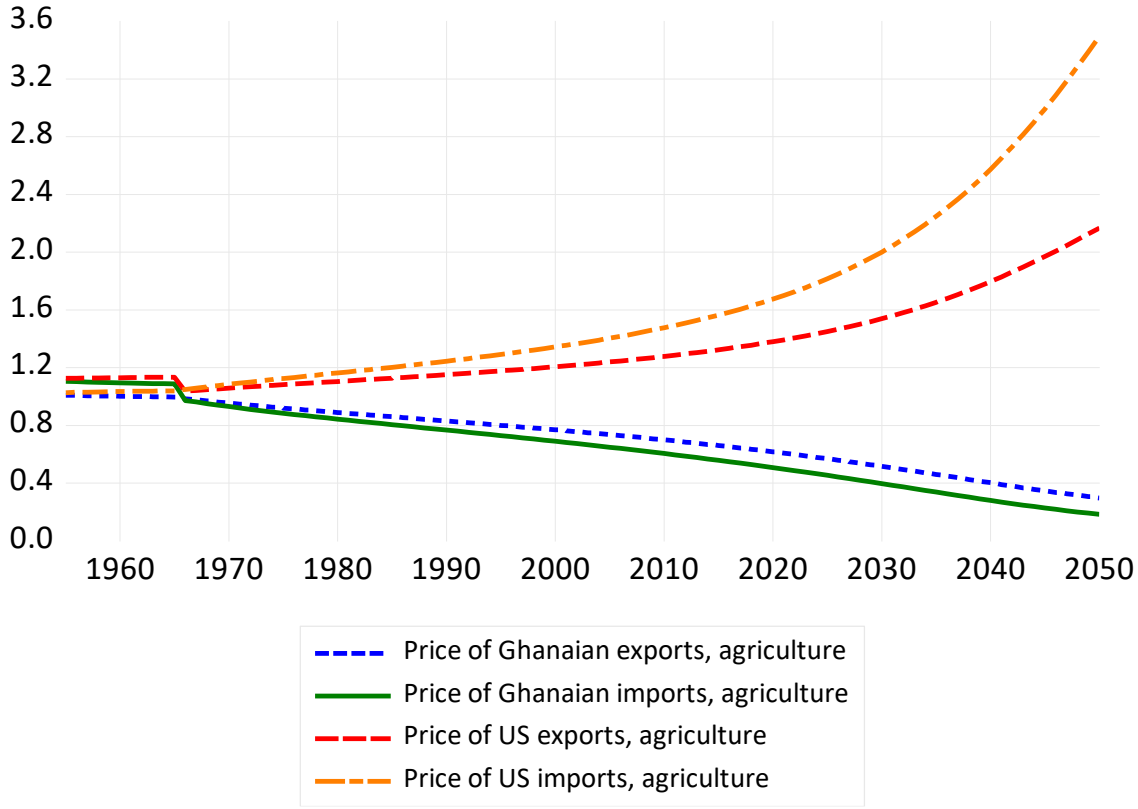
Interestingly, as seen in Figure 9, trade liberalization leads to a long-run appreciation of the Ghanaian currency, which exhibits a rather exponential change over time. This is because the exchange rate is determined by the supply of Ghanaian holdings of US bills outpacing demand of those holdings in the model. Such a change should improve the health of the Ghanaian economy, and this may be what helps adjust Ghana's private sector balance in the long-run. However, this rapid appreciation also plays an important role in determining what happens to export and import prices on the global market, as seen below in the next graphs provided. This change is brought about what happens to the US economy (see equation 109) in response to the drop-in tariff rates.

Figure 9: Effect on the Cedi exchange rate of a decrease in the Ghanaian agricultural tariff.



Moving on to Figures 10 and 11, we can see the effects of unilateral liberalization on the prices of both imports and exports for both economies as well as the general pattern of trade for the Ghanaian economy. As expected, unilateral liberalization leads to a long-run reduction in the price of imports for Ghana. Largely in part to the appreciating exchange rate, we can see the prices of imports and exports for the US economy rapidly rising, leading to both a growing GDP for their economy due to growing export prices, as well as a worsening terms of trade for the US since import prices rise much faster than export prices. Such a result should not be puzzling if one reexamines the price equations provided above, as well as the importance of the exchange rate in defining these prices for the US economy. Additionally, the extent to which US import prices continues to rise much faster than their export prices can also be attributed to the fact that this scenario only implements *unilateral* liberalization, with US tariffs on agricultural imports maintained – something which should affect and artificially raise import prices in the US economy, such as we see in Figure 10. Overall, although prices are falling for Ghana, we should take notice that their terms of trade here do improve over the course of the simulation as the ratio between export and import prices expands.

Figure 10: Effect of a decrease in the Ghanaian agricultural tariff on various price indices.



Turning our attention primarily to Figure 11, more interesting results are revealed. In order to cut out the noise of nominal variations in prices and the exchange rate, we can look at the real patterns of agricultural imports and exports in Ghana, comparing the non-liberalization baseline scenario with what occurs after the tariff reduction. What's immediately apparent is that real volumes in both imports and exports rapidly decline compared to the non-liberalization baseline scenario, despite an initial jump in imports. Moreover, it appears that imports eventually become marginally closer in volume to exports after the adjustments to the tariff shock are taken into account. It would seem, then, that the only thing that keeps the Ghanaian current account balance positive is their foreign bill holdings and the rapidly appreciating exchange rate. Looking at Figure 12, we can see that the long-effects of unilateral liberalization is to increase the gap between US and Ghanaian GDP – a result that is contrary to much of the CGE literature that consistently claims there are economic gains to continued liberalization in the global economy for developing nations.

Figure 11: Effect of a decrease in the Ghanaian agricultural tariff on the patterns of trade.

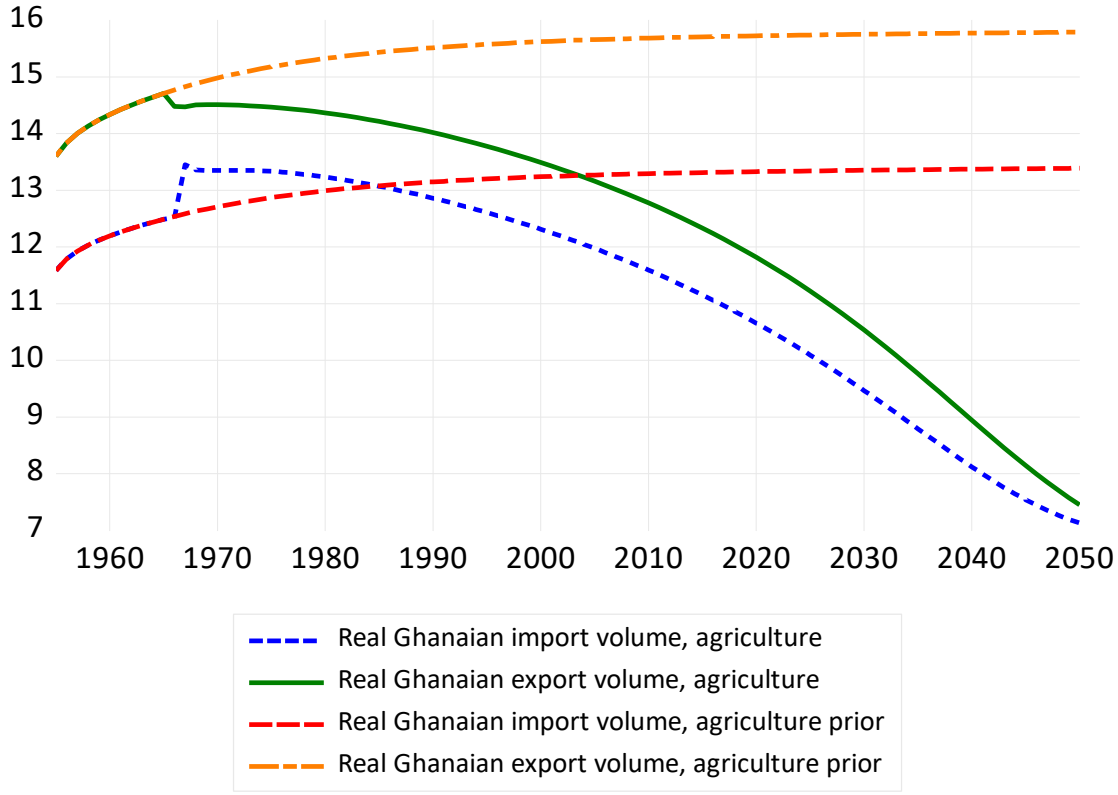
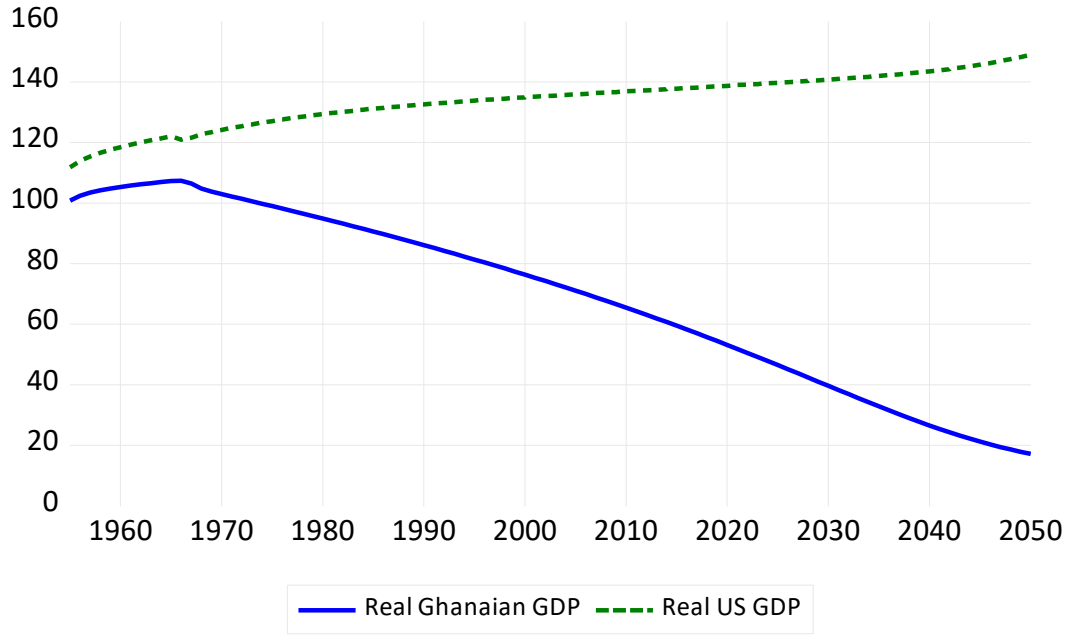


Figure 12: Effect of a decrease in the Ghanaian agricultural tariff on US and Ghanaian real GDP.



Scenario Two: Bilateral Liberalization

The second scenario runs shocks on the Ghanaian economy in the same way, but this time also lowers the US's import tariffs in the same magnitude, allowing us to see the effects of bilateral trade liberalization in Figures 13 through 17 by looking at the same metrics. What first stands out is that bilateral liberalization in this model seems to increase the magnitude of the adjustments previously described in Figures 8 through 12. The Ghanaian budget deficit verges on doubling in size by the end of the simulation, and the exchange rate appreciates even more rapidly, implying a stronger divergence between the supply and demand of US bills held by Ghanaian households. Again, the net accumulation of financial assets reflects a shift of household wealth holdings into new Ghanaian bills as well as US bills, although the demand for US bills is rapidly outpaced by the supply.

Interestingly, despite lowering their own trade barriers, the US's import and export prices continue to rise significantly over Ghanaian prices, leaving only the exchange rate as the main explanation for this result. The divergence between import and export prices is stronger, with the US terms of trade worsening compared to the first scenario. The current account balance is aggravated even more for Ghana, as real imports rest at a much higher level than exports, with the exchange rate allowing for it to stay positive with a rapidly appreciating cedi. Absent this effect, Ghana's trade deficit would grow, and it's perhaps reasonable to assume this would be the real-world outcome. The larger takeaway here is that bilateral liberalization does not seem to be any better for Ghana when compared to the unilateral case. Notably, the US economy grows more rapidly in the context of bilateral liberalization, showing that the case for liberalization rest much more strongly for the US than for Ghana. If we were to add in export subsidies for US agricultural product, a reality with many agricultural products coming from the US, we may see this dominance by US firms come about at a much faster pace. A fixed exchange rate regime, or a different formulation for a flexible exchange rate, could change these results within the model as well.

Figure 13: Effect of a bilateral decrease in the Ghanaian and US agricultural tariff on the Ghanaian current account balance, net accumulation of financial assets, and government deficit.

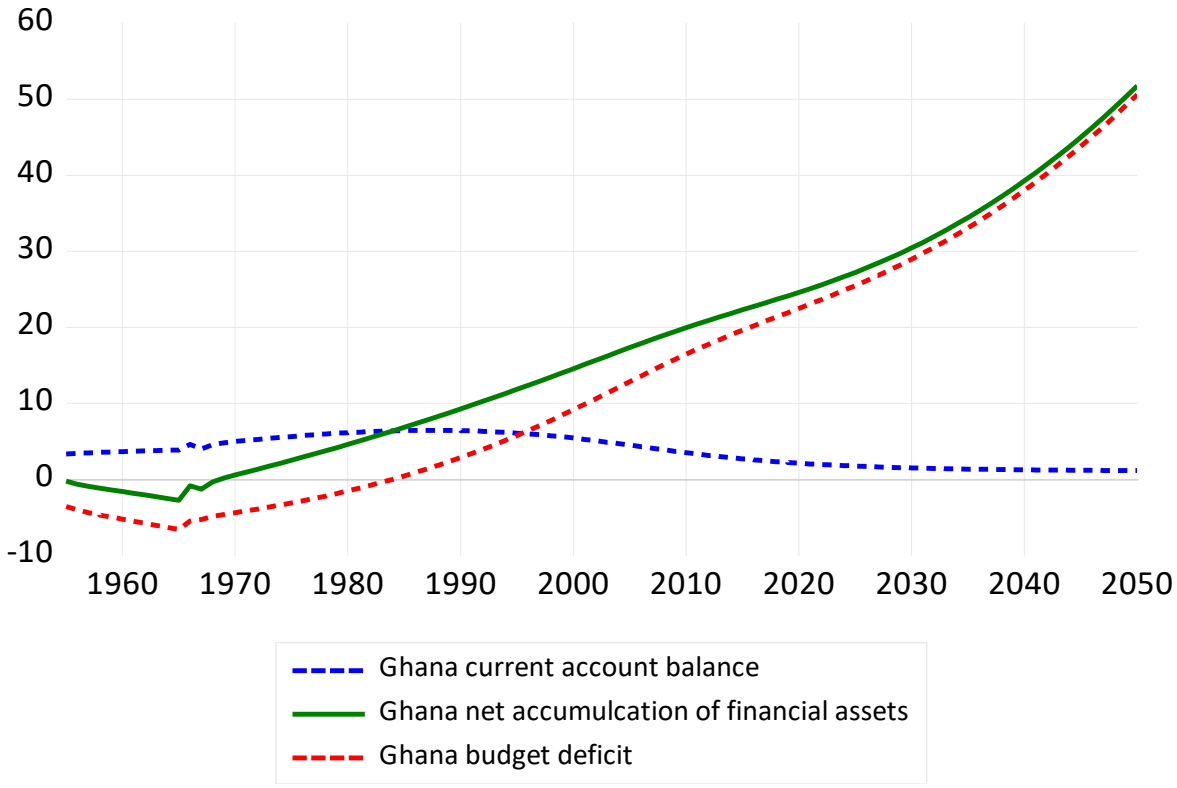


Figure 14: Effect on the Cedi exchange rate of a bilateral decrease in agricultural tariffs.

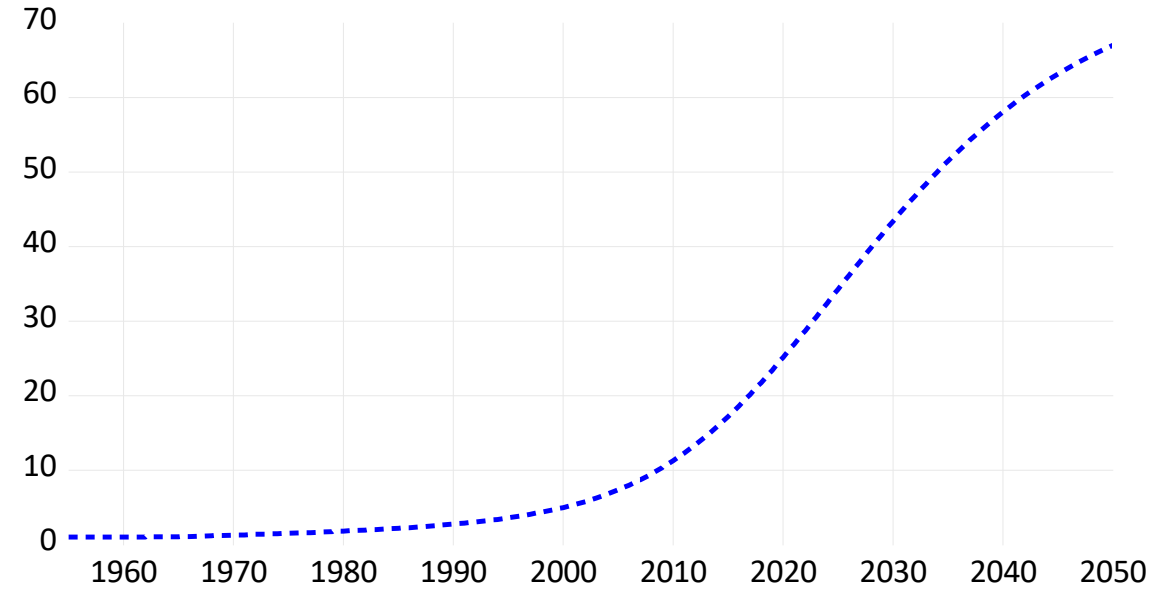
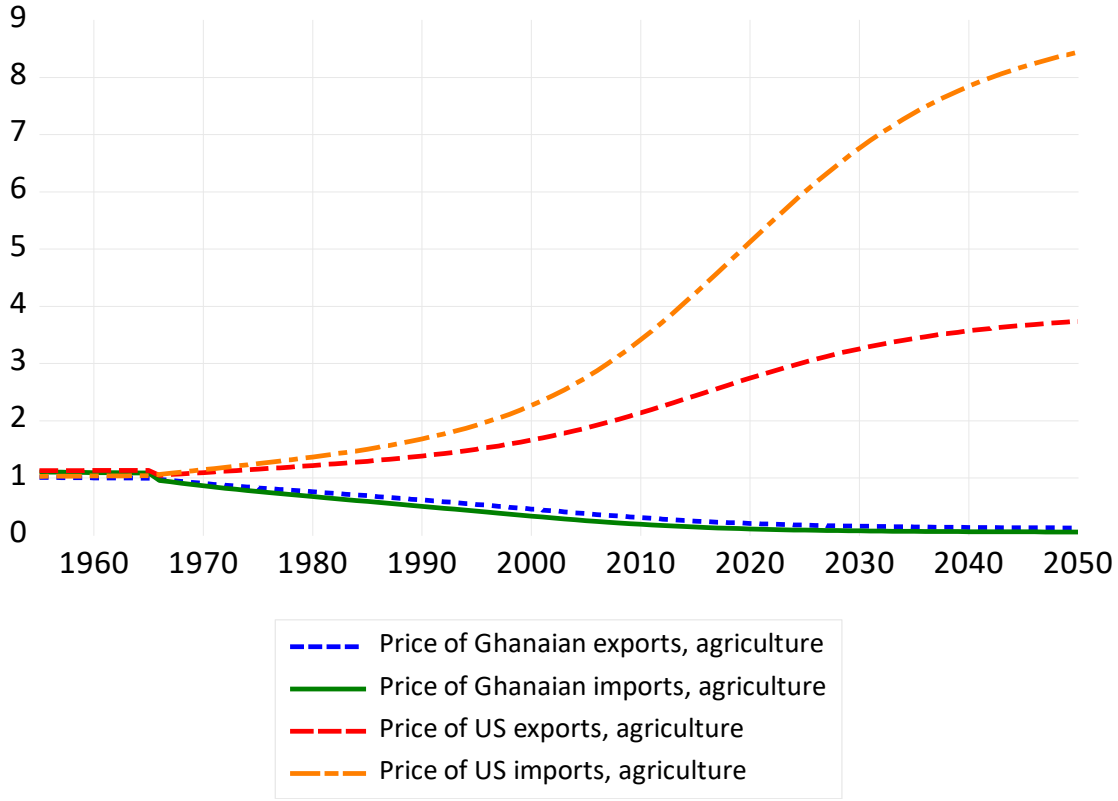


Figure 15: Effect of a bilateral decrease in agricultural tariffs on various price indices.



The conclusions that can be drawn from these first two shocks, looking at unilateral and bilateral liberalization, is that neither present a favorable outcome to the Ghanaian economy, with the US weathering the first and greatly benefiting from the second. Claims by others that even unilateral liberalization would provide welfare benefits to the developing world should be looked upon with grave suspicion. Vitally, and as indicated by others such as Shaikh (1979, 1980a, 1980b), trade between these nations does not adjust to some equilibrium point in which both nations find their own comparative advantage here. The compensation thesis as presented by Godley and Lavoie (2012) and Lavoie (2014) can be taken as an explanation as to why here. As seen in both Figures 12 and 17, the long-run consequences for Ghana is a falling real GDP compared to the US, only compensated for by exchange rate adjustments. A nation with a fixed exchange rate would most likely find itself in a worse position and even deeper fiscal crisis in the aftermath of trade liberalization. Therefore, there is no *prima facie* evidence from these simulations that trade liberalization would generally provide benefits to a developing nation, but rather may sink their ship rather than lifting them with the rising tides.

Figure 16: Effect of a bilateral decrease in agricultural tariffs on the patterns of trade.

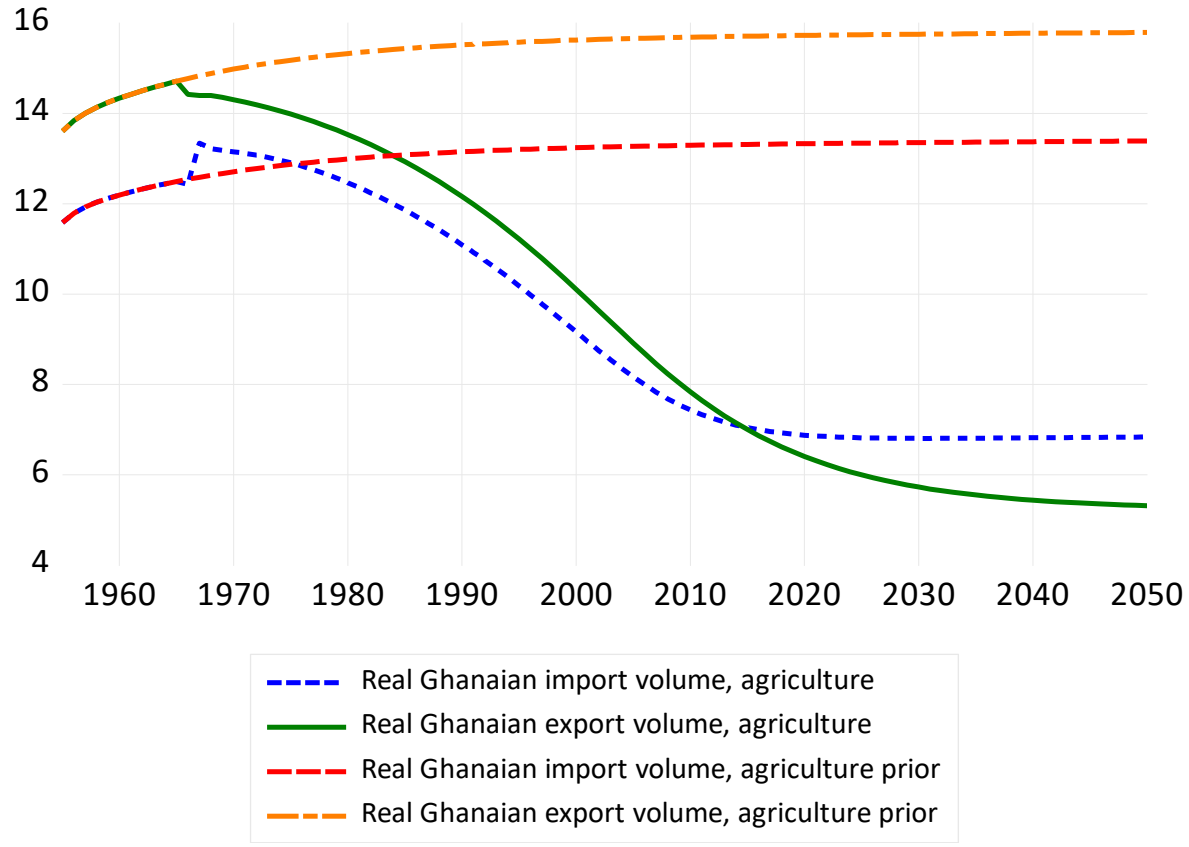
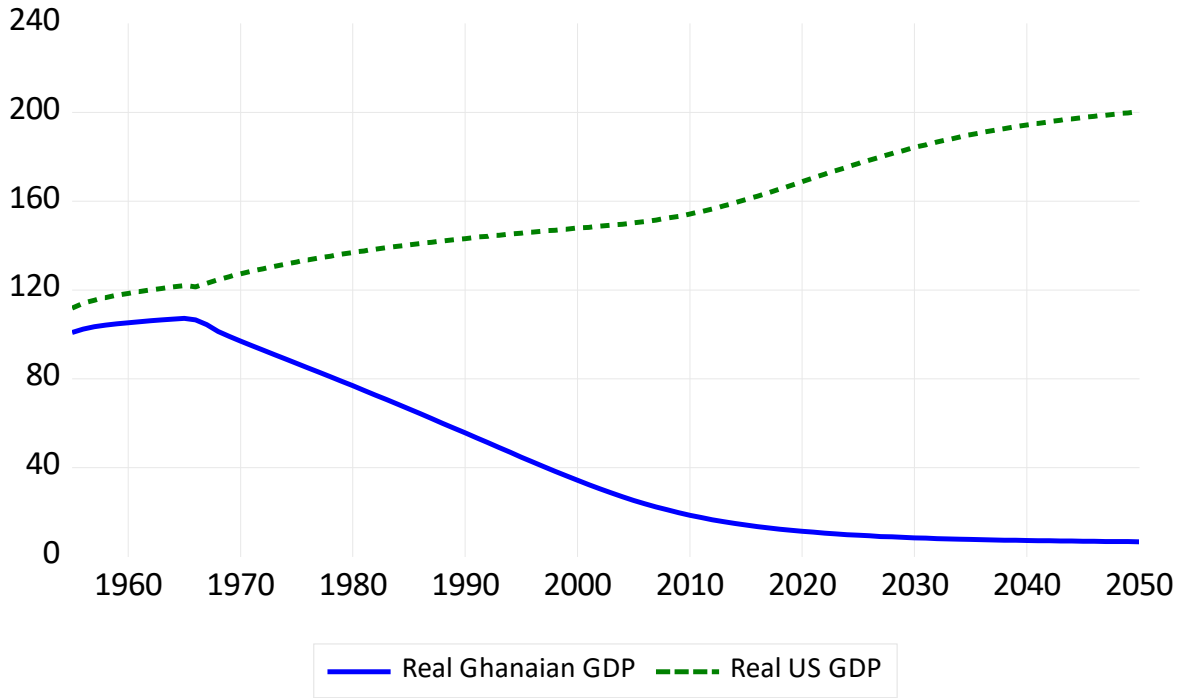


Figure 17: Effect of a bilateral decrease in agricultural tariffs on US and Ghanaian real GDP



Scenario Three: Increasing Protectionism

The last scenario to examine then is what happens if Ghana raises its import tariffs, therefore increasing protection for its own agricultural sector. Within this simulation, the US maintains its tariff rate at the established level, while Ghana more than doubles its level of protection concerning agricultural imports. The results are presented in Figures 18 through 22, and interestingly enough, seems to reverse the direction of many of the unstable processes explored in the previous two scenarios. As seen in Figure 18, the first thing to notice is that Ghanaian budget deficit rapidly goes into surplus as tariff rates are increased – an expected result, since tariff revenue in this model is used solely to finance government expenditure. As a first take away, it should be recognized that tariffs may be a vital source of revenue for developing countries with fiscal crises who are largely unable to generate tax revenue from their own economic base. Developing economies typically are not able to generate significant revenue through taxation on people's incomes, due to the brute fact of informal production and high unemployment that is so common in the developing world. Tariff revenue, then, is a necessary fiscal policy tool for Ghana in this model.

Turning our attention to Figure 19, we can see that the result of increasing protection is to depreciate the Ghanaian exchange rate, rather than exploding appreciation as was seen in the previous simulations. Since the exchange rate is driven as a ratio of bill holdings supply and demand, this indicates that increasing trade protection's effects on prices drives the Ghanaian economy to either demand more dollar denominated bills *or* decrease the supply of dollar denominated bills that households in Ghana are able to obtain – or both. Notably, this depreciation helps drive the current account balance of Ghana into the negative, although this change, as was above, is marginal. The other important trend here is that the government surplus drives the issuance of new bills downwards and tied with the current account deficit causes the private sector to lose wealth holdings over time and in theory take on debt instead. This is because the issuance of bills by the Ghanaian government becomes nonexistent in a surplus environment.

Figure 18: Effect of an increase in the Ghanaian agricultural tariff on the Ghanaian current account balance, net accumulation of financial assets, and government deficit.

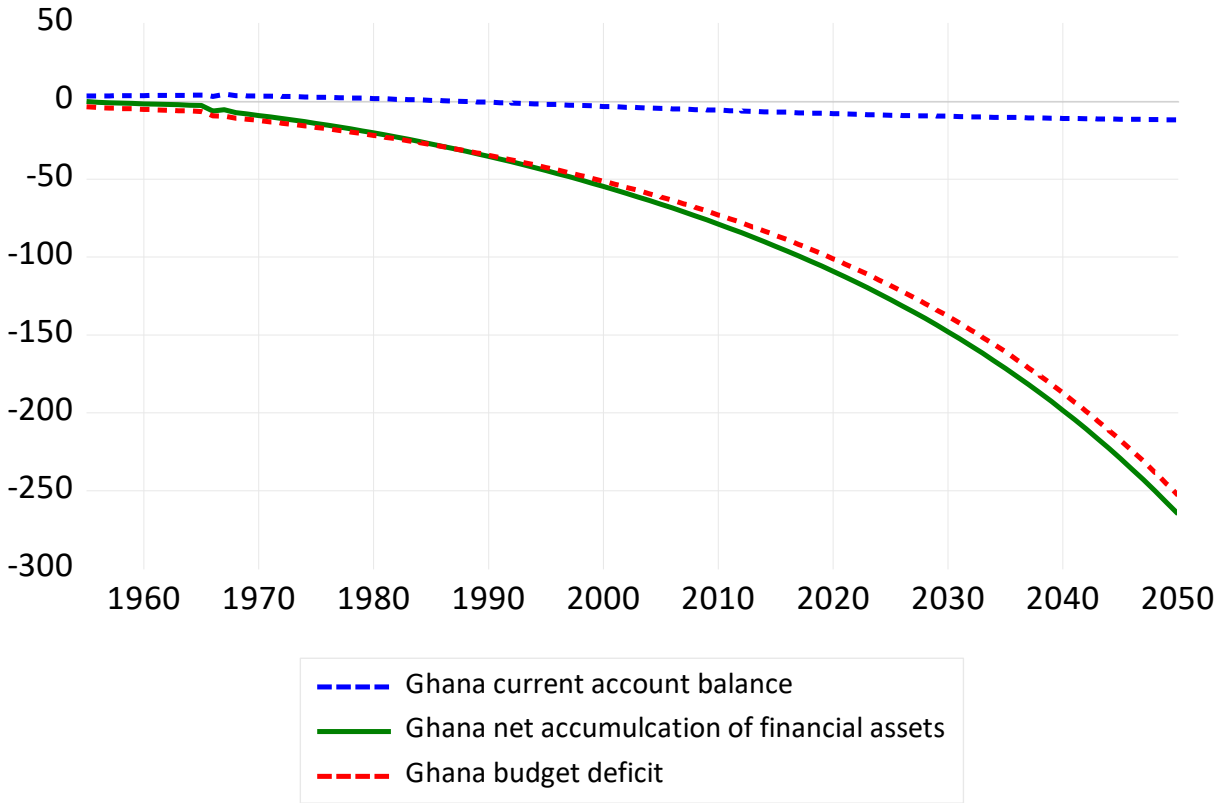


Figure 19: Effect on the Cedi exchange rate of increasing protection in agricultural tariffs.

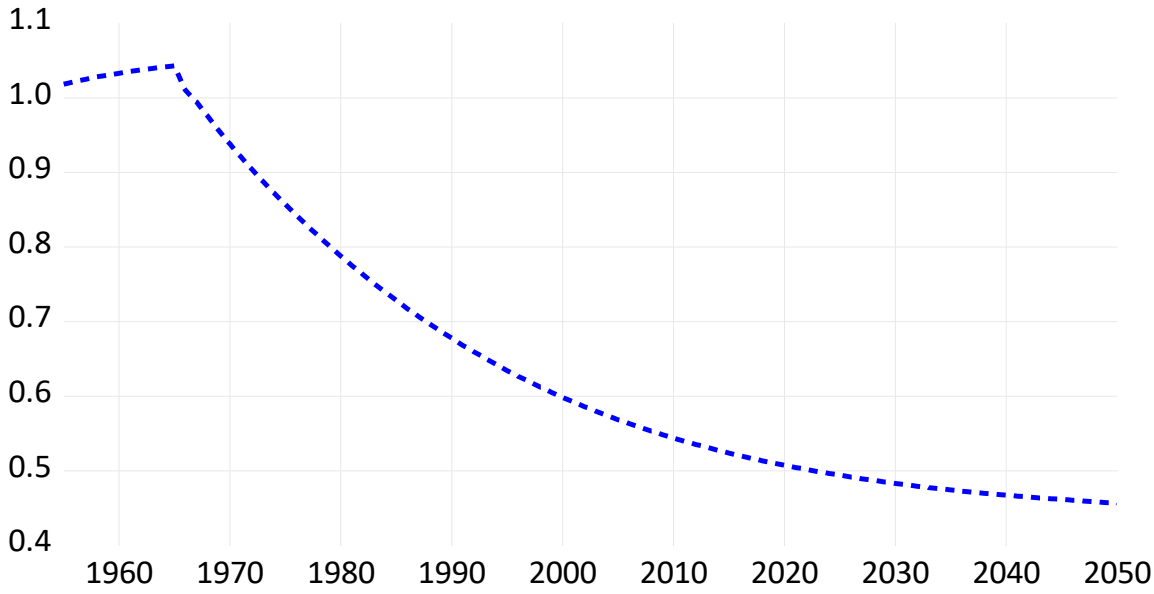
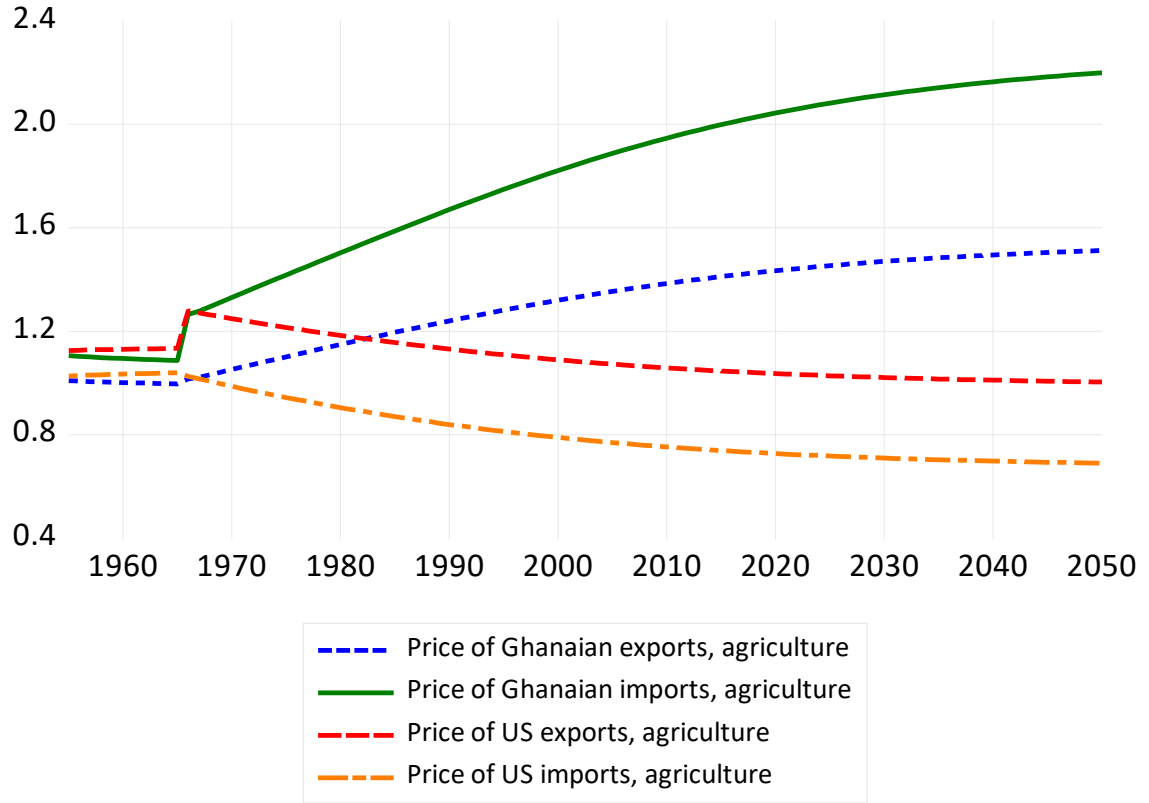


Figure 20 shows the effects of increasing protection on the prices of imports and exports for both economies in the model. The results here show that increasing import tariffs for Ghana has helped stop the explosive divergence in prices that was seen earlier in Figures 3 and 8. The effect is also to drive the price of Ghanaian imports much higher than Ghanaian exports, worsening their terms of trade overall. Of course, such a result should be taken with a grain of salt, as global commodity prices – especially in agricultural goods – are subject to wild variations over time, and it's doubtful that Ghana's tariff increase would change global prices to such an extent. Nonetheless, increasing tariffs may act as a necessary tool for developing nations to allow for better conditions for their own domestic firms, as is indicated by the effects seen below in Figure 21. By getting the prices "wrong," they in essence get the prices "right." Furthermore, such a policy may be even more effective in a sector exhibiting increasing returns, such as in the manufacturing or industrial sectors, rather than just within the agricultural sector here in the model. Thus, further modeling may show that increasing protection can increase the terms of trade experienced by nations under different conditions.

Figure 20: Effect of increasing protection in agricultural tariffs on various price indices.



Turning to Figure 21, we can see the effects this increase in the tariff rate has on the overall patterns of trade for Ghana. The increase has a clear immediate effect on the real volume of imports, as it falls initially due to the sudden increase in the price of imports. However, the long-run price adjustments quickly correct this course and allow for a steady increase of imports over time. Export volumes also increase and maintain a steady, but larger than before, ratio over the level of imports. This increase may help compensate for what is lost in worsening terms of trade. While the price of exports is increasing for Ghana when compared to US prices, the exchange rate corrects for this internationally and allows Ghana to steadily increase its share of the global market for agricultural goods. This undoubtably allows the Ghanaian economy to continue to grow its GDP, as seen in Figure 22 below. Its explosive growth beyond the US should also be taken with a grain of salt here. Additionally, because this model assumes constant returns to scale, we are unable to test for the effects such a change would have on a sector with diminishing or increasing returns (e.g., a reversal of the export/import ratio).

Figure 21: Effect of increasing protection in agricultural tariffs on the patterns of trade

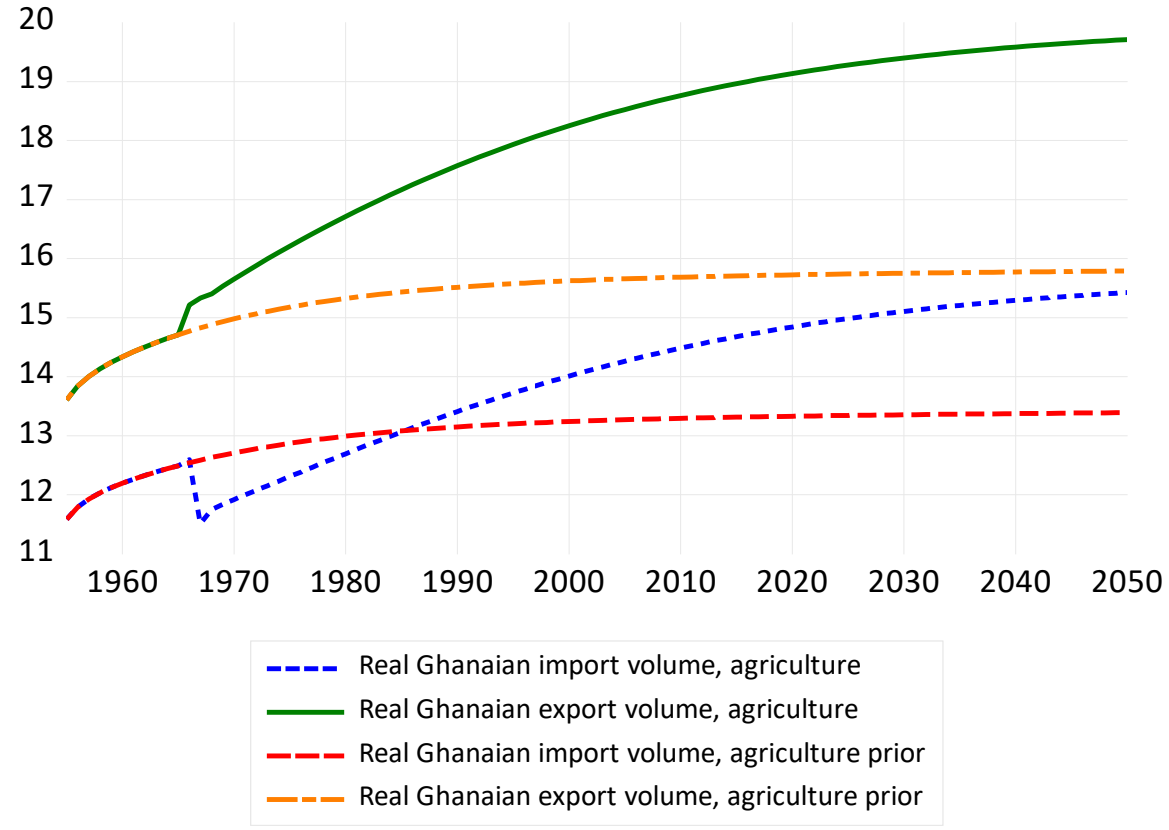
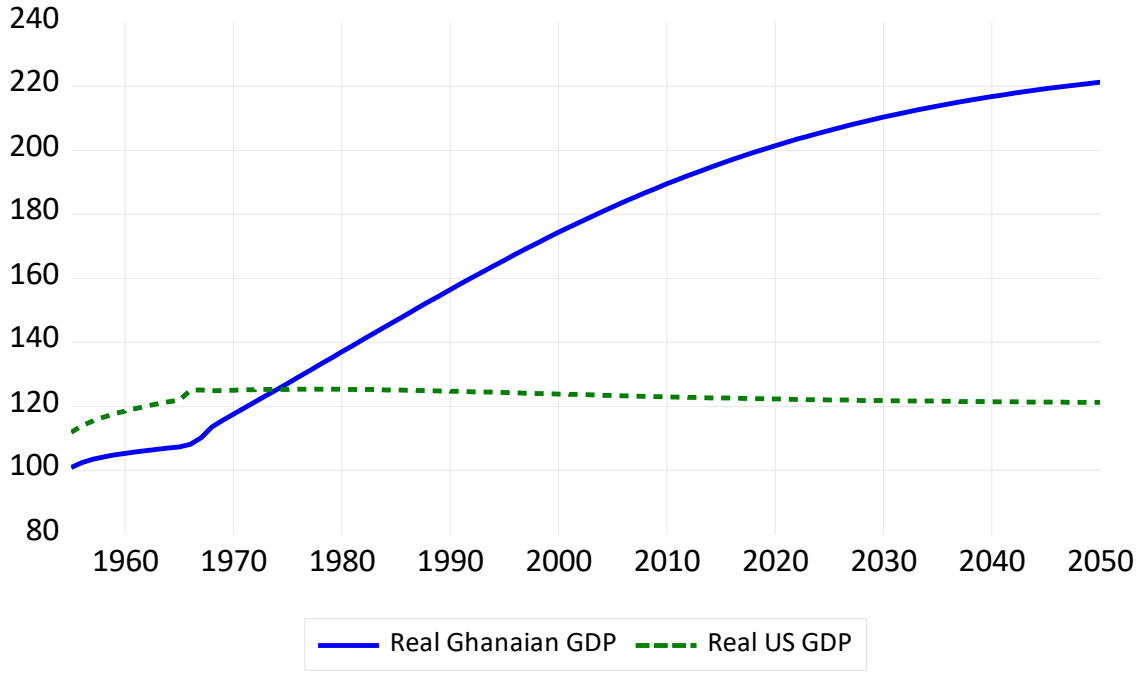


Figure 22: Effect of increasing protection in agricultural tariffs on US and Ghanaian real GDP

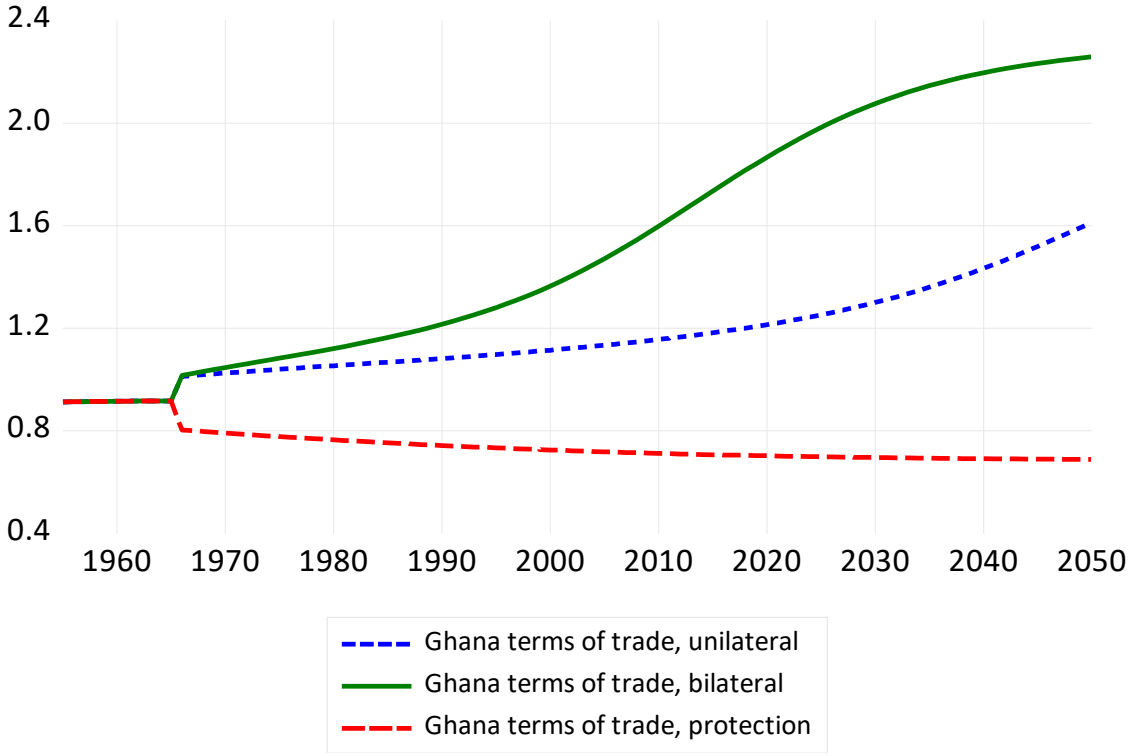


The explosive growth seen here in real Ghanaian GDP can be attributed to the instability of the model being used. However, it is an indication that trade protection can be a vital tool in ensuring the long-run growth of an economy. While the US economy stagnates here, Ghana is able to grow and catch-up overtime. As Rosnick, *et al.* (2017) show, the effect of globalization and the liberalization policies of the Washington Consensus era was a dramatic slowdown of growth in the developing world – something indicated by the scenarios run within the present model as well. Had industrial policy played a more important role in the globalization efforts of the 1980s and '90s, allowing for more sound and practical policy with each particular nation, such a result may have been avoided. While this model is running tests within the agricultural sector, as the model currently stands we would expect the same results if similar shocks were run in the other two sectors present. And, to belabor this point, if increasing or diminishing returns are worked into each sector appropriately, we may see differing results based on different kinds of economic activity and the protection placed around it.

Finally, we can compare the effects on the terms of trade for Ghana under all three scenarios. Looking at Figure 23, it's apparent that only when Ghana begins to liberalize their economy do their

terms of trade improve. However, because of the exchange rate appreciation, the benefits of such a change are not captured by the Ghanaian economy. Thus, it is doubtful that policies which aim solely to improve a nations terms of trade will amount to much when other considerations are taken into account – primarily on the monetary side of things. Had the Ghanaian economy been able to depreciate its currency in the aftermath of liberalization, then the gains from increasing terms of trade may have been captured. But this opens up other issues in terms of making payments on dollar denominated debt, acquiring foreign reserve holdings, and so forth. Therefore, it is not apparent from this model that single mindedly attempting to improve any one metric (e.g., terms of trade, the exchange rate) will lead to a better result for a nation as a general rule. Rather, the implication is that each developing nation would have its own set of appropriate policies *specific to its own economic structure and situation*. General approaches that posit a one size fits all approach are doubtful at best, and at worst damaging to the health of an economy. (Note: this also indicates that something like the Prebisch-Singer hypothesis, while perhaps empirically correct, does not capture the whole story of what's going on here and that we should defer to Reinert's (2007) conception of trade).

Figure 23: Effects on terms of trade for Ghana under all scenarios.



In sum, the larger takeaway from these simulations is that tariff policy can have significant impacts on the sectoral development of an economy, as well as its current account balances and government deficits. The instability arises because the newly generated revenue from tariff policy only acts to offset government spending in this model, so future extensions should work to redirect these flows back from the government and into particular sectors, either as export subsidies or capital investments, etc. Absent a large formal economy and a manufacturing sector, tariff policy can be used to create distortions in prices that can work in the own-economy's favor, as indicated by Reinert (2007) and Chang (2003a, 2005, 2015). Again, in the given framework, these results should be taken cautiously – we do not know precisely how adding capital flows and allowing capital holdings for firms will work to change the overall outcome here. However, given the theory and historical evidence presented earlier, these results seem to corroborate the general idea that it is absolute advantage, rather than comparative advantage, that rules here and that there is no central tendency for the system to bring itself back to balanced trade once these differences take effect.

Other scenarios that would be interesting to examine include cases of unilateral liberalization with the developed country maintaining export subsidies for their industries (as the US does with its agricultural producers, mentioned above). Also, building out a domestic financial sector beyond each nation's central bank would allow for private financing of production and consumption, as well as allowing for international financing flows. Finally, one last consideration may be to add an additional region to this model, so that a country like Ghana is trading not just with the US as a proxy for the world market, but also the EU or China, which would introduce a third or fourth currency to the model and greatly complicate the exchange rate regimes. Nonetheless, this would provide a more realistic picture on the effect of prices internationally as well as the potential direction of capital flows in such a model. Such possible constructions of complexity are provided by Taylor (2004) in his extension of the basic SAM he utilizes from the work of Godley and Lavoie (2012).

CONCLUSION

Given the current international environment, with growing trade tensions between the US and China, as well as other trading partners, it is highly appropriate to revisit the consensus around international trade theory and explore the possibilities available to developing nations. Given the historical record, the conclusion of this paper is that the neoliberal trade doctrine that was encapsulated in the Washington Consensus has been an economic, political, and moral failure when it came to lifting the Third World to the levels of the industrialized Anglo-American nations and their allies in Europe and Asia (such as Germany, Japan, and South Korea). Rather, as suggested by Reinert (2007) and Shaikh (1980b), the result has been uneven development and the constraining of the industrial development of these nations. As indicated by Branko Milanovic (2005, 2006) as well, this period saw a divergence in income growth throughout the world, leading to increased global inequality for households. So, not only has a doctrine of free trade lagged numerous nations behind the industrialized West, but has also aggravated the divergence of global incomes, as well as domestically.

The predominate use of CGE models, with neoclassical closures, to justify the policies of globalization were based on false theoretical foundations and unrealistic assumptions about the heterogenous nature of developing economies. SFC modeling adds an avenue for examining the importance of financial variables, but this too would be limited as an approach if the choice of closure mirrors what has been done historically with CGEs. What is required is a rigorous Institutionalist and Structuralist analysis of the specific economy at hand, allowing for sectoral specificity, as well as realistic and proper assumptions about the nature of money, production, and distributional patterns. For this purpose, this paper finds it highly appropriate to defer to theorists more in line with Marx or Keynes, such as seen in the Marxist and Post-Keynesian literature. In terms of model construction and empirical methods, the work of Structuralists such as Lance Taylor is invaluable. Given all of this, if financial accounts data is available, it should be possible to construct an SFC model that is appropriate for a developing economy – in so long as it takes into account the institutional and sectoral specificity of that economy. Modifications to the model presented in this paper are also required and are listed as follows.

First, in order to allow for a flexible exchange rate closure, this model has made the assumption that the Ghanaian central bank's holdings of US bills is held constant, meaning we cannot test for effects on the foreign reserve holdings of Ghana post-liberalization. A possibility would be to rearrange some the model's equations within another scenario outside of the baseline to see these effects. Given that this was a concern of some scholars, such as Weisbrot and Baker (2003), it would seem highly appropriate to allow such a variable to be endogenous. To do so would require an exogeneity of the exchange rate, as one possibility, and would be vital for a developing nation that attempts to peg their currency at a fixed-exchange rate.

Secondly, international capital flows and firm's investment are not present in the model, arguably a fundamental determinate of the patterns of trade internationally as well as a determinate of a nation's economic and sectoral development. To further illustrate and test the effectiveness of industrial policy – policy which taxes imports and transfer those funds to invest in a less efficient and protected manufacturing sector with increasing returns – these additions would be vital. Furthermore, as Léonce Ndikumana and James K. Boyce (2011) and Léonce Ndikumana (2014) pointed out earlier, measures should be taken to properly account for capital flight from the country and the effect it has on domestic savings and domestic investment because of such leakages. Capital flows would allow for foreign direct investment (FDI) as well, allowing the model to test what affect protectionist measures may have on FDI and what importance it may play in development.

Thirdly, further potential is present when it comes to the sectoral decomposition which this model begins to develop. To be more precise, agricultural sectors should be dictated by regimes of decreasing returns and perfect competition on the global market (with Ghana unable to affect the global market price in a small economy setting), while the manufacturing sector should largely be dictated by a regime of increasing returns and imperfect competition. The industrial sector, consisting of extractive goods and intermediate goods, would most likely be ruled by constant returns to scale, albeit this would depend on the exact industries in question. Extractive industries such as logging and petroleum production would be defined differently, although they both could be arguably included within non-manufacturing categories.

Additionally, a services sector has been omitted from this model, despite its relevance to both the Ghanaian and US economy. This is largely due to the problems that arise in modeling trade protection for services (i.e., what is the tariff equivalent of trade barriers around services), as well as Ghana's lack of trade in services at the international level. Another concern regarding the composition of developing economies is the prevalence of informal production and exactly how to model this – potentially as a sector its own. Such a construction may be able to test for the effects of policy on the informal sectors growth, how it affects both tradeable and non-tradeable goods, as well as transitions from the informal sector into a more formal sector paid in wage labor.

When looking at the real Ghanaian experience in particular, we can conclude that Ghana has the policy tools available to itself to implement industrial policy that could lead to the development of its own internationally competitive manufacturing sector. A more fleshed out SFC model could aid in this project. Current policy should focus on the ability of the government to harness income flows from the oil production currently in place, as well as the use of context specific protectionist policies that fit Reinert's (2007) description of good protectionism for new, developing industries. As it now stands, Ghana is highly exposed to the variability of primary commodity prices, and it is unrealistic to rely on the sale of oil alone to develop the economy – especially if those gains from oil production are distributed in a concentrated way and fall victim to Africa's capital flight problems. Venezuela is a case in point here. What Ghana choses to develop is dependent on what resources are available to the nation, but one immediate possibility is the processing of cocoa crop within the country, rather than raw export. Ultimately, Ghana needs to direct policy in a way that allows it to beneficially position itself within global value chains of production, rather than as the first input. To do so, Ghana may have to actively "get the prices wrong."

From this basis, further areas of research come to mind in order to aid in the proper development of an applied SFC model in a developing economy context:

1. The added benefit of a two- or three-sector SFC model should be explored against the traditional, one-sector SFC model that is common in the literature.
2. An empirical exploration of the determinates of exchange rates in a flexible exchange rate regime, as well as alternative modeling formulations.

3. The development of other trade policy tools, such as export subsidies and duties, import quotas, voluntary export restraints, and capital controls for SFC open-economy models.
4. Further applied research on the industry complexity of a developing nation, its forward and backward linkages, and how to model this appropriately.
5. Other institutional and structural concerns for a developing economy, such as credit restraints, chronic unemployment, informal production, and capital flight could be researched and modeled in an applied fashion.
6. Finally, a sectoral decomposition of households to allow for research on the effects of trade liberalization on income distribution may be useful.

The point of this paper, then, has been to challenge the predominant liberal narrative on trade and development. As indicated by some of the theorists discussed, the pernicious obstinance of uneven development will not be corrected unless the international system itself is reformed, in which the developed nations help subsidize full employment policies and sectoral development in the developing world. However, absent such a possibility – because the political will does not exist – it is this papers argument that developing nations have the political and moral right to engage in economic policies that allow them to capture a fairer piece of the global economy. Developed nations lecturing others for "distortionary" policies have no right to do so, as many of these nations developed through trade protectionism of their own – not to mention the benefits these nations accrued through their colonies and imperialist conquests.

In conclusion, the developing world is neither backwards or doomed to poverty and uneven development *if* the appropriate measures are taken on their behalf, which admittedly will require immense political courage in the face of dollar hegemony, the Anglo-American institutions such as the World Bank and IMF, and the power and reach of the US military in maintaining this order to a large extent. However, absent such actions, the developing world will continue to find itself as a secondary partner to the developed world, always getting the worst part of the deal and strikingly reminiscent of the colonial period. China stands out as a prominent example here, although not all nations will have access to the natural resources and labor force that China does. Regardless, there are other examples abound, such as the "Asian Tigers," which should provide hope that such

development is possible in Latin America, South Asia, Eastern Europe, and most significantly in Africa. The constraints here are largely political, rather than having anything to do with these regions' geography, cultural, institutional development, and natural resources.

There is also reason to move towards the development of more appropriate and accurate modeling techniques in order to simulate and predict the effects of this kind of industrial policy. Such a tool would be significant for developing economies as they seek to navigate the complexities of the international economy and its financial system. They should not be bound to models created within the neoclassical tradition and its models which have been developed predominately for the OECD core, but rather should opt to see the realm of trade and development as it actually is – harnessing the "Other Tradition" that Reinert (2007) speaks of. While it has been mentioned numerous times that that assumptions behind our aggregative macroeconomic models drive the results of any experiment we conduct using them, there is sufficient historical evidence and empirical and pragmatic know-how to allow for modeling assumptions that can accurately predict the development outcomes of given policies.

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