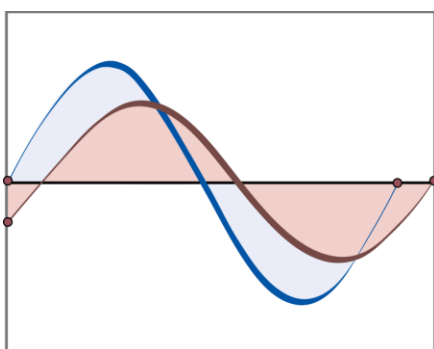


TO BE PUBLISHED IN:

Modelling Small States: Essays in Honour of Professor Roland Craigwell

Central Bank of Barbados



Assessing the Dynamics of Inflation in a Small Open Petroleum Economy: The Case Study of Trinidad and Tobago

Dindial Ramrattan and Daryl Cheong
Research Department

Abstract

This paper seeks to examine the inflation dynamics in a small open petroleum economy. An examination of the data reveals that over the past decade or so, Trinidad and Tobago has experienced swings in headline inflation primarily due to volatile food prices. Core inflation on other hand has been generally low and stable. Suffice to say, increasing volatility and generally higher inflation levels is of major concern to policy makers given that the expected relationships between underlying inflation pressures and macro-economic variables such as growth, money supply and fiscal operations have become somewhat disjointed. This aim of the study is to gain a better understanding of the determinants of inflation in Trinidad and Tobago by attempting to uncover whether the inflation phenomena is structural, monetary or some combination of both (eclectic). The results of the research concluded that government spending, money supply and imported inflation were short run influencers on inflation. In the long run, the money supply remained a contributor to inflation while government spending was actually a mitigating factor on domestic inflation rates. Based on the findings, a combination of fiscal and monetary tools is recommended to achieve long term price stability.

JEL Classification Numbers: E310, E270, Q350, F14

Keywords: Inflation, VECM, Modelling, Petroleum economy, Macro-economy

dramrattan@central-bank.org.tt or dcheong@central-bank.org.tt

© Central Bank of Trinidad and Tobago, 2015

Table of Contents

1. Introduction	3
2. Inflation and an Open Petroleum Economy	4
3. Overview of Trinidad and Tobago's Economy.....	7
Gross Domestic Product	7
Labour Market	8
Wages	10
Fiscal.....	10
Money Supply.....	11
Nominal Effective Exchange Rate.....	12
Imports.....	12
Domestic Inflation	13
4. Methodology and Data	14
5. Results	17
Short-run Dynamics – Greatest Contributors: Government Spending, Money Supply and Imported Inflation	17
Long run dynamics : Greatest Contributors : Money Supply, Nominal Effective Exchange Rate and Government Spending (deflationary impact)	18
6. Conclusion and Policy Recommendations.....	19
Bibliography	22
Appendix.....	23

Assessing the Dynamics of Inflation in a Small Open Petroleum Economy: The Case Study of Trinidad and Tobago

Dindial Ramrattan

Daryl Cheong

1. Introduction

Over the past few decades, Trinidad and Tobago has been dependent on the petroleum industry as its major source of revenue. It is no surprise therefore, that the economy of Trinidad and Tobago has often been subjected to the vagaries of the international markets for oil and gas. The uncertain and volatile nature of energy prices has often placed a challenge to policy planners when formulating strategies for sustainable growth and development. Particularly noteworthy has been the relative underperformance of various diversification strategies in sectors such as agriculture, tourism, finance, manufacturing, arts and culture. Theorists such as Krugman (1987) and Hosein (2008) cited that a more lucrative tradable energy sector is the primary reason for the crowding out of investments in other sectors of the economy since earnings from the energy sector often outweighs that of the other sectors.

Furthermore, subsidies and grants arising out of the country's ownership of crude oil and natural gas reserves are sometimes considered impediments to the success of other industries in the country. Business owners have voiced concerns surrounding the prevalence of government's temporary work programmes which they view as contributing to general malaise and a distortion to labour productivity, while policy planners continue to raise concerns surrounding the sustainability and efficiency of subsidies and transfers such as transportation fuels in the case of the former, and welfare programmes in the case of the latter. One must acknowledge however the myriad of advantages that state support of this nature is often critical to the development of industries (aids in reducing cost overheads) and in the development of human capital (social welfare programmes assist in providing a decent standard of living for those less endowed and subsidies such as free tertiary education and training programmes such as On-the-Job Training (OJT)). However, it is equally important to carefully and continually balance and reassess the need and level of government intervention surrounding issues of sustainability, empowerment and development.

In the immediate years post liberalization (1993), headline inflation in the domestic economy was relatively well contained; however, during the more recent period of heightened energy prices (2004 – 2008), this soon resulted in rapidly rising inflation. Significant windfalls from the energy sector led to an accumulation of net foreign assets and facilitated higher government expenditure which resulted in higher wages and increased employment opportunities throughout the domestic economy. Consequently, there was an increase in the marginal propensity to import while the unemployment rate fell to record lows. Immediately after the Global Financial Crisis, inflation in Trinidad and Tobago was relatively volatile mainly reflecting the erratic nature of food inflation. Core inflation on the other hand was stable despite robust government expenditure, low unemployment and rapid growth in the money supply during 2010 – 2014. Theories suggest that the core component is more suggestive of the economic health of the country given that food inflation is subject to sporadic and less controllable price

shocks (Ranchhod, 2013). The dichotomy in the evolution of inflation over the 2004-2008 high growth period and following the Global Financial Crisis has strained policy makers' understanding of its main determinants.

In order for policy makers to gain a better understanding of the nature of domestic inflation, the paper attempts to identify the main determinants of inflation over a twenty-year horizon. The study will test for the main factors explaining headline inflation in the domestic setting - whether it is monetary/structural or eclectic in nature. Macro-economic variables such as the money supply, government spending, the output gap and external factors such as exchange rate and imported inflation will be tested against the nexus of domestic inflation. The rest of this paper is structured as follows: firstly, the mechanism of the open petroleum economy is discussed followed by supporting data for key variables. The third section focuses on the methodology, while the results are presented in the fourth section. The paper concludes with key policy conclusions and recommendations.

2. Inflation and an Open Petroleum Economy

Prominent economist Dudley Seers in his theory of Mechanism of the Open Petroleum Economy (1963) identified the need for economic theories with specific emphasis on resource based economies. His observations at the time were, primarily, that traditional economic theories focused on industrialized economies with little or no adjustments made for different economic structures, referred to as the 'special case' (Seers, 1963). As such, the use of these traditional models to explain countries engaged in primary exports - inclusive of the Caribbean- were very limited and constrained by the countries' internal challenges. Seers further postulated that unemployment is often structural and chronic and perhaps a more pressing concern than income levels. Today, these patterns remain applicable to various economies and extend beyond petroleum economies to include the closure of the sugar industry in Trinidad and Tobago and the decline of the Caribbean banana industry.

Seers work was based on the Venezuelan economy - a primary exporter of crude oil. Seers used the Venezuelan economy as the benchmark to identify ideological differences between primary exporters and the industrialized world.

The Open Petroleum Economy (OPE) is characterized by the nature of its exports and related source of Government revenue. The four main characteristics of the OPE are:

- I. The majority of the country's exports are derived from the energy sector, in this case petroleum;
- II. Exports are highly profitable;
- III. Significant percentage of government expenditure is derived from petroleum revenues;
- IV. The majority of petroleum companies are foreign owned, with government collecting its incomes from taxes and royalties.

In some ways Lloyd Best's theory of the Plantation Economy is reminiscent of that of Seers' Open Petroleum Economy. Both theories attempted to explain the mechanisms by which a country with a strong offshore sector can derive the necessary benefits for its entire population. Both theorists recognized that the offshore sector provided the majority of foreign exchange earnings and government revenues which is leveraged to the domestic economy through integration in the international economic

structure. In turn, citizens indirectly benefit from the offshore sector through various policies, programmes and investment arising out of the country's earning (Best, 1968).

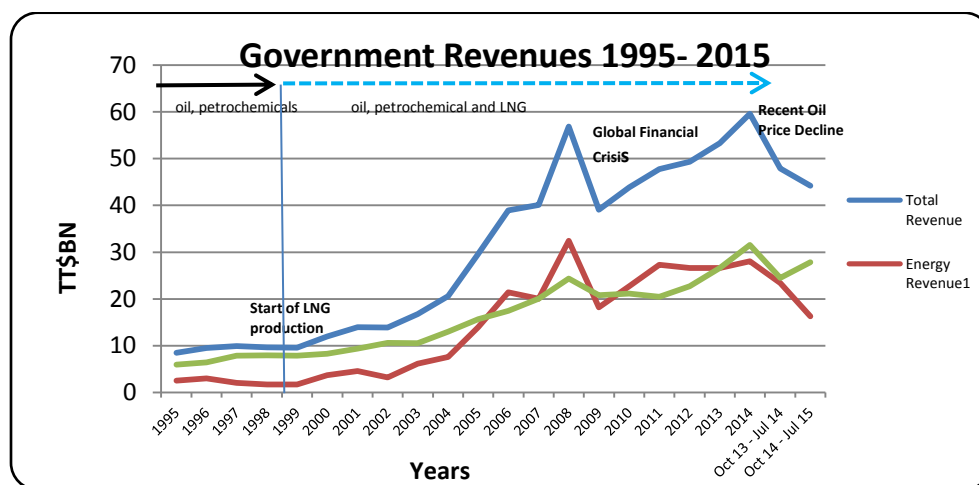
Seers however identified a typical paradox that exists in country's who are predominantly primary commodity exporters: a.k.a the paradox of high unemployment alongside high wages. While, the non-energy sector is expected to absorb the surplus labour, high existing wage levels – which are often as a result of benchmarking to that of levels in the energy sector - make it very difficult for them to do so. Interestingly and increasingly, unions will often negotiate for higher wages in the non-energy sector as they strive to keep pace with upward adjustments in the energy sector. Additionally, the resulting increase in the overall wage bill of non-energy sector companies has a crowding out effect on new employment further exacerbating the problem (Pantin & Ram, The Determinants of Market Trends in the Off-Shore Oil Refining Industry in the Caribbean, 2005). Furthermore, the marginal propensity to import also weighs heavily on employment as domestic production may be crowded out by the presence of more cost competitive and affordable foreign goods.

In his work, Seers identified some of the internal consequences of an export boom within an Open Petroleum Economy. Petroleum prices are determined externally by a combination of short term and long term supply, demand, commercial and geo-political factors. As such, higher global demand leads to higher prices and higher government revenues, of course, the converse is true. Higher government revenues often leads to higher levels of expenditure on investments such as highways, housing and utilities with the ultimate goal that enhanced institutions and infrastructure lays the groundwork for economic development. The economic experience of Trinidad and Tobago is an attest to Seers' theory. Over the past four decades, the economy has benefited from three periods rapid growth in energy prices and buoyant domestic production (1973-1974, 1979-1980, 2005-2008), which led to expanded revenues, higher government spending and heightened levels of domestic activity. The growth in the 1970's and 1980's were the result of rapid increases in crude oil production and prices, while the latter is attributed to rapid natural gas based industrialization. In the case of the latter a few things needs to be noted:

1. The domestic economy experienced strong growth over the period 2003 and mid-2008. Over this period, the current account balance as a per cent of GDP more than tripled as government revenue from the energy sector surged. Additionally, the country's import cover expanded dramatically to about one year by 2008. Additionally, the benefits from the energy sector filtered throughout the economy and added greatly to the country's Gross Official Reserves. Moreover, other macroeconomic indicators such as primary balance as a per cent of GDP, unemployment and domestic wages also moved in a positive direction.
2. By mid to late 2008 however and in response to the Global Financial Crisis, there was a sharp contraction in global energy prices and this resulted in a slowdown in domestic activity. Global declines in energy prices were accompanied by lower energy production due to downtime at some key producers. Intermittent growth would have been achieved within the sector, however overall activity was generally lower when compared to the early prior. In general however, domestic economic activity remained largely sturdy driven by the non-energy sector. Private sector credit growth and rising consumer expenditure, particularly for durables helped to maintain overall economic growth which was boosted by an expansionary fiscal stance following the Global Financial Crisis 2008. In spite of the reduced government revenue, the macroeconomic fundamentals were well managed typified by continued declines in the unemployment rate, steady levels of import cover and increasing levels of domestic wages, as well as increasing non-energy revenue.

The buoyancy of the economy post 2008 (and despite the Global financial Crisis) is directly attributed to the fact that since 2004 the Trinidad and Tobago economy had diversified its revenue stream from oil and gas-based petrochemicals to oil, gas-based petrochemicals and LNG. So while revenues tended lower, the contractual commercial nature of the LNG trade provides the economy with a sort of buffer or cushion from a collapse in revenues (Chart 1).

Chart 1: Trinidad and Tobago's Government Revenues 1995-2015



Source: The Impact of Falling Oil Prices on Trinidad and Tobago's Economy 2015 – Governor J. Rambarran – A note.

One aspect of the OPE which can be re-visited is Seer's theory surrounding the dynamics of inflation. Indeed, the dramatic rise in oil prices in the mid-2000s which culminated in oil prices averaging 50 per barrel pre-global financial crisis in 2008, was associated with higher inflationary pressures in several oil exporting countries, such as Saudi Arabia, Kuwait, other members of the Gulf Cooperation Council (GCC)¹, Nigeria and even in Trinidad and Tobago. The experience of higher inflation in the GCC countries prompted studies such as Hasan and Alogeel (2008) noted and Kandil and Morsy (2009), which examined the underlying determinants of inflation in these countries.

Hasan and Alogeel (2008) noted that a select few economists in the GCC region linked inflation to large fiscal spending associated with higher energy revenues. The authors concluded that in the long-run, inflation in their trading partners and exchange rate pass-through were the main factor affecting inflation in Saudi Arabia and Kuwait, while positive demand shocks and excess money supply contributed to higher inflation in the short-run. Kandil and Morsy (2009) also recognized the link behind higher oil revenues, government spending and inflation in GCC countries. They concluded that in GCC countries inflation was a result of both domestic and foreign factors. Among the five GCC states, the authors revealed that trading partners' inflation, exchange rate depreciation and monetary growth contributed to higher inflation in the long-run, while government spending mitigated against it. On the other hand, government spending, excess demand and international food prices were found to be inflationary in the short-run.

¹ GCC countries include Bahrain, Kuwait, Oman, Saudi Arabia and the United Arab Emirates.

Petroleum based economies were also adversely affected by non- energy resource migration/movement and dramatically altered spending effects which can severely distort macro-economic variables thereby creating inflationary pressures. Resource movements occur as factors of production, such as labour and capital, are attracted to the better rewards in the energy sector thereby reducing the availability of these resources for other productive activities. Resource movements may be inflationary if the outward movement of the factors of production lead to supply constraints and lower domestic output of key industries such as manufacturing and agriculture. These higher and altered spending patterns are due to overall higher revenues which bids up the general level of prices. The increased demand pressures create conditions of demand pull inflation (Mardaneh, 2012).

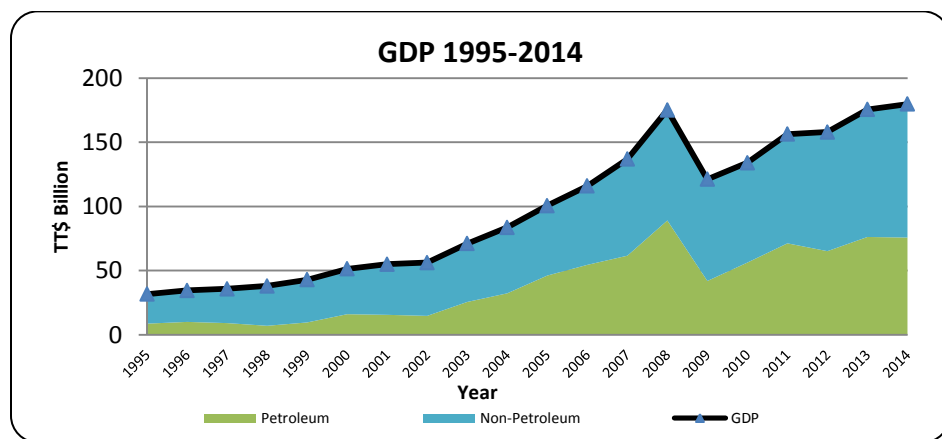
Another distortion from economic fundamentals arises from the rentier approach to income redistribution. The OPE is in fact a version of a rentier states is a country is dependent on one major export (oil/natural gas for example) as its main source of economic rents. A common characteristic between those systems is that the imperative is on the government to pass on benefits from the revenues through various social programmes and infrastructural expenditure. These types of systems are often characterized by economic and social problems which are usually camouflaged until periods of downturn. In turn, this poses a myriad of issues for the state. Furthermore, the success of the offshore sector and reliance on state funded segments may crowd out other forms of productive activity which also rears its during periods of downturn (Pantin, 2001).

Against this background, we will measure domestic inflation versus the macro-economic variables such as higher government, expansion of the money supply (through accumulation of net foreign assets (NFAs)), higher negotiated wages and salaries, employment and import prices in order to understand the determinants of inflation in Trinidad and Tobago by attempting to uncover whether the inflation phenomena is structural, monetary or some combination of both (eclectic).

3. Overview of Trinidad and Tobago’s Economy

Gross Domestic Product

Chart 2: Gross Domestic Product



Source: Central Bank of Trinidad and Tobago and Review of the Economy (various years).

Over the past few decades, the rapid growth and development of the Trinidad and Tobago was primarily supported by its exports of crude oil and natural gas. Indeed, since the 1970's oil and natural gas exports have dominated the landscape and are largely responsible for the economic largesse. At its peak, the energy sector contributed approximately fifty-one (51%) per cent to total GDP in 2008. Over the period 1995 to 2014, average contribution to GDP was in excess of thirty five (35%) per cent, second only to the services sector which is an amalgamation of significant industries such as construction, distribution, finance and central government. Moreover, the exploration and production and refining sub-sectors account for more than seventy (70%) per cent of total energy sector output.

Suffice to say, the offshore energy sector facilitates significant amounts of domestic fiscal expenditure, particularly via the country's Public Sector Investment Programme (PSIP). As a result, expansionary fiscal policy by way of increased government expenditure, and income redistribution through transfers and subsidies greatly leverages the domestic economy.

Despite the decline in oil prices and a temporary mismatch in gas supply and demand, overall domestic activity has been supported by solid growth in the non-energy sector from 2012 and onwards². In fact over the period 1995-2014, activity in the non-energy sector expanded for all except for two of those years (namely 2009 and 2010). As a result, the economy recorded positive growth for most of the years spanning the period 1995-2014, with the exception of years 2000 and 2009-2011 which coincided with the Global Financial Crisis 2008. The strongest non-energy sectors over the period included distribution, construction, and finance, insurance and real estate.

Labour Market

Chart 3: Labour Market Indicators

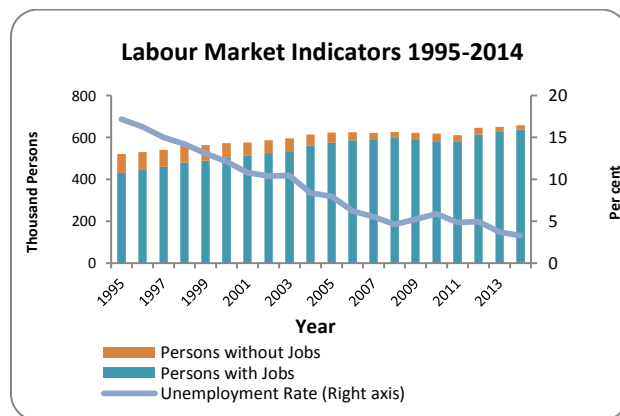
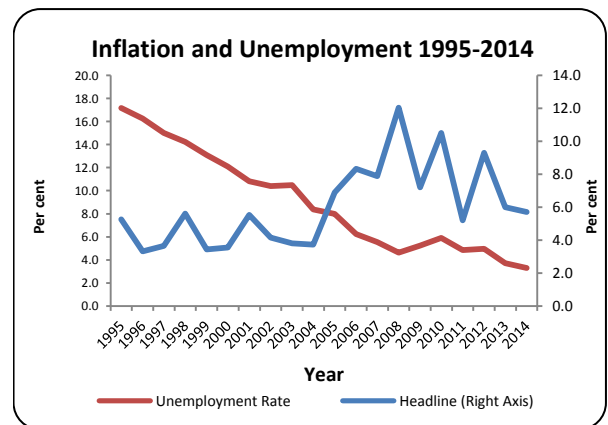


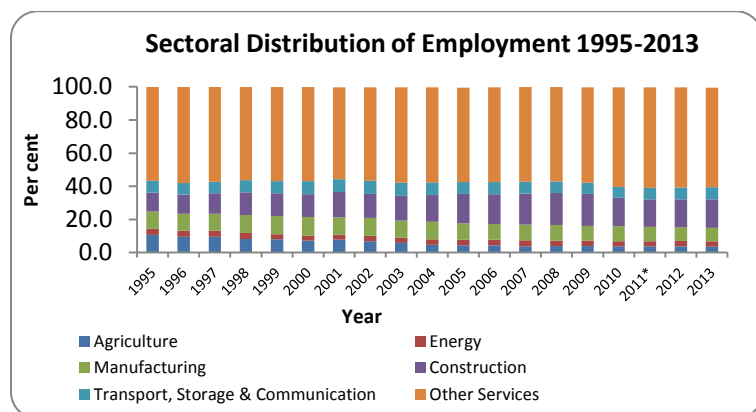
Chart 4: Unemployment and Inflation



Source: Central Bank of Trinidad and Tobago and Central Statistical Office (various years).

² Although production declined in these years, there were no lay-offs as most companies increased exploration activities.

Chart 5: Employment by Sector



Source: Central Bank of Trinidad and Tobago and Central Statistical Office (2014).

Growth in the energy sector propels growth in the non- energy sector and led to an expansion of the domestic labor market – both directly and indirectly. The agriculture sector however declined dramatically. Over the period 1995-2014, the number of persons employed expanded by almost 50 per cent leading to a decline in the unemployment rate from 17.2 per cent in 1995 to 3.7 per cent in 2013. In fact, after remaining in double digits from the start of the reference period up to 2003, the unemployment rate plummeted to single digits during from 2004 onwards – a consecutive period of eleven (11) years. Simultaneously, the participation rate remained above sixty (60) per cent for the entire twenty year reference period (1995-2014). Other noteworthy indicators over the period included an upward trend in both the employment to population and employment to labour force ratios, with the latter moving well above 90 per cent post 2004.

On a sectoral basis, the services sector (finance, insurance and real estate sector) was the main source of employment over the 20 year reference period. The services sector accounted for just over 55 per cent of persons employed in 1995 and by 2013 represented a total of sixty (60%) per cent of employed persons. Over the period 1995-2013, this sector experienced the fastest pace of growth at about eighty-three per cent (83.4 %) followed by the community, social and personal sector with growth averaging just about fifty-five per cent (55 %), while the wholesale and retail sector recorded growth of 41.7 per cent. Importantly, the largest divergence occurred in the non-services sector. The construction sector was the main impetus behind employment growth in these sectors as it accounted for more than 17 per cent of total employment in 2013, compared to less than 12 per cent in 1995. On the other hand, the manufacturing sector and petroleum sector employed a lower percentage of the persons over the period due to the capital intensive nature of petroleum industry. The sharpest decline however occurred within the agriculture sector. In 1995, agriculture accounted for more than twelve per cent (12 %) of all persons employed; however by 2013, the sector's contribution to total employment fell to just about 3.5 per cent, and was the only sector to depict a contraction in the number of persons employed by 52 per cent. One major factor explaining this phenomenon can be cited as the closure of Caroni (1975) Ltd in the mid-2000s. Another major factor may be cited as the higher wages in the other sectors may have attracted persons out of the agricultural sector, as noted in the literature and evidenced by the receding labour force for the agricultural sector.

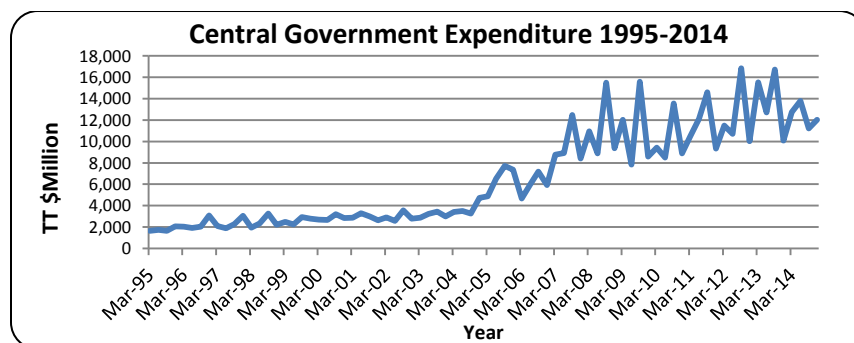
Wages

During the period 1995-2014, GDP per person employed increased significantly, reflecting the higher revenues stream associated with the start of an entirely new energy industry – the LNG or liquefied natural gas industry. As GDP increased the Government's fiscal outlay/allocation to capital programmes and transfers and subsidies also trended upwards. Suffice to say, these measures resulted in the pass through of higher wages to the population and contributed dramatically to increased household disposable income. In spite of the negative impacts of the Global Financial Crisis of 2008, GDP per person employed remained elevated from 1995. Data sourced from the CSO's Labour force Report across various years verifies this finding and indeed depicted a sustained upward trend in wages over the period 1995 to 2012³.

The conflicting returns from the onshore and offshore sectors creates a disproportionate wage schedule and at the same time, the more capital intensive nature of the energy sector leads to lower demand for labour within this sector. In fact, between 1995 and 2014, the numbers employed in the energy sector accounted for less than five per cent (5 %) of total employment. Given the high profitability and relatively low labour demand, wage rates in this sector are significantly more attractive than other sectors of the domestic economy. This then creates some labour market distortion as bargaining units for other sectors place wage demands considering the increases in the energy sector, in spite of less comparable production and profitability within their respective domain. In the domestic setting, the energy sector transmits some of its benefits indirectly to the rest of the economy. In the more recent period of high growth and increased government revenue, there was rapid expansion of various government programmes and initiatives which provided increased employment opportunities across the country. In this way, there is some difference from the usual wage and price rigidities according to Phillip's Curve theory. While traditionally Phillip's curve analysis considers the impact of excess demand and prices, the use of labour programmes as a form of income redistribution, as is the case with some domestic initiatives, creates a non-market based increase in demand. This also helped reduce the levels of unemployment which would have been thought of as characteristic within the OPE model.

Fiscal

Chart 6: Government Expenditure



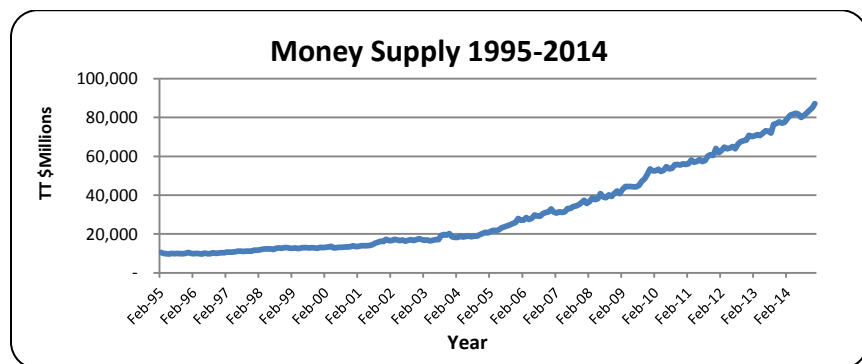
Source: Central Bank of Trinidad and Tobago (2014)

³ Data for the more recent years are not yet available.

Over the period 1995 -2014, the economy witnessed a surge in Government expenditure and is closely tied to the strong improvement in Government revenue in line with theories surrounding a rentier economy. (Beblawi (1987) defines a rentier state as one whose activities are substantially supported by expenditure from the state, while the state itself is funded from rents that accrue abroad. In Trinidad and Tobago, government expenditure is financed mainly via income earned from the monetization of the country's energy reserves. Over the period 1995-2014, the data validates this assertion as the economy witnessed a surge in Government expenditure over the period 2005-2008 and is closely tied to the strong improvement in Government revenue over the period.

Furthermore, and in line with Keynesian economics, the level of Government expenditure remained significantly accelerated in the years of the Global Financial Crisis 2008 to date. As Keynes indicated in his General Theory of Employment, Interest and Money (1935), fiscal policy can serve to maintain a certain level of consumption in times of downturn but this is dependent on the extent of government spending in these periods. The expansionary fiscal policy approach of the country post 2008 is indicative of such a policy measure where the domestic economic activity was simulated through an expansion of government expenditure on large scale infrastructural projects, and some elements of social policy.

Money Supply
Chart 7: Money Supply



Source: Central Bank of Trinidad and Tobago 2014

Broad money (M2) defined as currency in active circulation plus demand, savings and time deposits increased sharply over the period 1994 – 2014. As such, the money supply doubled from approximately TT\$10 billion in 1994 to TT\$20 billion in 2014. However, in the subsequent 10-year period, from the end of 2004 to the end of 2014, M2 more than quadrupled to TT\$87 billion. This strong growth in the money supply was also associated with a rapid accumulation of foreign reserves due to elevated energy prices⁴. Trinidad and Tobago's net international reserves rose from US\$2.5 billion at the end of 2004 to US\$11.3 billion at the end of 2014. The inability of on shore economy to fully capitalize on the astronomical rise in the money supply, created a structural liquidity overhang in the domestic financial system over this period. As such, the Central Bank of T&T

⁴ Simplistically, the balance sheet of the monetary system equates net foreign assets plus net domestic assets to broad money, i.e., NFA + NDA = Broad Money.

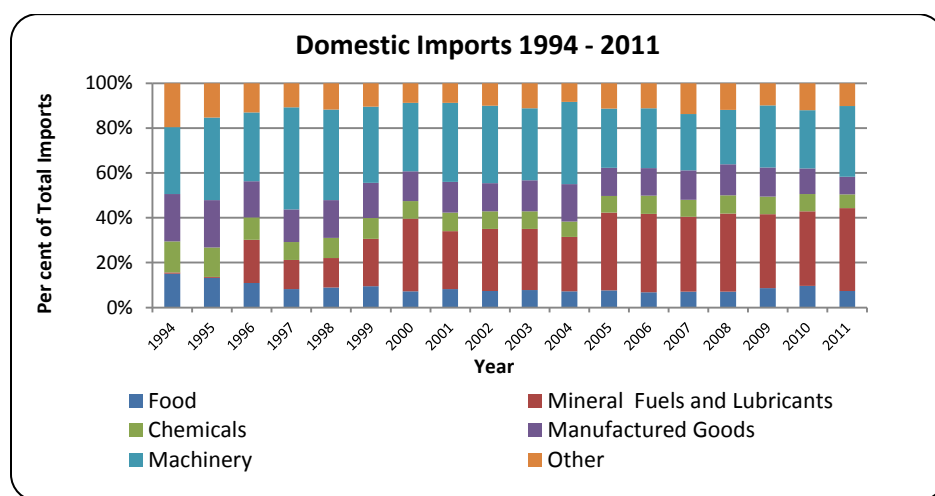
implemented several liquidity management tools, including net open market operations, reserve requirements, commercial banks' fixed deposits and liquidity absorption Treasury bonds. So far, the tools have been successful.

Nominal Effective Exchange Rate

Over the past 20 years or so (1995 – 2014) the year-on-year movements in the NEER has fluctuated within a relatively narrow band of -5.0 to 5.0 per cent and has generally matched the performance of the USD. The nominal effective exchange rate (NEER) index uses a relative measure of the country's exchange rate to a trade weighted average of the main trading partners. Since Trinidad and Tobago's currency is de facto stabilized against the US dollar, the NEER indirectly reflects movements between the USD and other currencies such as the pound, euro, yen and Canadian dollar. The stability of the TT-US exchange rate meant that the NEER was applicable as a proxy for the value of the domestic currency. The real effective exchange rate (REER) would have adjusted for inflation between countries but for the purpose of this study the researchers were more concerned with the impact of exchange rate movements based on a weighted basket of the country's main trading partners. A similar method was used in research by the Centre for Development Economics (Gaur & Dua, 2009) and (Lim & Papi, 1997). The NEER was selected in place of the US \$ exchange rate to allow for the inclusion of exchange rate movements of the main trading partners as opposed to one single currency. Price changes were captured through inclusion of the respective countries' exchange rates. While the REER seems a suitable option in this case, a limitation of using that approach is that the REER takes into account the countries that we trade with – both imports and exports. However, the authors were more interested in looking at imported inflation and thus used the price changes from the main import markets of Trinidad and Tobago.

Imports

Chart 8: Imports by Area

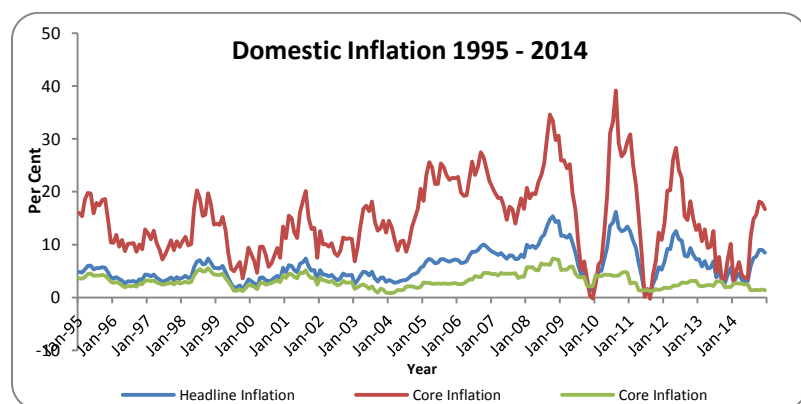


Source: Central Bank of Trinidad and Tobago 2014

In 1993, foreign exchange controls were removed as part of financial and foreign exchange liberalization and led to a dramatic rise in the value of imports and may render a country susceptible to imported inflation. This rise in the value of imports rose was almost 20 per cent of the country's GDP in 1994; however by the year 2000 this figure had doubled and was recorded at 40 per cent of GDP. In spite of some minor deceleration since, total imports was still over 30 per cent of GDP by 2014,⁵ and averaged 37.4 per cent over the twenty year period 1995 to 2014. Over the past few years, a significant share of the country's imports originated from countries such as the US, Europe, Brazil, China and Canada. Rising income levels facilitated a healthy demand for foreign items such as motor vehicles and luxury goods. Unfortunately however, increased imports not only places strain on the foreign reserves of the economy, but also leaves the economy susceptible to imported inflation.

Domestic Inflation

Chart 9: Inflation



Source: Central Bank of Trinidad and Tobago 2015

Between the years 1995 to 2001, headline inflation was more or less equally dictated by movements within the food and core components; however after 2001, food inflation had begun to drive domestic inflationary conditions and exhibits a distinctly structural change. Inflation in Trinidad and Tobago is comprised of two main components - food and core. The food component, monitors price changes using a basket of food items including non-alcoholic beverages. Price movements within the food index are weighted 180 out of a total weight of 1000 for the headline index. The remaining eighty-two per cent (82% - 820) of the total weight of the index is comprised of price changes across the consumer durables segment of household consumption, as well as, other non-food items such as education, health, transport and alcoholic beverages and tobacco. Interestingly, price changes within these categories are often less pronounced and less frequent than the food index. The items within the domestic basket of goods are obtained from the Household Budget Survey (HBS); the HBS of 2008/2009 informs the composition of the current basket (base year 2003).

⁵ Based on mirror trade data and calculations from the authors.

Inflationary trends in Trinidad and Tobago exhibited a distinctly structural change from 2001 and onwards. During the years 1995 to 2001, headline inflation was more or less equally dictated by movements within the food and core components; however, after 2001, food inflation had begun to drive domestic inflationary conditions. At its peak, food inflation accounted for 88.5 per cent of headline inflation in 2003, and has contributed more than 60 per cent to overall inflation since the early 2000s. This surge in the contribution of food inflation rendered domestic inflation increasingly volatile and unpredictable in its movements. Given that food prices may be influenced by short-run conditions such as weather, production processes, energy prices and surges in demand, policy decisions and tools to effectively contain inflation became more onerous.

4. Methodology and Data⁶

The authors chose to adopt the use of a vector autoregressive (VAR) model within the paper because it allowed for the description of the dynamic structure of the various endogenous variables. Additionally, the flexibility of the model in explaining for multivariate time series data poses advantages in its use regarding economic and financial data. In essence, a VAR allows the researcher to make estimates on the impulse (reaction) of a particular variable to identified macroeconomic shocks. Another important consideration in choosing to adopt such a model is its simplicity to understand and the frequency with which it appears in the literature. These factors help ensure that it can be easily compared to other studies and understood by researchers alike. Additionally, because quarterly data was used in the model, the dataset encompassed eighty (80) data points or observations over the twenty (20) year period. Given that more than thirty (30) observations are considered to ensure normal distribution, the authors felt this sample size was adequate to go forward. AR Roots test and the autocorrelation LM test were further tests utilized to ensure stability of the model.

This section seeks to empirically uncover the underlying determinants of inflation in Trinidad and Tobago and posits that growth in the money supply creates inflation in the long-run. This paper tested the theoretical assumption that growth in the money supply creates inflation in the long-run, as charged by Fisher and Freidman. Furthermore, Hasan and Alogeel (2008) and Kandil and Morsy (2009) found it useful to distinguish between long-run and short-run factors which may impact on prices. Trinidad and Tobago has been able to accumulate a reasonable level of foreign assets from energy sector earnings. Since net foreign assets are explicitly linked to private sector liabilities, the money supply is a key variable in any inflation model for a petroleum producing economy.

Rentier economies also depend on government spending to redistribute the rents from the energy sector to other sectors of the economy, thereby creating employment through indirect linkages. Except during construction phases, the energy sector is highly capital intensive and permanently employs just about 3-5 per cent of the labour force in Trinidad and Tobago. The energy sector, however, has huge indirect linkages (services sector) and indirectly employs a significant number of persons. Critically, rents from the energy sector are paid into the government coffers which are utilized to improve infrastructure, provides services to households and thereby also create jobs. In essence, receipts from the energy sector are redistributed to the citizens of Trinidad and Tobago through government spending on infrastructure and through transfers and subsidies (free education, subsidized fuel, etc). Therefore a measure of government spending is included in the model, to

⁶ (Brooks, 2008) and (Watson & Teelucksingh, 2002).

address whether fiscal policies play a role in inflation in Trinidad and Tobago. Seers (1963) argued that in the Caribbean, the number of persons employed is a key determinant of economic growth. The model also tests the long-run impact of employment on inflation, and therefore albeit indirectly, evidence on whether the Phillips curve holds for Trinidad and Tobago.

As a small open economy, Trinidad and Tobago's inflation in the long-run could be impacted by external factors such as exchange rate movements and inflation in our major trading partners. Although the TTD exchange rate vis-à-vis the USD has been relatively stable post liberalization, the TTD is affected indirectly through USD movements against the currencies of other trading partners such as the United Kingdom, the Euro area and Japan. In addition, Trinidad and Tobago imports raw materials to be used in the production of final goods, as well as final consumer durables such as vehicles, household appliances, communication devices and other electronic products. Given these considerations, the nominal effective exchange rate (NEER) and the weighted average inflation rate from the country's major import markets are included in the model.

The paper also tested the impact of short-run factors⁷ such as excess demand (measured by the output gap) and wages as both factors could possibility create transitory 'demand pull' pressures on domestic inflation. *A priori* expectations suggest that when the economy is growing above potential, inflationary pressures may be created, the converse is true. Rising household incomes should increase demand for goods and services, which in the short-run can be inflationary.

Given the considerations presented above, the long-run determinants of inflation are the broad money supply (M2), government spending (G), foreign inflation and the NEER. Foreign inflation was calculated as a weighted average of the price indices of Trinidad and Tobago's major import partners. Thus, in the long-run, inflation can be specified as the function:

$$\text{Domestic inflation} = f(\text{foreign inflation, NEER, M2, G, employment growth})$$

The short-run determinants included are excess demand and wage growth. Excess demand is proxied by the output gap using trend estimates of the Central Bank's Real Quarterly GDP index derived by applying the Hodrick-Prescott filter. The output gap was then calculated as the difference between actual QGDP index, and the level of the potential (trend) GDP index divided by potential GDP. For wage growth, the year-on-year per cent change in the series of average weekly earnings was used. Although this series captures wages in the manufacturing sector, it is the only series produced at a quarterly frequency.

The model used quarterly data spanning the period Q1:1995 – QIV:2014. Domestic and foreign inflation, the NEER, and wage and employment growth were represented by their year-on-year per cent changes, while the output gap was expressed in percentage terms. M2 and Government spending were expressed in natural logarithms. The Augmented Dicky-Fuller (ADF), Phillips-Perron and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Unit Root tests revealed that domestic inflation, the log of government expenditure and the log of the money supply were non-stationary with the order I (1). Meanwhile, the tests revealed that foreign inflation, employment growth, wage growth and the output gap were stationary, that is, of order I (0). In the case of the year-on-year movements in the NEER, the ADF test showed the presence of a unit root at all traditional confidence levels, while the Phillips Perron and KPSS tests provided evidence in favour of rejecting the null hypothesis of the presences of a unit root at the 1, 5 and 10 per cent significance levels.

⁷ The paper also tested the impact of rainfall on inflation since significant volatility has coincided with flooding in key agricultural districts across the country. However, the model indicated a very limited relationship between inflation and rainfall in both the long- and short-run.

The final prediction error (FPE), the Akaike Information Criterion (AIC) and the Hannan-Quinn information (HQ) criterion indicated an optimal lag length of six quarters (**Table 1**). Since the Schwarz Information Criterion (SC) applies the harshest penalty in the lag selection process it tends to select the smallest number of lags (Canova, 2007). In this case, the SC selected a lag order of 1, which may be unrealistic in the local environment. More so, Ivanov and Kilian (2005) recommended the use of the HQ criterion for quarterly vector autoregressive (VAR) models. Therefore, a sixth-order VAR model was specified. The long-run relationships were tested by applying the Johansen procedure for cointegration analysis as in Brouwer and Ericsson (1995) and Diouf (2007). Using the Johansen cointegrating test, both the Trace test and the maximum eigen-value test indicated six cointegrating equations at the 5.0 per cent confidence level (**Appendix Table A1**). The presence of cointegrating equations supported the argument that there are long-run relationships between domestic inflation and the variables included in the model.

Table 1
VAR Lag Length Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-951.7716	NA	65.34242	26.88254	27.38847	27.08395
1	-671.3526	482.9439	0.162406	20.87090	23.40053*	21.87796
2	-614.3796	85.45939	0.212182	21.06610	25.61943	22.87880
3	-562.6485	66.10090	0.359413	21.40690	27.98394	24.02524
4	-457.7143	110.7639	0.168317	20.26984	28.87058	23.69382
5	-315.7914	118.2690*	0.038735	18.10532	28.72976	22.33494
6	-204.3730	68.08903	0.036075*	16.78814*	29.43628	21.82340*

* indicates lag order selected by the criterion
Source: E-views 7 generated output.

Given the evidence of cointegration, the model was re-specified in a vector error correction (VEC) form similar to that specified by Kandil and Morsy (2009) and Diouf (2007). Re-specifying the equation in a VEC form also required the reduction in the number of lags indicated by the lag length criteria for the VAR model to $n - 1$ lags. Therefore, in this case, the VECM contained 5 lags. To test the assumptions that wages and the output gap impacts inflation only in the short-run, zero type restrictions were imposed on the error correction coefficients on these variables. The log of the WTI oil price was also included as an exogenous variable in the model set-up. The VECM was specified as:

$$\Delta \text{infrate}_D = c + \beta(\text{infrate}_{D_{t-1}} - \alpha_1 \text{infrate}_{F_{t-1}} - \alpha_2 \text{neerm}_{t-1} - \alpha_3 \text{lngovt_exp}_{t-1} - \alpha_4 \text{lnm}2_{t-1} - \alpha_5 \text{emp_growth}_{t-1}) + \sum_{i=0}^n b_{1i} \Delta \text{infrate}_{D_{t-i}} + \sum_{i=1}^n b_{2i} \Delta \text{infrate}_{F_{t-i}} + \sum_{i=1}^n b_{3i} \Delta \text{neerm}_{t-i} + \sum_{i=1}^n b_{4i} \Delta \text{lngov_exp}_{t-i} + \sum_{i=1}^n b_{5i} \Delta \text{lm}2_{t-i} + \sum_{i=1}^n b_{6i} \Delta \text{emp_growth}_{t-i} + \sum_{i=1}^n b_{7i} \Delta \text{wage_growth}_{t-i} + \sum_{i=1}^n b_{8i} \Delta \text{output_gap}_{t-i}$$

Here, β is the cointegrating vector and elements outside the parenthesis are the short-run dynamics, where wage growth (wage_growth) and the output gap (output_gap) are included. The year-on-year domestic and foreign inflation rates are

represented as *infrate_D* and *infrate_F*, respectively, while the annual movement in the NEER is represented as *neerm*. The logarithm of government spending and M2, are expressed as *Ingov_exp* and *lnm2*, respectively. Finally, the year-on-year change in the number of persons employed was expressed as *emp_growth*.

The stability of the VECM was tested using the AR Roots test. Looking at the AR Roots Graph, the modulus of all roots was shown to lie inside or on the unit circle, thereby suggesting that the VECM is stable. The autocorrelation LM test, tests the null hypothesis of no serial correlation and follows a χ^2 distribution with 64 degrees of freedom. For a VECM with 5 lags, the LM statistic was 57.1399 which was less than the test statistic at the 0.05, 0.025 and 0.01 levels of significance. Therefore, the null of no serial correlation could not be rejected. A VEC residual normality test was also performed where the residuals were found to be independently and jointly multivariate normal.

5. Results

Short-run Dynamics – Greatest Contributors: Government Spending, Money Supply and Imported Inflation

The short-run dynamics varied somewhat from the long-run dynamics. In the short-run, the factors having the strongest influence on domestic inflation were government spending, foreign inflation and the money supply (**for impulse response functions see Appendix Figure 9**). For a small economy such as Trinidad and Tobago, with fixed productive capacity and inventory levels, higher government spending can generate strong demand which drives up inflation in the short-run. The impulse response function shows that a one standard deviation shock to government expenditure, can add nearly 1.5 percentage points to the year-on-year inflation rate by the fourth quarter. As expected the money supply is inflationary both in the short and long-run. An increase in purchasing power as represented by a build-up in the money supply creates price pressures in the short-run as there is “too much money chasing too few goods”. By the third quarter a shock to M2 added approximately 75 basis points to the year-on-year inflation rate.

Imported inflation was found to have an immediate upward impact on domestic inflation. By the second quarter, a shock to foreign inflation resulted in a near 1 percentage point increase to inflation. However, its effect quickly diminishes and is near zero by the sixth quarter. The growth in the number of persons employed contributes marginally to inflation in the initial stages, but its impact surprisingly turns negative by the sixth to ninth quarters.

On the other hand, currency movements, the output gap and wage growth had little impact on inflation in the short-run due to the weighting of the energy sector. The importance and characteristics of the energy sector may have led to the output gap having a limited impact on inflation in the short-run. The energy sector carries a significant weight in the Central Bank’s real GDP index (312.9 out of 1000). Therefore temporary increases or decreases in production of key energy producers can result in output deviating from potential. However, these deviations in production in the offshore economy do not impact inflation in the onshore economy. The short-run results for wage increases were somewhat surprising. The impulse response function showed a very minimal response from inflation following a shock to wage growth in the first five periods. After the initial shock to wages, in the sixth to ninth periods, inflation declined.

A look at the variance decomposition showed that in the initial periods domestic inflation was dominated by its own lag (**Appendix Table A2**). Of the other variables, foreign inflation accounted for 18 per cent and 21 per cent of the variance in domestic inflation in the second and third quarters, respectively – the most of any other variable. By the fourth period, government spending begins to dominate, accounting for roughly 30 – 40 per cent of the variance of inflation up to the tenth period. From the third quarter onwards, M2 accounted for a relatively stable share of the variance in inflation, ranging between 7.2 – 9.5 per cent.

Long run dynamics : Greatest Contributors : Money Supply, Nominal Effective Exchange Rate and Government Spending (deflationary impact)

Results from the model indicated that the main factors influencing domestic inflation in the long-run were movements in the NEER, government spending and the money supply (Table 2). Although the exchange rate pass through was relatively weak, against a priori expectations, an appreciation of the NEER resulted in higher inflationary pressures in the long-run and vice versa. Expectations dictate that if the TTD appreciates and holding all other things constant, residents should pay less for imported goods and hence domestic inflation should be mitigated. However, Kandil and Morsy (2009) found a similar relationship between inflation and currency appreciation in the United Arab Emirates (UAE). They explained that currency appreciation can increase the purchasing power of residents which drives demand and in turn can create additional price pressures. Moreover, foreign inflation was found not to be a significant factor in influencing domestic inflation in the long-run. This finding suggests that in the long-run, domestic firms may be able to diversify their import markets. An analysis of Trinidad and Tobago's trade data supports this argument. For example, in 1995, 51 per cent of Trinidad and Tobago's imports came from the US, but by 2011, 25 per cent of imports were from the US and 41 per cent were from the rest of the world category⁸.

Government spending was a major factor mitigating inflation in the long-run. Unlike in the short-run, where government spending is inflationary in nature, in the long-run it has a mitigating impact on inflationary pressures. This finding is consistent with that of studies done in other petroleum producing countries such as Bahrain, Oman and the UAE. The results suggest that government spending in the long-run eases capacity constraints and increase the efficiency of doing business by way of improvement in institutional and infrastructural developments. Over the last twenty-years (1995 – 2014), the Government of Trinidad and Tobago's (GOTT) capital investment has accounted for on average 11.5 per cent of total expenditure. More so, GOTT has increased its public investment programme in the last ten years (2005 – 2014), with capital expenditure accounting for on average 15.7 per cent of total expenditure over this period. In addition, the GOTT's ability to maintain subsidies over the past 20 years on a wide array of goods and services such as fuel, electricity, pipe borne water, public transportation, education and health may have also assisted with mitigating overall price increases. Further, GOTT's initiatives in the agriculture sector throughout the years, such as the Mega Farm projects and the Caroni Green Limited may also help increase the food crop production and therefore dampen food price inflation.

Consistent with economic theory, the growth in the money supply was found to have a significant and positive relationship with inflation in the long-run. This suggests that the purchasing power of consumers as evidenced by growth in

⁸ Source: Handbook of Key Economic and Financial Statistics (2014), Central Bank of Trinidad and Tobago. The rest of the world category excludes the U.S.A, U.K, Canada, E.C.M. countries, Latin America and CARICOM.

the money supply is a main driver of inflation in the domestic economy. On the other hand, growth in numbers of persons employed was found not to be an important determinant of inflation in the long-run. Thus the model uncovered no evidence of the Phillips curve type relationship in Trinidad and Tobago.

In addition to the long-run variables, two short-run factors were included in the model. Zero type restrictions were imposed on the error correction vector for wage growth and the output gap. Given that there were two restrictions, the test statistic follows a χ^2 distribution with two degrees of freedom. The p-value for the test was 0.0000, and therefore these restrictions were not supported by the data. Applying zero type restrictions to the output gap alone, however, resulted in the p-value of 0.411952, which in this case indicates that the exclusion of the output gap in the long-run equation is justified. On the other hand, the model suggests that wage growth should be included in the long-run equation.

Table 2
Long Run Dynamics:
Results from the VECM

Variable	Coefficient
INFRATE_D(-1)	1.000000
INFRATE_F(-1)	-0.170349 [-1.07687]
NEERM(-1)	0.455902 [5.96454]*
LNGOVT_EXP(-1)	-14.41865 [-11.7140]*
LNM2(-1)	5.480390 [4.26885]*
EMP_GROWTH(-1)	-0.041198 [-0.42942]

Source: E-views 7 generated output.

Figures in parenthesis are t-statistics. *Significant at 1, 5 and 10 per cent confidence levels.

6. Conclusion and Policy Recommendations

The study established the multi-faceted nature of inflation in Trinidad and Tobago, and depicted the dynamic impact of the variables analysed in the long- and short-run. In the long-run, domestic factors such as government spending and the money supply were found to play a key role in determining inflation. However, both these factors are influenced by the energy sector. Government spending in long-run had a mitigating impact on inflation as improvements to infrastructure and subsidies eased capacity constraints and directly reduced costs for citizens. Inflation's eclectic nature was also evident in the short-run. In this case, both government spending and the money supply were found to be inflationary. In addition, an external factor, imported inflation was a key short-run driver of domestic inflation.

The eclectic nature of inflation and the differing impact of key factors in the long-run and short-run creates some challenges for authorities who seek to manage domestic price pressures. While monetary policy can be used to contain (or expand as the case may be) the growth in the money supply, any inflation management framework must delicately balance the upward pressures from government spending in the short-run without limiting its long-run benefit. Though the study did not

directly delve into cost push inflationary factors, GOTT's initiatives in the agriculture sector such as subsidies on machinery and fertilizers and the establishment of Caroni Green Limited are examples of public sector investment helping to ease inflationary pressures.

Therefore the key for inflation management in Trinidad and Tobago is coordination between monetary and fiscal policy.

Monetary policy should be flexible to ensure that funding for public sector (as well as private sector) investment is sufficiently available. At the same time, the timing and pace of government borrowing and project implementation should be communicated with the Central Bank so that it can effectively plan its monetary management strategy. In this way, the Central Bank may be able to manage short-run demand pull factors stemming from higher government spending. In addition, reforms to remove administrative bottlenecks in the public sector may hasten the pace of project implementation which may allow inflation to adjust towards its equilibrium at a greater speed.

Table 3
Chronology of the Main Determinants of Inflation in Trinidad and Tobago

Inflation Determinants	Dr. St. Cyr	Ram-jeesing	Bourne & Persaud	Dr. St. Cyr	Bynoe	Farrell	Finch	Ramrattan & Cheong 2015	
	1974	1974	1977	1979	1981	1984	2009	Long-Run	Short-run
Money Supply				X				X	X
Wages						X			
Expectations	X			X					
Gov't Expenditure					X			X	X
Consumer Expenditure									
National Income (per capita)									
Import Prices	X		X	X	X		X		X
Openness		X							
Productivity									
Net terms of trade									
Output prices							X		
GNP									
Bank Loan Rate			X						
Foreign investment exp.									
Exports									
Gov't budget deficit			X						
Bank credit									
Real GDP						X			
NEER								X	

Source: Central Bank of Trinidad and Tobago – Adapted from Various Papers and authors' findings 2015

Bibliography

- Best, L. (1968). Outlines of a Model of the Pure Plantation Economy. *Social and Economic Studies* , 283-323.
- Brooks, C. (2008). *Introductory Econometrics for Finance, Second Edition*. New York: Cambridge University Press.
- Brouwer, G. d., & Ericsson, N. R. (1995). Modelling Inflation in Australia. *Board of Governors of the Federal Reserve System, International Finance Discussion Papers*, Number 530.
- Canova, F. (2007). *Methods for Applied Macroeconomic Research*. New Jersey: Princeton University Press.
- Diouf, M. A. (2007). Modelling Inflation for Mali. *IMF Working Paper*, WP/07/295.
- Gaur, U., & Dua, P. (2009, April). Determination of Inflation in an Open Economy Phillips Curve Framework: The Case of Developed and Developing Asian Countries. *Working Paper No 178*.
- Hasan, M., & Alogeel, H. (2008). Understanding the Inflationary Process in the GCC Region: The Case of Saudi Arabia and Kuwait. *IMF Working Paper*, WP/08/193.
- Hosein, R. (2008). The Evolving Pattern of Trade in a Small Hydrocarbon Exporting Economy and some Policy Recommendations for Sustainable Development. *Business, Finance and Economics in Emerging Economies*, 121-154.
- Ivanov, V., & Kilian, L. (2005). A Practitioner's Guide to Lag Order Selection for VAR Impulse Response Analysis. Volume 9, Issue 1. *Studies in Nonlinear Dynamics and Econometrics*, Article 2.
- Kandil, M., & Morsy, H. (2009). Determinants of Inflation in GCC. *IMF Working Paper*.
- Krugman, P. (1987). The Narrow Moving Band, the Dutch Disease, and the Competitive Consequences of Mrs. Thatcher. *Journal of Development Economics* 27, 41-55.
- Lim, C. H., & Papi, L. (1997, December). An Econometric Analysis of the Determinants of Inflation in Turkey. *IMF Working Paper: European I Department*.
- Mardaneh, S. (2012). Inflation Dynamics in a Dutch Disease Economy. *University of Leicester Working Paper No. 12/25*.
- Pantin, D. (2001). Governance in Natural Resource Based Rentier Economies in the Caribbean. *SALISES Conference on Governance*. St. Augustine: UWI.

Pantin, D., & Ram, J. (2005). The Determinants of Market Trends in the Off-Shore Oil Refining Industry in the Caribbean. In D. Pantin, *Caribbean Economy* (pp. 223-233). Miami: Ian Randle.

Ranchhod, S. (2013, March). Measures of New Zealand core inflation. *Reserve Bank of New Zealand Bulletin* 76 (1).

Seers, D. (1963). The Limitations of the Special Case. *Bulletin of the Oxford University Institute of Economics and Statistics*, 77-98.

Seers, D. (1964). The Mechanism of the Open Petroleum Economy. *Social and Economic Studies*, 233-242.

Watson, P. K., & Teelucksingh, S. S. (2002). *A Practical Introduction to Econometric Models: Classical and Modern*. Kingston: University of the West Indies Press, 2002.

Appendix

Figure A1: Impulse Response Functions

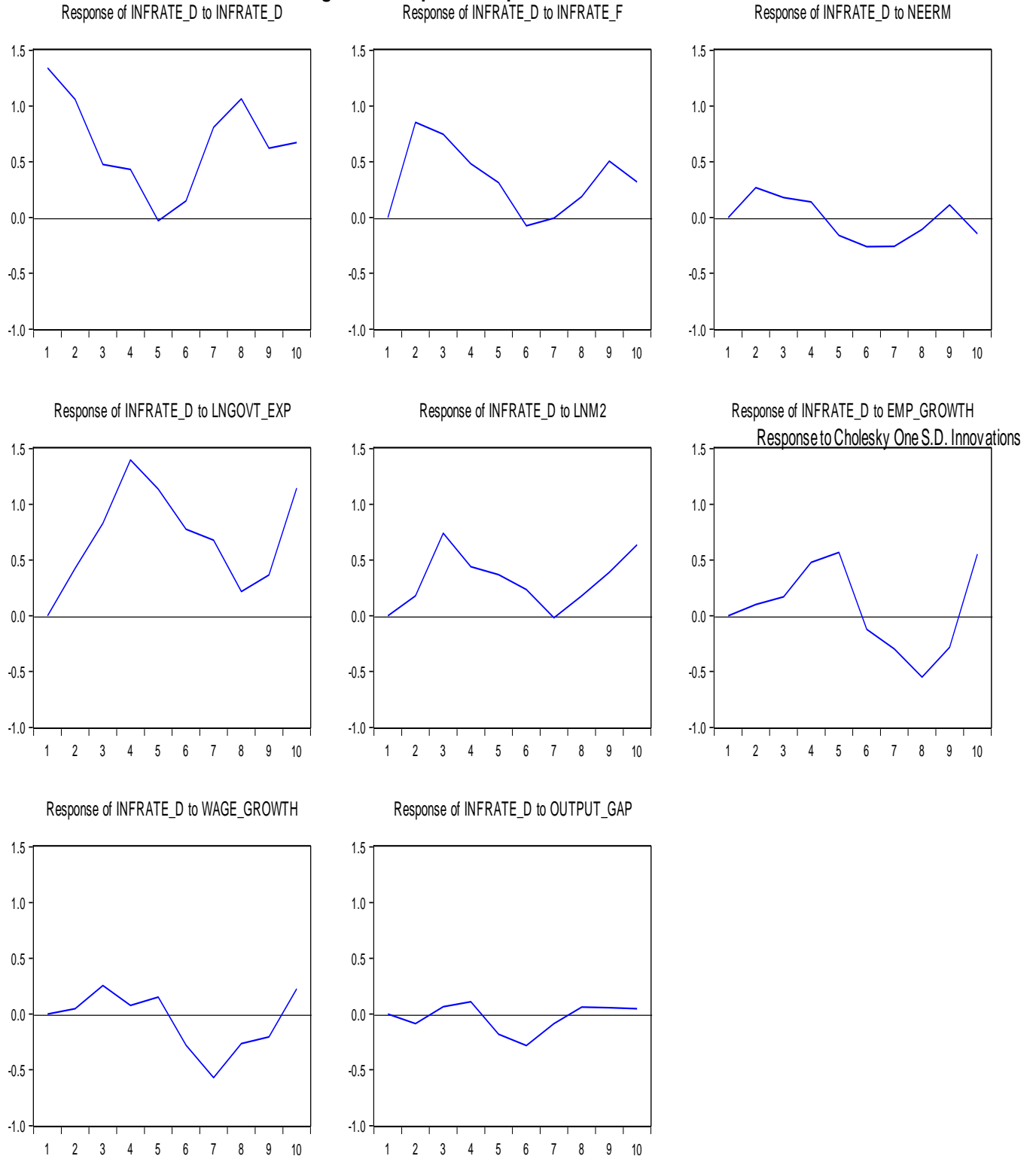


Table A1
Cointegration Tests

Sample (adjusted): 1996Q4 2014Q3
 Included observations: 72 after adjustments
 Trend assumption: Linear deterministic trend
 Series: INFRATE_D INFRATE_F NEERM LNGOVT_EXP LNM2 EMP_GROWTH WAGE_GROWTH OUTPUT_GAP
 Exogenous series: LNOILPRICE
 Warning: Critical values assume no exogenous series
 Lags interval (in first differences): 1 to 5

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.870086	465.8767	159.5297	0.0000
At most 1 *	0.824777	318.9330	125.6154	0.0000
At most 2 *	0.601369	193.5308	95.75366	0.0000
At most 3 *	0.468740	127.3110	69.81889	0.0000
At most 4 *	0.452129	81.77073	47.85613	0.0000
At most 5 *	0.293417	38.44720	29.79707	0.0040
At most 6	0.163060	13.44060	15.49471	0.0996
At most 7	0.008635	0.624392	3.841466	0.4294

Trace test indicates 6 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.870086	146.9437	52.36261	0.0000
At most 1 *	0.824777	125.4022	46.23142	0.0000
At most 2 *	0.601369	66.21979	40.07757	0.0000
At most 3 *	0.468740	45.54029	33.87687	0.0013
At most 4 *	0.452129	43.32353	27.58434	0.0002
At most 5 *	0.293417	25.00661	21.13162	0.0135
At most 6	0.163060	12.81620	14.26460	0.0836
At most 7	0.008635	0.624392	3.841466	0.4294

Max-eigenvalue test indicates 6 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: E-views 7 generated output.

Table A2
Variance Decomposition of Domestic Inflation

Period	S.E.	INFRATE_D	INFRATE_F	NEERM	LNGOVT_EXP	LMN2	EMP_GRO_WTH	WAGE_GRO_WTH	OUTPUT_GAP
1	1.340146	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	1.987703	73.86034	18.44107	1.824576	4.560137	0.810710	0.256627	0.057434	0.189105
3	2.470358	51.54224	21.03339	1.705458	14.25412	9.523352	0.635834	1.113876	0.191732
4	2.989317	37.28607	16.96936	1.379742	31.56700	8.685658	3.013747	0.828264	0.270158
5	3.296519	30.66837	14.84899	1.372706	37.84838	8.397115	5.448923	0.895160	0.520358
6	3.434031	28.44750	13.72894	1.841214	39.99560	8.209433	5.144228	1.482520	1.150563
7	3.660203	29.93978	12.08506	2.115175	38.64223	7.228151	5.190952	3.731943	1.066708
8	3.877508	34.23136	11.00542	1.962440	34.74751	6.653425	6.629811	3.792785	0.977246
9	4.012470	34.36321	11.85718	1.911173	33.28218	7.160361	6.689569	3.803037	0.933285
10	4.330252	31.90922	10.72624	1.753990	35.56448	8.310773	7.380750	3.540761	0.813779
Cholesky Ordering: INFRATE_D INFRATE_F NEERM LNGOVT_EXP LMN2 EMP_GROWTH WAGE_GROWTH OUTPUT_GAP									

Source: E-views 7 generated output.