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Applicability to the Polak Model as a Factor Affecting the Outcome of Austerity Policies

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ABSTRACT

Many of the IMF's loans to struggling countries require the borrowing country to implement austerity. A set of policies meant to restore a country's economy and ensure that the IMF's loans are effective. Though the policies work in some countries, in others they lead to economic decline. As the IMF continues to place austerity it is important to understand factors that could be affecting the outcome of these policies to prevent economic disaster. We theorize that the Polak Model, an economic model underlying the justification behind austerity, doesn't apply to all countries, leading to poor economic policy due to an incorrect understanding of a country's economy. To test if applicability to the relations outlined by the Polak Model is a key variable leading to the mixed outcomes of austerity we examined countries where austerity was detrimental (Greece and Argentina) and countries that were better off after austerity (Estonia and Croatia) by reviewing existing research on the countries' economies' application to the Polak Model and outcomes of austerity measures in those countries. We hypothesize that if austerity measures were detrimental to a country's economy, then it would fail to fit the Polak model while a country that improved following austerity would fit the model. We find that our hypothesis is supported, indicating that the IMF must evaluate to which countries the Polak Model applies before pushing austerity instead of assuming that the model holds true for all countries and implementing ineffective policy based on flawed economic reasoning.

Introduction

General Background

The first half of the 20th century was marked by two world wars and a Great Depression, leading to significant economic destruction in the US and Europe. This instability led to the founding of the International Monetary Fund (IMF) in 1944 by 44 nations at the Bretton Woods Conference in order to ensure international monetary cooperation, stabilize currency exchange rates, and expand access to international currency to stabilize and promote growth in the international economy (McQuillan). Today, the IMF has expanded to 189 members and focuses on surveillance, a system to review the economic policies of members and offer advice; technical assistance, which is training and support to developing countries to help manage their economy; and another key function of lending, where loans are given to struggling countries under the condition that certain policies meant to stabilize the economy of the nation are placed by the government of the borrowing country (Masters et al., 2021). IMF loans were a key aspect in the process of combating the Asian Financial Crisis of 1997-1998, the financial crisis of 2008, and more recently during the global recession following the Covid-19 pandemic (Masters et al., 2021).

When lending money, the IMF requires the borrowing country to pass economic legislation meant to stabilize the economy and ensure its loans are effectively used. An example is a set of policies known as austerity measures, where among other actions, government spending is reduced and higher taxes are placed on citizens in order to reduce

the public sector debt (Amadeo, 2021; Hayes, 2022). In order to understand why loans are given and austerity is implemented, an explanation of public sector debt and its impacts on the economy is needed.

To understand public sector debt, one must understand that a government gets most of its revenue from various taxes. A government also needs to spend its revenue in order to fund infrastructure, welfare programs, and other government investments. In many countries, a government needs to spend more money than it makes in revenue. When this happens, a government is in a budget deficit and in order to make up for the extra spending, a government issues bonds to investors. A bond is where a government takes a loan from an investor for a set number of years. The government, much like an individual taking a loan from a bank, needs to pay the lender the initial principal and the interest. The public debt or national debt is the aggregate amount of money a government owes to the individuals it issued bonds to (Boyle, 2022).

In a scenario where the government needs even more money to cover the deficit, it issues more bonds with higher interest rates compared to previous bonds in order to attract more investors (Likos & Hicks, 2021). Higher bond interest rates tend to mean that a government has less spending ability in the long term since it has to pay back more money which increases a government's budget deficit and national debt (Likos & Hicks, 2021). Empirical studies by multiple researchers show that higher debt levels tend to significantly reduce long-term economic growth due to a multitude of reasons such as lower levels of private sector investment (Furth, 2013; Calderon & Fuentes, 2013). Higher government debt also increases the chances that a government may eventually default on its debt (Kenton, 2022). A government default could have highly adverse impacts on economic growth. If a government defaults on its debt, it significantly reduces the confidence of future investors resulting in the government not being able to raise enough money when needed. In case a government needs to raise money after a default, it will be forced to have very high interest on its bonds (Investopedia & Boyle, 2022). This again increases government debt and becomes a cycle of economic decline.

During a financial crisis, if a government has large debts that cannot be paid, the IMF provides loans so that countries can pay back their debt and prevent a default. The IMF then places policies such as austerity to ensure that the economy can recover and not have to continue to rely on IMF funds. Austerity measures are placed by a government in order to gain more tax revenue and reduce government spending thereby lowering the budget deficit and avoiding the cycle of economic decline which occurs when a government has national high debt (Hayes, 2022). A lower budget deficit and debt mean that a government can reduce the number of bonds it needs to issue, lower the risk of default, and achieve greater economic stability.

Though the concept behind austerity may sound straightforward, the reality is that there are many factors at play when austerity measures are implemented and as a result, these policies do not always work as expected. One of the most well known examples of disastrous austerity was during the Greek financial crisis of 2008, where following IMF implemented austerity measures the nation's economy shrunk by 25%, household income decreased by 12.3%, unemployment reached more than 20% of the population, more than 1 in 3 Greek citizens were below the poverty line, and the debt to GDP ratio remained rose to 180% (Cavero & Cortez, 2013). Furthermore, critics of austerity point out studies that compare countries that passed austerity versus those that did not and show that austerity had significant reductions in GDP (House et al., 2017; Wildowicz-Giegiel, 2019). While austerity measures have had significantly negative outcomes for some countries, other countries have flourished following austerity policies. A great example is Estonia, a country that implemented harsh austerity measures and was able to return its economy to pre-crisis levels (Staehr, 2013). Studies also show that some countries experienced positive economic growth following austerity measures (Born et al., 2014).

Literate Review

Current research offers a few possible factors that may affect the outcome of austerity measures. For example, Benjamin Born writes that one factor could be the level of fiscal stress that the economy is in when implementing austerity measures and explains that legislators must prevent a buildup of fiscal stress before implementing austerity (Born,

2015). Another example is a study by the OECD which lists possible factors affecting the outcome of austerity measures to be the type of austerity that is placed (whether the measures focus more on tax increases or less government spending), the magnitude of tax increases, and spending cuts, which citizens are most likely to be negatively affected, the time frame of which these measures are implemented, and the economic conditions present when implementing austerity measures such as level of investment or consumption (Anderson & Minneman, 2014).

In this paper, we will attempt to provide another factor that may affect the outcome of austerity measures, a country's national economy's applicability to the Polak Model.

Polak Model

The Polak model was developed in the 1950s by IMF economist JJ. Polak to serve as the basis of the IMF's understanding of a country's economy and has been used by the IMF to justify its policies, including austerity measures. The model consists of the 4 equations below (Nowak, 2012; Betz & Carayannis, 2015):

Equation 1: Imports(I) are proportional(k) to GDP(P)

$$I = kP$$

Equation 2: Exports minus imports are equal to change in reserves(R) minus capital inflow to businesses(C)

$$E - I = (R - C)$$

Equation 3: Change in money supply(M) is proportional(k) to GDP(P)

$$\Delta M = k\Delta P$$

Equation 4: Change in reserves(R) equals change in money supply (M) minus change in domestic credit(D)

$$\Delta R = \Delta M - \Delta D$$

Variable explanations:

GDP - the total monetary value of all the finished goods and services produced within a country's borders in a specific time period.

Imports - Goods and services produced outside the boundaries of one country, which are then purchased by that country.

Reserves - assets (gold or foreign currency) that are readily available to and controlled by monetary authorities for direct financing of payment imbalances.

Capital inflow to businesses - the amount of capital coming into a business, for example in the form of foreign investment

Money supply - the total amount of money (cash, coins, and balances in bank accounts)in circulation.

Domestic credit - financial resources provided to households and businesses by financial corporations(banks) in the form of loans, purchases of non-equity securities, trade credits, etc.

Austerity and Application to Polak Model

Along with the objective of reducing the government debt, austerity measures also aim to increase the amount of exports over imports to bring more money into a country and increase its economic prosperity, these policies include increasing taxes and increasing interest rates on domestic loans (Anghel, 2016; Betz & Carayannis, 2015). Justification for such policies can be seen by the relations outlined by the Polak Model as explained below:

Taxes

By increasing taxes, citizens have less money to spend which lowers money in circulation, thereby reducing the money supply. By looking at the third equation it can be assumed that lowering the money supply would lower the GDP. Then, based on the first equation, a lower GDP would lead to less imports. By importing less, the country's balance of payment (BOP) is improved since the country isn't losing as much money to foreign countries and the country's economy gains more money through its exports.

Interest rates

By increasing interest rates, the public is much less willing to take out loans which reduces the creation of domestic credit. Based on the 4th equation it can be seen that by reducing domestic credit, there is less in the money supply, reducing imports and improving the country's balance of payments.

As some of the policies in austerity measures are rooted in the economic relationships outlined by the Polak Model, it may be that a country's conformity to these relationships is a key variable that determines the success of austerity measures. It may be that the Polak model only applies to the economies of some countries and these countries rebound after austerity measures while for other countries for which the model doesn't apply, austerity measures fail due to the flawed understanding of economics that the policies were based upon. If this theory is supported in this paper the IMF should revisit the Polak Model and ensure the model works for a country before pushing austerity policies, instead of continuing on the assumption that the model applies to the economies all countries and risking economic disaster from ineffective policy.

Methods

In order to test if conformity to the relations outlined by the Polak Model is a key variable that could be leading to the mixed outcomes of austerity measures, we examined countries where austerity was detrimental(Greece and Argentina) and countries that were better off after austerity(Estonia and Croatia) by reviewing existing research on the countries' economies' application to the Polak Model and historical data on the outcomes of austerity measures in the respective countries in an attempt to find a relation between conformity to the model and outcome of austerity measures. We hypothesize that if austerity measures were detrimental to a country's economy, then that nation would fail to fit the Polak model while a country that was better off after austerity does fit the model. If our hypothesis is supported it would indicate that the IMF must understand to which countries the model would apply to and to which countries it wouldn't in order to prevent the IMF from implementing ineffective policies.

We classify detrimental, failed austerity measures, or "being worse off after austerity" to be when the country had a higher debt to GDP ratio, higher unemployment rates, and lower GDP compared to the beginning of the financial crisis even after multiple years of implementing austerity policies. Successful austerity or being "better off" after austerity measures is when the country is able to return to pre-crisis levels in terms of the debt to GDP ratio, unemployment rates, or GDP.

We classify "fitting" or "conforming" to the Polak Model when a country shows evidence of having the relationships as outlined by the 4 equations of the model either through a qualitative analysis of its economy or through quantitative testing to find the correlations between variable as outlined by the model. Not fitting or conforming would mean that a country does not show the relation outlined by the model when tested quantitatively or qualitatively.

Results

Country	Outcome of Austerity	Applicable to Polak Model?	Hypothesis Supported?

Greece	Failed	No - determined by a qualitative analysis of economy	Yes
Argentina	Failed	No - determined by a qualitative analysis of the economy	Yes
Croatia	Successful	Yes - Determined by statistical tests and simulations of the economy	Yes
Estonia	Successful	Yes - Determined by quantitative reasoning	Yes

Greece's Background and Outcome of Austerity

The downfall of Greece in 2008 has its roots in the 1980s (Alhumoudi, 2018). At this time there were significant tax evasion problems in Greece, however, the government kept increasing its spending on social programs and government wages (Johnston, 2021; Picardo, 2022). This led to a high debt to GDP ratio of 99% in 1999(IMF DataMapper, 2022). This became a problem for Greece that year when the EU created a new currency for its members in order to encourage economic growth, stability, and integration. Greece, however, was left out of the euro since its debt-to-GDP ratio was well over the 60% threshold needed to adopt the new currency (Johnston, 2021). At this point, Greece either had to reduce spending to lower the debt or not adopt the euro. Neither solution appealed to Greece so it turned to the investment bank, Goldman Sachs to mask its debt through a deceiving process known as currency swaps (Alhumoudi, 2018). Through this process, Greece was able to implement the euro and reap some of its benefits, however, its debt continued to rise at dangerous levels which became evident when the financial crisis of 2008 hit. During this crisis the country's actual debt to GDP ratio was exposed, leading the country's credibility to crumble (Alhumoudi, 2018). Greece had to provide high-interest rates on its bonds to attract investors, pushing the country toward default. To prevent the default the IMF, along with the EU and European Commission loaned Greece 110B Euros and placed austerity measures (Council on Foreign Relations). The measures were in place until 2015, 7 years after the crisis emerged, however the policies did not work as they cost Greece 72 billion euros or 40% of its GDP, shrinking its economy by 25%. This reduced the tax revenues needed to repay the debt, leading to a debt to GDP ratio of 187% as of 2017. Unemployment rose to 25%, while youth unemployment hit 50% (Cavero & Cortez, 2013).

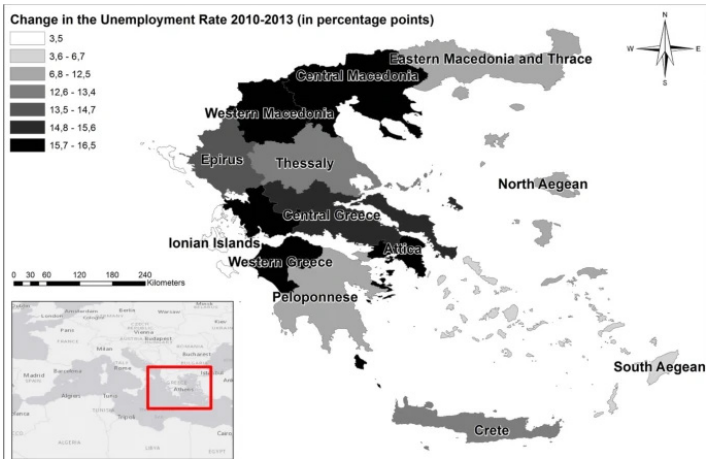

Figure 1. Change in Unemployment Rate 2010-2013. The map shows that there were significant increases in unemployment rates across Greece the years following implementation of austerity

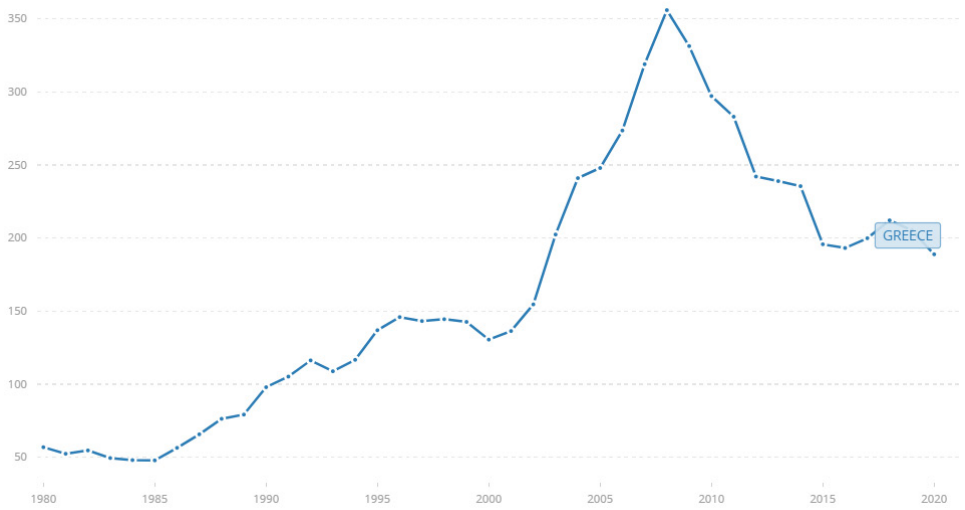

Figure 2. GDP (Billion USD) Over the Years in Greece. The graph shows how following austerity measures in 2008, GDP kept declining for the next 7 years.

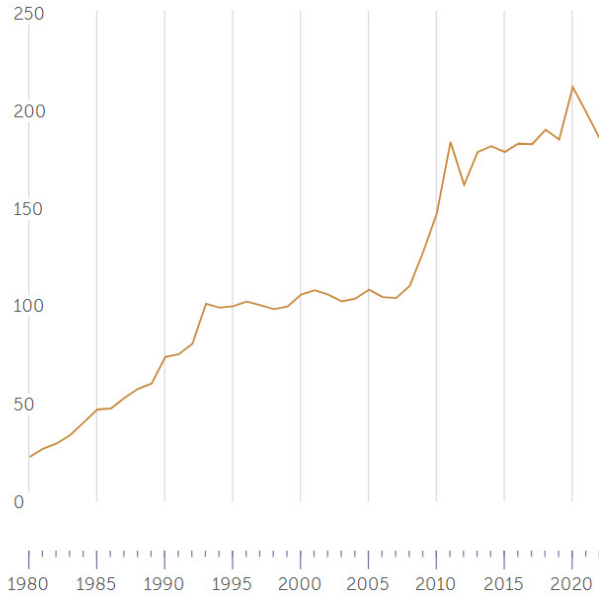

Figure 3. Debt to GDP ratio of Greece. Following austerity in 2008, the ratio continually increased

Application to Polak Model

From the economic statistics after austerity was implemented as shown in the previous section, it can be determined that austerity measures ultimately failed in Greece. To test the hypothesis that conformation to the Polak model is what determined the outcome of austerity measures, we reviewed past research on Greece's economy's application to the Polak model and find that our hypothesis is supported. After examining past research on the economic model of Greece, Frederick Betz, a professor from Portland University, and Elias Carayannis, from George Washington

University, found that the country did not conform to the assumptions made by the Polak Model through a qualitative analysis of the country's economy, summarized below (Betz & Carayannis, 2015):

The first equation claims that imports are proportional to the GDP. This may be thought of as a valid assumption since a higher GDP signals more productivity and incomes which can be used to finance higher levels of imports. However, for Greece this assumption was untrue. Betz finds that since Greece was part of the EU, its citizens enjoyed lower interest rates when borrowing currency from foreign nations resulting in the level of imports being far more dependent on low foreign interest rates compared to the level of GDP.

The second equation assumes two ideas, the first of which is that the difference between exports and imports depended upon changes-in-money reserves in the central bank and upon the inflow of capital into the non-banking sectors. However, for Greece, the difference of exports to impacts did not have a strong relationship with the amount of gold held in the Greek reserves, instead, the level of imports was more dependent on the sale of Greek bonds (imports in this case would be the money coming in through foreign investment in Greek loans).

The second assumption of the equation is that the difference between exports and imports depended negatively upon the inflow of capital into the non-banking sectors. Meaning that exports increase when the inflow of capital (foreign loans) decreases. The reasoning behind this is businesses borrowing less from foreign investors signals economic strength since that business can now get the revenue it needs from domestic consumers, a situation that can only occur if the economy of a country is strong enough that its households drive demand and economic stimulation. In times of such strong economic growth, governments tend to invest in manufacturing development which drives up exports. However, in Greece, the surplus revenue generated was generally used to pay for more wages.

The third equation states that the money supply is proportional to the GDP. The reasoning behind this is that with a more productive economy (GDP), there will be more money available for households to spend on goods and services, increasing the amount of money in circulation (money supply). The opposite would hold true for times of declining GDP. Though the equation may hold true for many nations, it was not the case for Greece. Its membership in the EU and its adoption of the euro meant that its currency was not sovereign so it did not fluctuate according to the economy of Greece, instead it depended on the overall economy of the Eurozone countries.

The final equation states that the reserves carried by a country are dependent on the difference between the money supply and the creation of credit. These assumptions were not true during the financial crisis for a couple of reasons. First of all, during the crisis banks stopped lending (creating credit) when Greece was unable to issue new sovereign bonds yet even when there was less domestic credit the reserves did not increase, instead the economy stopped. As stated before, the money supply was dependent on the EU so that part of the equation wasn't true either.

As can be seen from Betz's qualitative analysis, Greece did not conform to the Polak Model and from historical statistics we find its economy also deteriorated following austerity measures, providing support to the hypothesis.

Argentina's Background and Outcome of Austerity:

Argentina's financial crisis began in 1999 when the collapse of Brazil's currency led to major declines in Argentina's exports, causing its economy to contract for three years in a row. Even with the contraction, the economy was relatively stable until 2001 when the continued economic decline led investors to demand higher interest rates on Argentine bonds (Moreno, 2002). This reduced the ability of Argentina to pay back its debt, and in 2001 it defaulted on its debt (Hornbeck, 2013) Though the IMF tried to step in to prevent a major financial crisis at the early stages, its austerity measures actually contributed to the contraction of the economy with a loss of 20 % of GDP between 1998 and 2002. They also hurt the government's ability to provide essential services and unemployment soared above 20 % while wages dropped by 18%. More than 50% of Argentines were exposed to poverty (Romero et al., 2018).

Application to Polak Model

From the economic statistics before and after austerity, it can be determined that austerity failed in Argentina, a deduction confirmed by multiple sources. From past research, we see that much like Greece, Argentina's economy did not fit the Polak model either for reasons explained below (Betz, 2013):

For the first equation, much like Greece, Argentina's imports were much more related to the availability of foreign credit (foreign loans) than to GDP.

The second equation which states that the difference in export and imports is equal to the difference in reserves and the capital inflow was also untrue. In Argentina, exports depended upon the international price of beef products instead of the value of assets held in reserves or the economic strength of the Argentine economy. When the price fell, Argentina exported more frozen beef and when the price rose, Argentina exported less. Much like in Greece, the surplus revenue generated from times of economic prosperity was used to finance government services instead of being invested into productive capital.

The assumption of the third equation which states that the money supply is proportional to GDP is only true if the money supply is increased through natural economic trends such as changes in GDP. However, at the time, the government was increasing the money supply by inflating the currency instead of letting economic forces control the money supply.

The fourth equation states that reserves are based on money supply and domestic credit was also shown to be untrue. In Argentina, the exchange rate between Argentine Peso and the US dollar was what impacted the value of Argentina's reserves as the country's currency was pegged to the USD.

Argentina did not fit the Polak model and its economy contracted following the IMF's austerity measures, therefore our hypothesis is supported again.

Croatia's Background and Outcome of Austerity

From 2002 to 2007 though the Croatian economy was seeing a relatively high amount of economic growth with a 4.8 percent increase in GDP per year, the economy was also characterized by the accumulation of foreign debt, increasing budget deficit, and expansion of government spending (Sonje, 2012). When the economic crisis hit in 2008 it triggered a six-year recession, undoing many of the previous economic and social achievements, by 2014 the public debt doubled from pre-crisis levels to 85 percent of GDP, and unemployment reached over 17 percent (The World Bank, 2016). To try to get its economy to recover the EU placed Croatia under harsh austerity in 2014(Markovic, 2014). After its implementation, looking at data from the World Bank it can be seen from multiple indicators of economic health such as GDP growth, the debt to GDP ratio, and unemployment rates that its economy started to recover in the following years.

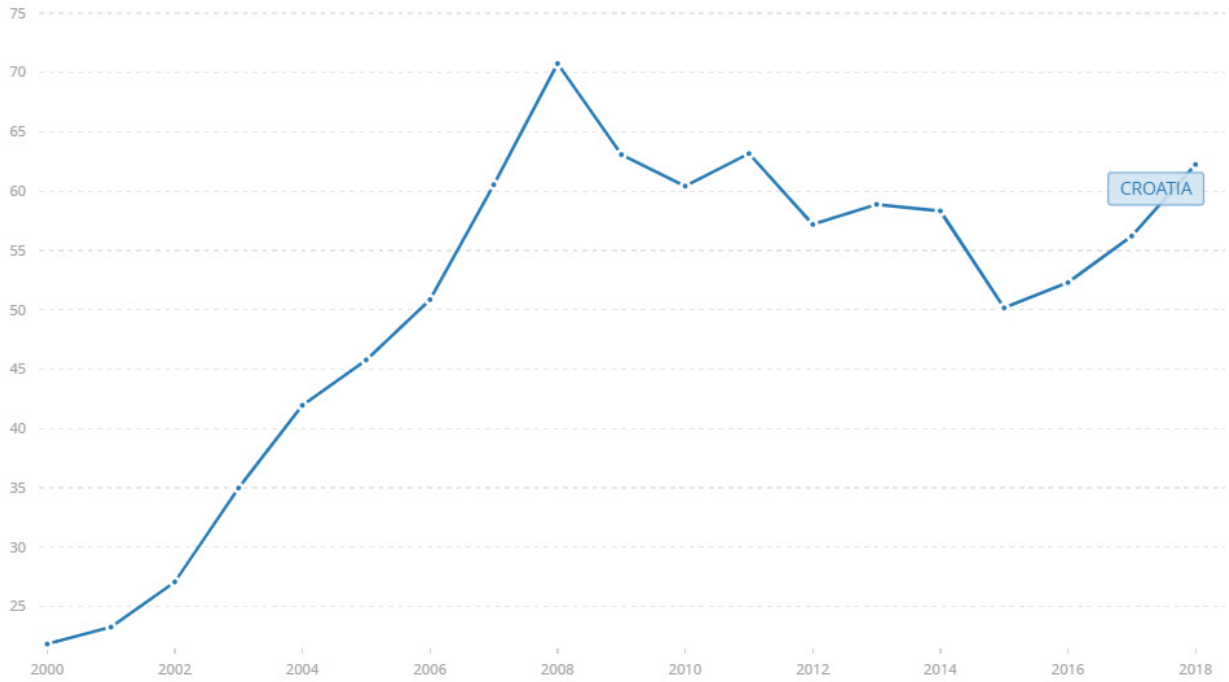

Figure 4. GDP (Billions of USD) of Croatia. After 2014, for the first time since 2008, there was positive economic growth in Croatia.

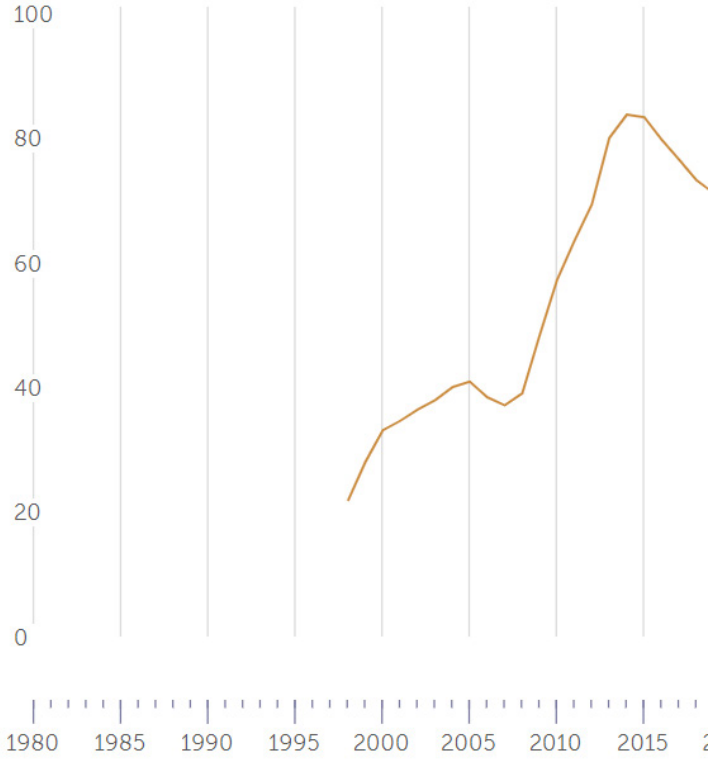

Figure 5. Croatia Debt to GDP. Graphs shows that following austerity in 2014, the ratio was declining following sharp increases starting in 2008.

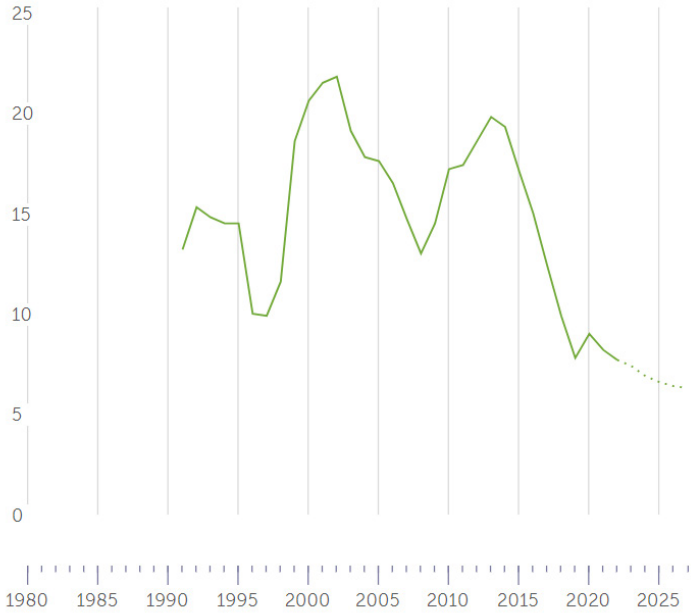

Figure 6. Change in Unemployment Rate in Croatia. The map shows that there were significant decreases in unemployment rates the years following the implementation of austerity

Though the IMF was not directly involved in Croatia, austerity measures still have policies that can be tied to the Polak Model. Although the IMF was not the organization directly pushing for austerity measures, the policies pushed in Croatia were carried out in close cooperation with the IMF(Grcic). For these reasons exploring the economy of Croatia and its application to the Polak Model during the crisis can provide key insight for the IMF even though the organization was not directly involved in Croatia.

Application to Polak Model

As seen from data from the World Bank, Croatia was better off financially after the austerity measures. When looking at past research we find that our hypothesis is supported again as Croatia fits the Polak Model. Branko Grcic uses quarterly economic data to test the applicability of the Polak model to Croatia's economy through statistical tests and simulations of the Croatian economy(Grcic). He found direct links between imports and nominal GDP as stated by the 1st equation, capital inflow, reserves exports, and exports as stated by 2nd equation, and a relationship between reserves and domestic credit according to the 4th equation. From these statistical tests, he concludes that the Polak model is an accurate representation of Croatia's economy. Observing how Croatia's economy improved following austerity measures there is support to the theory that a country's application to the Polak Model is a key factor affecting the outcome of austerity policies.

Estonia's Background and Outcome of Austerity

From 2000 to 2007, Estonia was one of the fastest-growing economies in Europe with an average 8 percent increase in GDP per year. Though the economy was growing quickly, Estonia was accumulating large amounts of government debt. At the end of 2007, Estonia had a debt to GDP ratio of 72%. This became a problem in 2008 when the financial crisis decreased export demand and halted foreign investment. Due to the lack of demand for exports, production

levels dropped significantly and unemployment rates skyrocketed. These factors led to Estonia not getting enough revenue to continue its debt payment and the fear of default by the Estonian government was setting in. In response, the county implemented aggressive austerity measures in order to recover the economy and lower its debt in order to implement the Euro, which required a budget deficit of less than 3 percent of GDP, and a debt to GDP ratio of less than 60%. The austerity measures put into place were successful as Estonia's government budget deficits decreased, its economic productivity increased, and the country was able to implement the euro in 2011(Staehr, 2013). Like the case with Croatia, though the IMF was not directly involved, examining Estonia's application to the Polak model can still provide key insight for the IMF since austerity measures still have policies that can be tied to the model.

Application to Polak Model

Estonia can be considered a country that was better off financially after austerity measures as it met its goal of improving the economy and lowering its debt to implement the Euro. Based on past research it appears that our hypothesis was supported again as the country fits the Polak model. Ulana Chukha of the University of Montreal was able to apply the Polak model and its assumptions through various statistical tests to model the economy of Estonia and accurately estimate various economic measures such as income velocity of money and marginal propensity to import (Chukha). What these measures are will not be explored as they are not relevant to the hypothesis being tested. What is important is that since he was able to apply the model to get accurate economic measures, we can assume that the Polak model is an empirically valid economic model that applies to Estonia. If the model could not be applied to Estonia, Chukha would not have been able to get accurate measurements. We also find that unlike Greece, Estonia's currency was sovereign when austerity policies were implimented. This would mean that the equations involving money supply (3rd and 4th) have a better chance and being representative of Estonia's economy. From this we find that our hypothesis is supported as Estonia's austerity measures succeeded and the Polak model did apply to its economy.

Conclusion

From our analysis of past research on the economies of various countries and the history of austerity policies in their countries, we find that our hypothesis is supported. The countries that failed to recover their economy through austerity measures (Greece and Argentina) did not fit the Polak model while the countries that were able to recover through austerity (Estonia and Croatia) did adhere to the economic relationships outlined in the model. This supports the theory that a country's application to the relations outlined by the Polak Model is a key factor impacting the outcome of austerity measures. The findings of this paper indicate that the IMF must carefully evaluate to which countries the Polak Model applies before pushing austerity measures instead of assuming that the model holds true for all countries as the organization did when it failed to take into account that the model did not apply to the economies of Greece and Argentina and implemented policy based on flawed economic reasoning.

Discussion

The findings in the paper are important and relevant today as an Oxfam study finds that 85% of the deals made between the IMF and governments during the covid-19 pandemic include a form of austerity (Tamale, 2021). Isabel Oritz and Matthew Cummings find that 5.8 billion people have been affected by austerity till 2021(Ortiz & Cummings, 2019). As the IMF continues to implement austerity measures it is key to understand what factors may affect the success of austerity to prevent the catastrophic impacts that the policies may bring on the public.

Limitations

In our paper, we were only able to gather information on a few countries, and not all of the research we found fully explains how certain countries fit the Polak model. Future research must analyze the relationship between the Polak model and the outcomes of austerity in additional countries in order to provide further support that a relationship that exists. If the relationship is further supported, there must also be research done to figure out an efficient method in which the IMF can determine if a country's economy fits the Polak model.

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