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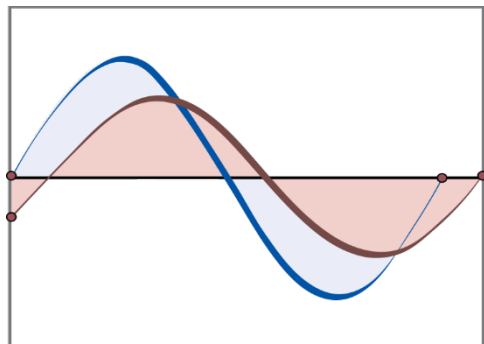
Working Papers

Exploring the Nexus between Labour Force Participation and Potential Output: Evidence from Trinidad and Tobago

Karen A. Roopnarine, Timothy Woolford and Lauren Sonnylal

Labour force participation in Trinidad and Tobago is relatively low and has been declining for some time. However, there is scope for increasing participation, particularly among women and youths. Increases in labour force participation could contribute to increasing Trinidad and Tobago's potential gross domestic product. This study employs a structural vector autoregression (SVAR) to identify and measure the relationship between labour market participation and potential output. Potential implications of a relatively low participation rate for Trinidad and Tobago are also identified. Annual time series data was used for the period spanning 1980 to 2021, which was collected from the Central Statistical Office of Trinidad and Tobago, the Central Bank of Trinidad and Tobago, the Ministry of Finance and Bloomberg. The dynamic analysis of the SVAR was undertaken using Structural Impulse Response Functions and Forecast Error Variance Decompositions. The study's main findings suggest that potential output can be significantly triggered by improvements in labour force participation rates, particularly among the female and youth populations. Based on these empirical findings, we recommend that domestic growth strategies should centre on improving labour market conditions to boost participation rates.

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1.0   Introduction

Labour market conditions are a critical metric in gauging the pulse of the economic environment. In the prevalent literature on labour market economics, the labour force participation rate (LFPR) has acquired some centrality in discourses surrounding movement in gross domestic product and explaining developments in potential output. Firstly, to thoroughly identify the contours of this relationship, a theoretical understanding of the underlying concept is necessary. McConnell, Brue and Flynn (2009) delivered a precise definition of the LFPR, which states that the LFPR is determined by comparing the actual size of the labour force with the potential labour force, also known as the "age-eligible population". Meanwhile, the International Labour Organisation (ILO) goes a step further in providing a comprehensive explanation: "The labour force participation rate is a measure of the proportion of a country's working-age population that engages actively in the labour market, either by working or looking for work; it indicates the size of the supply of labour available to engage in the production of goods and services, relative to the population at working age."

Similar to the ILO, Trinidad and Tobago's main institution for the collection and dissemination of labour statistics, the Central Statistical Office, defines the LFPR as a measure of the proportion of the working-age population that actively engages in the labour market, which can involve either being currently employed or seeking employment (Central Statistical Office, 2022). Furthermore, the working-age population in Trinidad and Tobago refers to the total non-institutionalised population between the ages of 15 and 64, which is a comparable definition to many other countries.

A priori, a positive relationship is expected between the LFPR and output, where a reduction in the number of persons participating in the labour force is associated with a decline in overall economic activity. Such thinking is at the core of formulating policies to capitalise on the contributions of the labour force in accelerating economic growth. The essential message is: to improve total output, it is necessary to increase the LFPR. Examining this testable theory is particularly important for developing countries, such as Trinidad and Tobago, as these economies, more so than others, tend to face the economic burden of low levels of labour force participation (Shahid 2014).

Over the recent decade (2010-2019), Trinidad and Tobago has experienced the twin occurrence of slowing economic output and reduced labour force participation. In 2010, the domestic economy grew by 3.3 per cent before recording a slight expansion of 0.1 per cent in 2019. Complementing this outturn was the simultaneous decline in the LFPR of approximately 4.8 per cent, from 62.1 per cent in 2010 to 57.4 per cent in 2019. Meanwhile, within one year of the coronavirus pandemic (COVID-19) which emerged in late-2019, Trinidad and Tobago's macroeconomic variables were severely weakened. Economic activity registered a record-high contraction of 7.7 per cent in 2020 – the largest decline since 1983, while the LFPR displayed one of its lowest recordable rates of 55.9 per cent – since the 1980s. Furthermore, this trend showed a more pronounced link when female and youth participation rates are disaggregated. Trinidad and Tobago's tumbling LFPR is a cause for concern, especially considering that 70 per cent of the population is in the working-age group of 15 to 64 years.

Consequently, this paper seeks to identify and measure the relationship between labour market participation and potential output, and the potential implications of a relatively low participation rate for Trinidad and

Tobago. Our research uses a structural vector autoregression (SVAR) approach to examine this nexus. Further, to provide a richer analysis of the demographic characteristics of the LFPR, individual examinations of the female, male and youth (15 to 24 years) participation rates were also undertaken.

While several studies have sought to examine the relationship between the LFPR and potential output globally, the extent of such research in the context of the Caribbean region is sparse. Therefore, the current research will build on the work of Caribbean authors by econometrically testing the concept. Although there have been several contributions to qualitative descriptions of labour force and unemployment statistics for the Caribbean (Downes 1998, 2006, 2009, Moonilal 2006, Kandil, et al. 2014, inter alia), labour market researchers have been historically stalled by limitations surrounding the availability of critical statistics, leading to stymied econometric analysis of labour market conditions (Downes 1998). As a result, there have been limited advances by way of quantitative investigations into the distinct relationship between the two main variables of this study.

The paper's organisation is as follows: Section 2.0 presents other theoretical studies conducted on the topic, where it emerges that while the international literature has empirically examined the association between the LFPR and output, regional studies on this relationship are limited. Section 3.0 surveys relevant country-level labour statistics and stylised facts relating to the Trinidad and Tobago economy, such as participation rates and economic growth, while identifying quantitative linkages between the LFPR and output. Section 4.0 follows, where an explanation of the data and methodology used to examine the concepts is presented. In this section, the primary statistical technique used is the SVAR for the entire sample and female, male, and youth sub-samples. The results and analysis of these estimations are presented in Section 5.0. Lastly, Section 6.0 summarises the main findings and proposes methods to tackle Trinidad and Tobago's declining LFPR by drawing on lessons learnt from various countries.

2.0   Literature Review

A synchronous relationship exists between the LFPR and potential output, making this concept a widely researched area of macroeconomics. Since the 1970s, various studies have attempted to model the existence of these variables to assist policy practitioners in understanding how the labour force can spur economic development.

John Dana Durand produced one of the earliest pieces of literature on the nexus between the labour force and economic development in 1976, entitled "The Labor Force in Economic Development." The book explored the composition and structural changes to the labour force alongside economic development. Based on global labour force and population statistics censuses taken for 100 countries from 1946 to 1966, it examined labour force characteristics (such as the size of the labour force, as well as sex and age patterns associated with participation in particular economic activities) that accompany economic development. It was one of the first large-scale studies that examined this area according to participation rates by women, young people and the elderly. Among the male population, it was noted that as the level of economic development increases, there is a falling participation rate of men in production, which can be attributed to a combination of later entry into the labour force (due to years of schooling and training) and earlier retirement (due to higher income earnings and the development of social security). Health improvements among middle-aged and older men do not appear to improve participation.

Participation of women in economic production produces noteworthy results where the chief result presents a "hypothesis of convergence" (Durand 1976). This term represents the finding that as the rate of female labour force participation increases at a particular stage of a country's economic development, the higher the likelihood that their participation decreases as economic development progresses. The author's conclusion states that "cultural, institutional, and other factors related to the regional grouping play a more important part than do factors related

to the level of economic development in determining the pattern of women's participation in income-producing employment" (Durand 1976). Regarding age structures, Durand (1976) reports that despite later entry into and earlier exit from the labour force, the crude participation ratio among high-income countries is higher than low-income countries, enabling the former to experience a higher per capita income.

More statistically integrated frameworks have also been used to study the relationship between the LFPR and output. For example, Shahid (2014) sought to investigate the short- and long-run relationships between labour force participation and gross fixed capital formation to economic growth in Pakistan through co-integration and vector error correction modelling techniques. Econometric evidence pointed to mixed results where labour force participation displayed a negative and significant relationship with economic growth, while gross fixed capital formation revealed a positive significant relationship. Regarding the former relationship, recommendations were advanced to improve this association, including the construction of new education and training institutes to develop the pool of skilled labour. Similarly, Yakubu, Akanedbu and Jelilov (2020) examined these similar relationships through identical modelling techniques for the commodity-exporting economy of Nigeria. The findings were complementary, where a negative long-run causal association was established between the LFPR and real gross domestic product. The authors attributed this inverse relationship to the high unemployment rate and inequality in employment opportunities, largely due to gender, in Nigeria. Given the conclusion that labour force participation impacts economic development, the authors highlighted that policymakers should devise strategies to increase the proportion of the adult population seeking jobs, particularly young graduates. Emphasis was also placed on encouraging young females to remain in school and receive a quality education.

Over time, the role played by females in the workforce has gotten significant recognition and research has highlighted how worldwide increases in female labour force participation rates (FLFPR) can contribute to economic development. Several students of labour market dynamics have referred to a feminisation U-shaped hypothesis based on trends between female labour force participation and economic development. Under this theory, the connection indicates that the FLFPR declines at first and then increases in line with economic development, forming a U-shape (for example Sinha 1967, Durand 1975, Cağatay and Özler 1995). The background of this shape stems from the argument that when a country is undergoing economic contractions, women work out of necessity, mainly in subsistence agriculture or domestic work. However, as the economy expands, employment shifts from an agrarian society to an industrial and service-based economy which tends to employ more men, resulting in the downward sloping line of the U-hypothesis. Subsequently, as the economy enters a higher level of economic development, female enrolment rates at school increase, fertility rates decrease and social stigmas associated with women working fall, which opens an avenue for more women to access employment opportunities (Rahma 2020). This leads to the rising limb of the U-hypothesis, and this hypothesis which dates to the 1960s has become a stylised fact in the development economics literature.

Rahma (2020) conducted a comprehensive panel study spanning 154 countries, which included Trinidad and Tobago, to examine the directional relationship between labour force participation and economic growth. Using Granger causality testing, a bi-directional relationship was established where female labour force participation Granger causes growth and vice versa. Broadly, the results conclude that economic growth is significantly linked to increasing female participation within the workforce. Furthermore, as the FLFPR increases, the relative economic statuses of these women will be improved, which will contribute positively to overall economic efficiency. Recommendations to promote a higher FLFPR included a focus on establishing effective policies to eliminate current barriers faced by women joining the labour force.

Notably, some studies have found an inverse relationship between female labour force participation and economic growth. However, it should be noted that these findings are predominantly concentrated within more traditional type economies. Anyanwu, et al. (2021), which examined the female labour force participation and economic growth nexus for Nigeria, highlighted that increases in economic growth, decline in fertility rates, and expansion in female education did not result in a commensurate increase in female participation. This result is of

concern as it is empirically proven that through formal and informal production, women play an active role in furthering economic development. Therefore, to promote economic growth and development in Nigeria, the study recommended that active labour market policies are required to encourage female labour market participation.

While several studies have examined the relationship between the LFPR and potential output globally, the extent of such research in Trinidad and Tobago is sparse. Downes (1998) highlighted the prevalence of unemployment as a major economic problem facing Caribbean governments. He credited much of this to the structural dynamics of these economies, the nature of the education system and its disconnect with the needs of the labour market. Referencing Ramesar (1977), Downes noted that the long-term presence of a labour surplus dates to the First World War. During this period, the country was largely a mono-crop economy dependent on the agricultural sector. In this post-emancipation era, several persons developed negative attitudes toward agricultural work. They preferred to wait for higher paying non-agricultural related jobs, suggesting low participation rates. This challenge was compounded by the inability of the non-agricultural sector to absorb large proportions of the labour force at that time. To date, this same challenge is best manifested in the capital-intensive petroleum industry, which continues to be the country's main driver of economic activity.

While Downes (1998) did not examine the relationship between the LFPR and output, the author looked at the necessary conditions to reduce unemployment in Trinidad and Tobago. Using a mix of econometric techniques, he deduced that in the short and long run, changes in real GDP and real average earnings both have a statistically significant impact on the unemployment rate. Increases in real GDP reduce the unemployment rate in both the short and long run, while increases in the real average earnings increase the unemployment rate in the long run. This is particularly interesting, given that Grigoli et al. (2018) highlight earnings as a driver of labour force participation, while several studies have alluded to it as a driver of output. This raises questions regarding the short-run versus long-run implications of increased labour force participation on unemployment. These issues, however, fall outside the scope of this study.

Regarding participation rates, Downes (2006) highlighted that a common trend in the Caribbean had been the gradual increase of female participation coupled with the constancy of male participation. Overall participation rates in the region were just under 70 per cent from 1996 to 2002. Rates generally trended upward largely on account of female participation. Since the 1960s, females appeared to be entering the labour force much more than their male counterparts. Downes (2006) attributed this to higher educational attainment, improvements in household production technology, expansion of economic activities, which have been a traditional source of employment for women, declines in fertility rates and average household size, which reduced the need to stay at home for longer periods. Further, he posited that increased female participation was fuelled by the self-actualisation of women and the drive for financial independence.

Kandil et al. (2014) contended that structural, and institutional challenges remain at the centre of labour market issues in the region. Despite the general improvement in educational attainment, there remains a small cadre of professional, technical and managerial personnel, resulting in a mismatch between labour demand and supply. Further, there has been a general upward trend in real wages with less than proportionate improvements in productivity. The region also appears to be characterised by a low rate of labour force growth, suggesting high emigration rates and an ageing population. FLFPRs have also been rising while male participation rates have been stagnant.

Downes (2009) examined the effects of the global economic crisis on the labour markets of the Caribbean. Except for Trinidad and Tobago, unemployment rates in the region have exceeded 10 per cent. The prevalence of the low rate domestically was partly reflective of economic growth but also a discrepancy in how unemployment is defined compared with other Caribbean countries. The decline in economic activity in the region created broad effects in the labour market: firstly, an added worker effect, characterised by the entry of persons into the labour market on account of the primary breadwinner being laid off and secondly, a discouraged worker effect where persons remove themselves from the labour market on account of the difficulty of the job search process. In the aftermath of the

2008-2009 Global Financial Crisis, LFPRs were fairly constant in most countries, making it difficult to determine which effect outweighed the other. However, there was slight evidence to suggest the dominance of the discouraged worked effect.

Summarily, a literature review suggests a direct relationship between the LFPRs and economic output. It also offers ample evidence to warrant a thorough examination of the participation rates by gender. Though the literature on the labour market is somewhat diverse and points to several unique structural dynamics, in Trinidad and Tobago, there is an absence of empirical literature on the relationship between participation rates and potential output. Domestically, participation rates appear to be characterised primarily by an increase in female labour force participation and the constancy of male participation. This paper, therefore, seeks to address a critical issue in an area relatively unexplored in the local context.

3.0   Stylised Facts

Roopnarine, Bowrin and Ramirez (2019) pinpointed that as an energy-based commodity exporting economy, international energy price fluctuations have been largely responsible for Trinidad and Tobago's bust and boom cycles. Earlier research by Edwards and Woolford (2018) corroborates this view, highlighting that periods of economic prosperity have been notably linked to periods of statistically high commodity prices and vice versa. This has been reflected in the country's high and low growth performances over the last four decades (1980-2021). Elevated commodity prices in 1979, brought on by speculative factors associated with the Iranian Revolution, spurred rapid increases in domestic growth from 1980 to 1982. Over this period, growth rates averaged 6.3 per cent, peaking at 10.4 per cent in 1980[1].

In addition to commodity prices, economic performance from 1983-2008 was further characterised by structural shifts and transformations of the Trinidad and Tobago economy. The collapse of oil prices in 1982 placed significant pressure on the country's external position leading to a deteriorated terms of trade position and a depletion of foreign exchange reserves, which also triggered declines in economic growth for seven successive years (1983-1989). This prompted a series of structural adjustments, which included diversification of the country's energy sector and a shift to predominantly gas-based export products. This augured favourably for the domestic economy, particularly from the mid-90s until the Global Financial Crisis (GFC) of 2008. During the period, the energy sector's contribution to gross domestic product (GDP) improved noticeably. The sector benefitted from developments in liquefied natural gas and petrochemical production, including ammonia and methanol. Economic prosperity was further buoyed by the high commodity price environment underpinning these markets over the period. This was reflected in substantial fiscal and external balances[2], which informed major infrastructural developments in the country over the period.

In the aftermath of the GFC, growth over the period 2009-2021 was crippled several exogenous shocks, fuelled by a low commodity price environment **(Figure 1a)**. Crude oil prices declined 38.0 per cent in 2009, resulting in a sharp decline in real GDP. Widespread maintenance activity, which has characterised activity in the energy sector since 2010, also significantly disadvantaged real economic growth (2010- 2021).

Between mid-2014 and early 2016, the global economy faced one of modern history's largest oil price decreases (a 70 per cent price decline). This price decline was reflected in a contraction in Trinidad and Tobago's economy; in 2016, real GDP growth declined by 6.8 per cent. Before the onset of the COVID-19 pandemic, the economy struggled to regain the momentum experienced in the pre-international crisis era when annual GDP
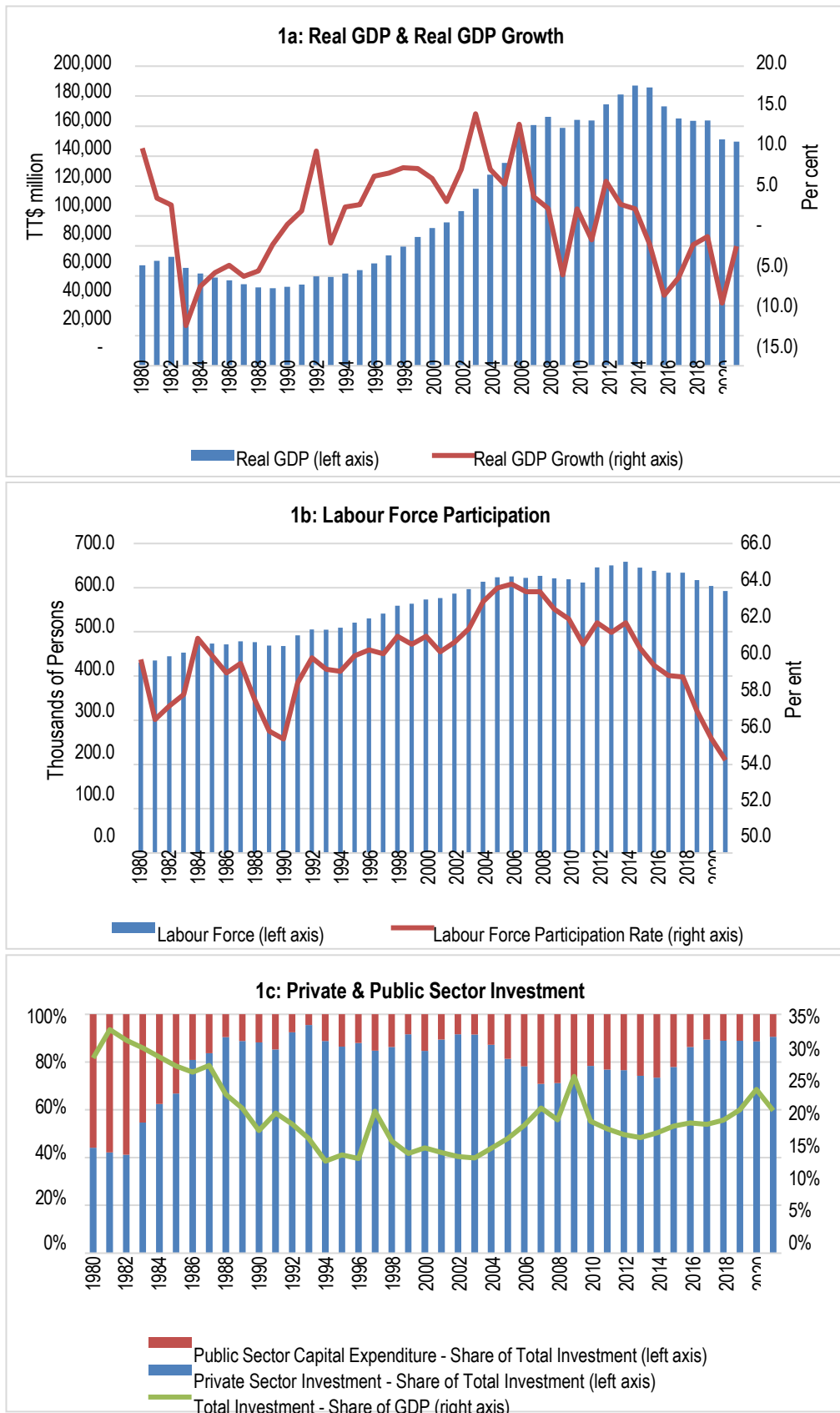
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[1] Inflation-adjusted West Texas Intermediate (WTI) oil prices moved from US$56.14 per barrel in 1978 to US$83.86 per barrel in 1979, and peaked at US$111.30 per barrel in 1980.
[2] For more information see: https://www.central-bank.org.tt/statistics/data-centre/public-finance-annual

growth averaged just over 8.0 per cent between 2000 and 2007. During 2020, the socio-economic challenges brought on by the pandemic, coupled with pre-existing economic and financial stresses, contributed to a contraction of 7.7 per cent in domestic activity. Despite an improvement in output during 2021, mainly due to a more buoyant international energy market and a pickup in activity, growth remained negative (1.0 per cent).

Figure 1: Real GDP, Labour Force Participation & Investment

1a: Real GDP & Real GDP Growth

Real GDP (left axis) — Real GDP Growth (right axis)

1b: Labour Force Participation

Labour Force (left axis) — Labour Force Participation Rate (right axis)

1c: Private & Public Sector Investment

Public Sector Capital Expenditure - Share of Total Investment (left axis)
Private Sector Investment - Share of Total Investment (left axis)
Total Investment - Share of GDP (right axis)

Sources: World Bank Development Indicators Database, Central Bank of Trinidad and Tobago, Central Statistical Office, and Ministry of Finance

Over the entire review period, the labour force grew by 37.5 per cent, moving from 430.6 thousand persons in 1980 to 592.2 thousand persons in 2021. However, since the mid-2000s, the size of the labour force has exhibited a downward trend. Similarly, the LFPR has been declining steadily, moving from a peak rate of 63.9 per cent in 2006 to 54.8 per cent in 2021 – the lowest rate in the sample period (1980-2021) **(Figure 1b)**. Apart from the economic fallout of COVID-19 in 2020, this decline in labour force participation can be partly explained by changes in the country's demographic characteristics, particularly the ageing population[3]. Moreover, the share of the working-age population that is "not in the labour force"[4] increased by 49.6 per cent over the review period. Paul, Hosein and Deonanan (2018) analysed the decline in the LFPR in Trinidad and Tobago from 1991 to mid-2017. The authors found that since 2006, approximately half of the decline in the LFPR was due to demographic factors (ageing population). Moreover, (negative) short-run causality was found to run from fiscal transfers and subsidies to the LFPR and to run (positively) from real GDP growth to the LFPR. Meanwhile, in the long run, real GDP growth, average weekly earnings and transfers and subsidies significantly impacted on the LFPR (Paul, Hosein and Deonanan 2018).

Historically, the LFPR for men and women have had a large disparity. However, this disparity has been narrowing as the male participation rate has been declining throughout the review period, moving from 82.0 per cent in 1980 to 63.1 per cent in 2021, while female participation has increased from below 40 per cent in the 1980s to over 50 per cent during 2004 to 2016. Since then, the trend in female participation has reversed and is now declining, reaching 46.8 per cent in 2021. Despite this, there remains a gap of almost 20 percentage points between the male and female participation rates. The presence of children in the household, chronic illness, and accessing social security programmes negatively impact female labour force participation in Trinidad and Tobago (Roopnarine and Ramrattan 2012). Conversely, being the head of the household, being single (marital status), and the level of education positively influences female labour market participation (Roopnarine and Ramrattan 2012). Notably, in Trinidad and Tobago, education plays a greater role in determining the likelihood of women participating in the labour market than it does for men (Dialsingh 2018).

In terms of the youth population, (aged between 15 and 24 years), before the COVID-19 pandemic in 2019, youth accounted for around 10.0 per cent of the labour force with a participation rate of around 40.0 per cent. The youth LFPR hovered around 52.0 per cent in the 1980s and 1990s but has consistently declined since 2008. It should be noted, though, that a relatively low youth labour market participation is not necessarily adverse for the macroeconomy as it may indicate youths' decision to further their training and education (ILO 2019).

As stated above, Trinidad and Tobago is an energy-driven economy. The petroleum and gas industry is highly capital intensive, accounting for, on average, only 3.4 per cent of total employment (1987-2021). The most labour intensive industry in Trinidad and Tobago is the construction (including electricity and water) sector, which has provided, on average, 14.8 per cent of all jobs. Other major labour-intensive industries include manufacturing (including other mining and quarrying) (9.4 per cent); transport, storage and communication (7.1 per cent); and agriculture (6.9 per cent).

The correlation between labour force participation and real GDP growth is 'moderate' with a coefficient of 0.45 **(Figure 2)**. However, when disaggregated by gender, female labour market participation has a greater correlation (0.27) with real GDP growth than male labour market participation (0.14) and real GDP growth. The same holds for youth participation by gender – female youth labour market

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[3] The United Nations defines a country as 'ageing' when 10 per cent or more of its population is over the age of 60 years. For 2021, data from the Central Statistical Office revealed that 13.4 per cent of the population was over the age of 60 years (Source: Review of the Economy 2021).
[4] "Not in the labour force" refers to those persons of working age (15 to 64 years) who are not economically active for diverse reasons such as, education, retirement, infirmity, etc.

participation is moderately correlated (0.49) with real GDP growth compared with a very weak correlation (0.06) for male youth participation.

Figure 2: Real GDP Growth and Labour Force Participation
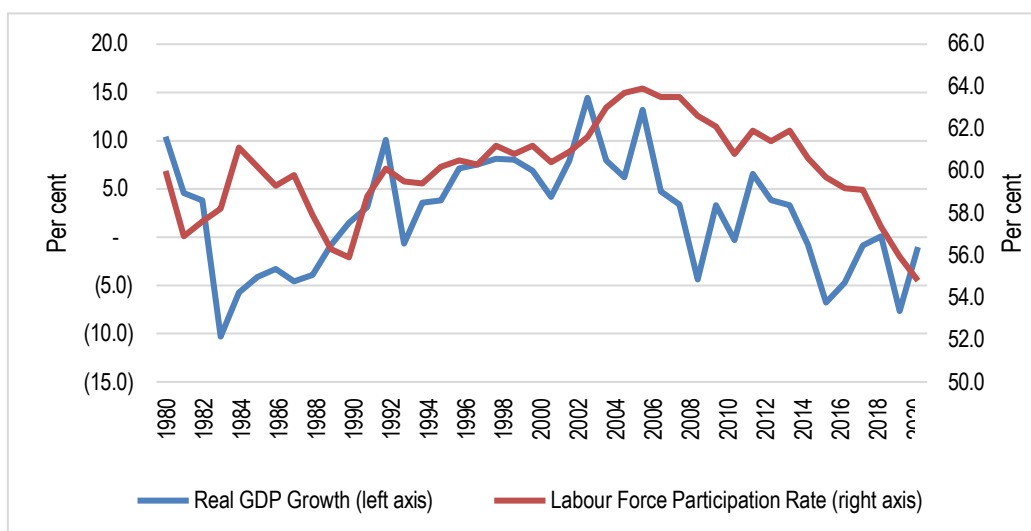
Source: Central Statistical Office

According to the *System of National Accounts, 2008* (2008 SNA)[5], gross fixed capital formation (or gross fixed investment) refers to the total value of producers' acquisitions and fewer disposals of fixed assets. Fixed assets refer to produced assets such as machinery, equipment, buildings or other structures used repeatedly or continuously in production over several accounting periods (more than one year). Gross fixed capital formation (GFCF) is usually captured at the national level when GDP is measured using the expenditure approach and indicates how much of the new value-added in an economy is invested rather than consumed. Trinidad and Tobago does not currently measure GDP using the expenditure approach, so a proxy measure of GFCF was used for this research – the sum of private sector investment and public-sector capital expenditure. The authors acknowledge that this proxy measures total investment, which may include financial assets rather than being a flow value of the net additions to fixed assets (i.e., GFCF).

During the 1980s and 1990s, total investment as a share of GDP declined, moving from a peak share of 33 per cent of GDP in 1981 to 15 per cent in 1999 **(Figure 1c)**. Following this, there was a reversal in this trend and total investment as a share of GDP increased gradually until 2009, when its share peaked at 26 per cent. Growth in investment as a share of GDP has since tapered off and has ranged between 17 per cent and 24 per cent between 2010 and 2021. For most of the review period, the private sector accounted for a larger share of total investment, averaging 80 per cent.

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[5] The *System of National Accounts, 2008* (2008 SNA) is a statistical framework that provides a comprehensive, consistent and flexible set of macroeconomic accounts for policymaking, analysis and research purposes.

4.0   Data and Methodology

4.1.   Data

In this study, the variables chosen are in keeping with the empirical literature and modelled in a series of regression equations. A dataset of four variables is used for populating each equation spanning an annual time series from 1980 to 2021, reflecting 42 observations per series (see **Appendix A.1.1** for descriptive statistics). Variables were compiled from multiple sources; the Central Statistical Office of Trinidad and Tobago (CSO), the Central Bank of Trinidad and Tobago (CBTT), Trinidad and Tobago's Ministry of Finance and Bloomberg. Data were individually log-transformed before incorporating into the model to reduce model instability.

First, at the head of the model, West Texas Intermediate [*WTI*] oil prices are used as the main external shock, given that Trinidad and Tobago is characterised as an energy-based economy. Following the recommendation by Favero (2001), an exogenous variable was also included as this increases the chances for identification in macroeconomic modelling. Secondly, total investment [*INV*] was used as a proxy to represent gross fixed capital formation, as this data is not compiled by Trinidad and Tobago's official sources. Total investment was calculated by aggregating private sector investment (commercial banks' private sector loans outstanding by purpose) and public sector investment (Central Government capital expenditure). Third, the labour force participation rate [*LFPR*] is included as one of the two key variables under investigation. However, to provide a richer understanding of the labour market in Trinidad and Tobago, separate equations are estimated for female [*FLFPR*], male [*MLFPR*] and youth [*YLFPR*] labour force participation rates. Lastly, the trend component of real GDP[6] was utilised to represent potential output [*HP_GDP*]. This was derived by applying the Hodrick Prescott (HP) filter, a simple smoothing technique commonly used for decomposing a series into its cyclical and long-term trend components. The HP filter is flexible in deriving the trend output, which is produced by minimising the squared distances between actual and potential output at each point in time throughout the sample period (Konuki, 2008).

4.2   Methodology

Structural Vector Autoregression (SVAR) Analysis

To analyse the possible effects of labour force participation on potential economic growth in Trinidad and Tobago, we employed a structural vector autoregressive (SVAR) model – the AB-model proposed by Amisano and Giannini (1997). One of the significant benefits of using the SVAR methodology instead of the simple, unrestricted vector autoregressive (VAR) model is that it allows researchers to use theoretical assumptions in the model by imposing explicit restrictions on the structural relationships. Also, the introduction of theoretical restrictions aids with overcoming econometric identification issues.

The underlying SVAR model can be written as:

$$Ay_t = C(L)y_{t-1} + B\varepsilon_t \qquad\qquad [1]$$

where A is a KxK matrix that captures the structural contemporaneous relationships among the variables, y_t is a K-dimensional vector of observable variables, C is a polynomial function of order p, L is the lag operator, and ε_t is a K-dimensional vector of structural innovations with mean zero and identity covariance.

However, this structural equation cannot be estimated directly due to identification issues. Instead, we estimate an unrestricted VAR of the form:

$$y_t = A^{-1}C(L)y_{t-1} + A^{-1}B\varepsilon_t \qquad\qquad [2]$$

The reduced form model used for the structural analysis can then be defined as follows:

$$Ae_t = B\varepsilon_t \qquad\qquad [3]$$

where e_t is the reduced form disturbance vector, while ε_t represents the unobserved structural innovation vector, both with a length k. Thus, equation [3] relates the reduced form disturbances to the underlying structural shocks where the B matrix filters the reduced form shocks so that the structural shocks can be identified. The reduced form VAR residuals can be estimated from the data as:

$$e_t = A^{-1}B\varepsilon_t \qquad\qquad [4]$$

The SVAR analysis requires some restrictions for the A and B matrices. By imposing structure on the A and B matrices in equation [4], we impose restrictions on the structural VAR in equation [1]. For identification of the AB model, a system with k variables, there must be at least $\frac{k^2-k}{2}$ restrictions imposed. These restrictions typically (but not always), take the form of restricting matrix B's off-diagonal elements to be equal to zero, constituting restrictions on the contemporaneous effect of one variable on another. If the model is over-identified, the value of a likelihood ratio (LR) statistic will be reported.

To identify the model, structural restrictions were applied to examine the determinants of potential output [HP_GDP$_t$]. The vector y_t contains the macroeconomic variables discussed above, denoted as $y_t = [WTI^*, INV, LFPR, HP\_GDP]$. The structural parameters are estimated using maximum likelihood estimator. More explicitly, for the AB model used in this study, the coefficients on the diagonal of the A matrix are normalised to unity, while the number of zero restrictions on the coefficients is 7. Hence our model is over-identified with 1 degree of freedom.

$$e_t = A^{-1}\begin{bmatrix} 1 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 \\ a_{31} & 0 & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{bmatrix}. B\begin{bmatrix} b_{11} & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 \\ 0 & 0 & b_{33} & 0 \\ 0 & 0 & 0 & b_{44} \end{bmatrix}.\varepsilon_t \begin{bmatrix} WTI_t^* \\ INV_t \\ LFPR_t \\ HP\_GDP_t \end{bmatrix} \qquad [5]$$

In the above system [5], oil prices are set ahead of all the variables to represent that crude oil prices are considered exogenous in the model. Given that Trinidad and Tobago exports energy-related products, oil prices are assumed to contemporaneously affect all variables in the system. Domestic variables [INV, LFPR, HP_GDP] are assumed not to contemporaneously affect crude prices [WTI*] because the Trinidad and Tobago economy is very small, therefore, highly unlikely to have any substantial impact on the international price for crude oil. We assume there are no feedback effects from LFPR on total investment and vice-versa. Restrictions in equation [5] indicate that all variables are assumed to contemporaneously affect potential output.

Regarding lag selection, we departed from the standard optimal lag length tests and used a common alternative, as suggested by Lüktephol (2007), instead. We estimated the VAR using the optimal lag length absent from autocorrelation and heteroscedasticity. The stability of the model was assessed using the eigenvalues of the companion matrix of the VAR model. The model is stable if all the eigenvalues are inside the unit circle. Given the country's relatively low female labour force participation and high unemployment among the youth, equation [5] was reconstructed to specifically analyse the impacts of the female labour force participation rate [FLFPR] and the youth labour force participation rate [YLFPR] on potential GDP. Furthermore, the impact of the male labour force participation rate [MLFPR] on potential output was also analysed for comparative purposes.

Importantly, two key factors impacting the empirical examination should be identified before assessing the results. Firstly, a

fundamental assumption in the model is that factor productivity (labour and capital) remains unchanged. The research did not investigate whether the decline in LFPR was due to changes in factor productivity or shifting shares of labour and capital application over time, which could have come about due to technological advancements, digitalisation, etc. Secondly, self-selection bias exists in the labour force, where individuals can determine whether to enter or leave the labour market based on personal preferences. Given the ambiguities surrounding this circumstance, it was not factored in the model.

The dynamic analysis from the SVAR model was conducted through Impulse Response Functions (IRF) and Forecast Error Variance Decomposition (FEVD). Our study used the Structural Impulse Response Functions (SIRF) as these account for the contemporary order of the restrictions in the model. Structural impulse response functions were used to measure the accumulated response to one standard deviation of LFPR and total investment on current and future values of potential output. We also estimated a 10-period ahead (10 years) variance decomposition of all the macroeconomic variables.

5.0   Results and Analysis

The time series properties and model selection procedure, including lag length criteria, stability test, heteroscedasticity and serial correlation Lagrange Multiplier (LM) tests, showed that the SVAR model of lag length three is valid and stable.[7] Although the AIC and FPE suggested a VAR model with four lags, as suggested by Lüktephol (2007), we chose a VAR model with three lags to ensure no heteroscedasticity and serial correlation among the residuals. Because the SVAR is over-identified, the validity of the over-identifying restrictions was tested using a likelihood ratio test whose null hypothesis is that the additional restrictions are valid. The results indicate that the null hypothesis cannot be rejected at most levels of significance with $pp = 0.0757$; $\chi\chi^2(1) = 3.154$. The estimation results of the SVAR model are presented in **Appendix A.1.6**. The results from the structural impulse response functions and variance decompositions are discussed below.

5.1 Impulse Response Functions

The impulse responses generated from the model yield results consistent with the literature regarding the relationship between potential output and labour force participation. A positive shock to total labour force participation generates continuous improvements in potential output over the ten-year forecast period (see **Appendix A.1.7a**). Conversely, a positive shock to total investment generates an initial negative effect on potential output over the first four years of the forecast period. However, it should be noted that the impact on potential

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[7] See **Appendix 1** for results of the model diagnostic tests.

output does turn positive over the later periods of the analysis, albeit generating a smaller impact when compared to the influence of total labour force participation on potential output. This result is consistent with findings from Yakubu, Akanegbu and Jelilov (2020), where no short-run causality was found from gross fixed capital formation to real GDP for the case of Nigeria.

Meanwhile, for Trinidad and Tobago, results from the model suggest that investments in the domestic economic landscape, as defined in this paper, appear inefficient. This may call to question the suitability of the proxy utilised as an appropriate substitute for gross fixed capital formation.

Even so, this result raises concerns surrounding the inability of capital expenditure by the State and lending by commercial banks to trigger a more significant response in economic growth. This finding also corroborates Seerattan (2012), who noted the inefficiency of capital expenditure in commodity-exporting countries in the region, such as Trinidad and Tobago. According to the author, capital expenditure is perceived as a more productive avenue to facilitate economic growth. However, in the context of fiscal consolidation, the Caribbean experience is characterised by downward revisions to the capital expenditure programme on account of the political sensitivities associated with a cut to wages and subsidies, which can inhibit the contribution of capital expenditure to enhancing growth. Additionally, the results support developing labour-intensive growth strategies in the domestic setting.

A second iteration of the model examined the impact of increased female labour force participation on potential GDP. In this version, the impact was again increasingly optimistic over the forecast horizon (see **Appendix A.1.7b**). The long-run relationship between female labour participation and GDP is corroborated in both the early literature (such as Sinha 1967, Durand 1975, Cağatay and Özler 1995), and more recently, in Rahma 2020. Although female participation has increased from below 40 per cent in the 1980s to over 50 per cent from 2004 to 2016, greater efforts to entice women to participate in the labour market will auger well for future economic growth. Education is one avenue that could be used to encourage women to participate in the labour market, as Dialsingh (2018) found that in Trinidad and Tobago, education plays a greater role in determining the likelihood of female labour market participation than it does for males. In this iteration, the impact of investment on potential GDP follows a similar pattern as total labour market participation. However, it remains positive over the entire 10-year forecast period, keeping with a priori expectations. Taking this result in conjunction with the outturn for total labour force participation, it appears that investment in Trinidad and Tobago has a stronger impact on potential GDP in the long run than in the short run.

A third iteration of the model investigated the relationship between potential output and youth labour force participation (see **Appendix A.1.7c**). While the impact of increased youth labour force participation on potential output was marginal in the short-run, the medium- to long-term influence was greater. However, the size of the impact was less pronounced when compared to the total and female labour force participation models. The International Labour Organisation (2019) noted that employment growth among adults has systematically exceeded that of youths, pointing to issues in job creation for young workers. The same holds for Trinidad and Tobago. Unemployment among school leavers (15 to 19 years) is particularly severe, with females being more affected.

 Meanwhile, the unemployment rate progressively declines in the older age categories. Again this points to the need for developing employment programmes targeted at the nation's youth, particularly, female youths. Notwithstanding, decreasing youth labour market participation is not necessarily adverse for the macroeconomy as it may indicate youths' decision to further their education. In this iteration of the model, the impact of investment on potential output remained negative throughout the forecast period, when compared to previous iterations, which eventually turned positive in the later years.

For comparative purposes, a fourth iteration of the model investigated the relationship between potential output and male labour force participation (see **Appendix A.1.7d**). Interestingly, the impact of increased male labour force participation on potential output was significantly less influential over the entirety of the forecast compared to the first three iterations of the model. Literature on the dynamics of this relationship is scant. In the context of the

Caribbean, Downes (2006) notes the constancy of male LFPR over the years, with increases in total LFPR being driven predominantly by the entrance of female participants into the labour market. Therefore, we, postulate that on account of the already relatively high male LFPR domestically, any increase in male labour force participation will have the muted effect on growth displayed in the model. This, therefore, supports the need for policy action to focus specifically on increasing youth and female labour force participation to facilitate growth. In this iteration of the model, the impact of investments on potential output mirrors that of the first and second iterations, where output is initially hostile and turns positive by the fifth year of the forecast period.

5.2 Variance Decomposition

It is useful to analyse the variance decompositions derived from the models (see **Appendix A.1.8a**) as it allows us to decompose the variance of the forecast error into the contributions from specific exogenous shocks. The results for total labour force participation highlight that in the earliest stages, most variations in potential output come from the potential output variable itself. Interestingly, the value of this contribution displays a downward trend throughout the forecast period, falling from 81.5 per cent in the first year to 67.2 per cent by the 10th year. As defined in the model, investment accounts for 9.1 per cent of the variation in potential output in the initial year and gradually increases over the forecast period, contributing 11.6 per cent by the final year. The narrative is similar when we examine contributions from the LFPR, which accounts for 8.8 per cent of the variation in potential output in the first year and gradually increases over the forecast horizon to 20.7 per cent. In the first year of the forecast period, investment has a slightly stronger impact on potential GDP when compared to total labour force participation. However, this performance reverses by the second year, with total labour force participation surpassing investment in its contribution to the variation in potential output. In the long run, labour force participation appears to be the second strongest driver of potential growth, behind potential GDP itself. These results support the need for more labour-intensive growth strategies which can positively impact economic growth.

Analysis of the variance decomposition for females only (see **Appendix A.1.8b**) shows a similar trend to the total participation analysis. Most of the variation in potential output is explained by this variable itself. The investment variable accounts for 4.4 per cent of the variation in the first year and increases over the forecast horizon to 15.1 per cent in the 10th year. The contribution of female labour force participation to potential GDP is much smaller in this model iteration, measuring 1.9 per cent in the first year. Still, it gradually ascends to 10.7 per cent by the 10th year. This association again highlights, the long-run positive impact of increased female labour force participation on potential output.

The variance decomposition for youths repeats a somewhat similar trend to the previous two iterations of the model (see **Appendix A.1.8c**). Again, most of the variation in potential GDP is accounted for by the potential output variable itself. Interestingly in the youths-only iteration of the model, investment contribution to potential output displays an opposite relationship when compared to the first two iterations of the model. Unlike the total and female labour force participation models, the contribution of investment to potential output in the youth scenario slows from 9.5 per in the first year to 0.3 per cent by the 10th year. Furthermore, similar to the female labour force participation iteration of the model, the contribution of youth labour force participation to potential output is limited in the first two years moving from an average of 1.6 per cent to 3.0 per cent in the third year, before rapidly increasing from the 5th year, and reaching 31.8 per cent by the 10th year. Notably, in this iteration, the contribution of external factors to output is increasingly more prominent in the long term. This is evidenced by the share of West Texas Intermediate (WTI) crude oil prices in accounting for variations in potential GDP, moving from 0.8 per cent in the first year to 11.8 per cent in the final year.

Analysis of the variance decomposition for males only (see **Appendix A.1.8d**) highlights that most of the variation in potential GDP is accounted for by the potential output variable itself, with that contribution slowing over the long run. Similar to the total and female labour force participation iterations, the contribution of investments increases in the long run, moving from 7.8 per cent in the first year to 16.6 per cent by the final year. This highlights a more

pronounced impact of investments on potential output in the long run, with an inability to significantly contribute in the short term. However, unlike the three previous iterations of the model, the impact of male labour force participation on potential output steadily declines over the forecast horizon, moving from 7.3 per cent in the first year to 1.6 per cent by the 10th year. This corroborates the need for policy action to target female and youth participation as improvements to male labour force participation do not appear to substantially support potential output in the long run.

6.0   Conclusion

This paper identifies and measures the relationship between labour market participation and potential output in Trinidad and Tobago. The analysis was premised on using a structural vector autoregression (SVAR) approach to examine this nexus. Additionally, the paper offers a richer analysis of the demographic characteristics of labour force participation, with individual examinations of the female, youth (15 to 24 years) and male participation rates. The results highlight the need to undertake labour-driven growth strategies to close the gap between actual and potential output, particularly over the long run. This is evidenced by the increasing contribution of improved participation to potential output. A closer examination of demographic factors highlights that increased male labour force participation offers little impetus to growth, particularly in the long run. This narrative is reversed when we examine female and especially youth labour force participation, thereby highlighting their significant value in buttressing potential output. It should also be noted that policy actions to improve output must be undertaken in the context of the country's overall economic development framework. Additionally, the increased investment appears to be impactful in closing the output gap, though the contributions to movement in potential output display a degree of constancy over the forecast period. This warrants further investigation into whether private and public sector investments yield optimal results.

The results point to a need to thoroughly examine the effectiveness of investment in both the private and public spheres as a trigger for improving potential output. Uskova (2013) argues that investments are the most integral part of attaining sustainable economic growth, thus highlighting investment's long-term and transformative nature. The response of potential output to increased investment, as defined in this study, is muted in the short run but shows a weak acceleration over the long-run period. While this relationship suggests that capital expenditure can contribute to potential output in the long run, the response would be subdued. This result is supported by Seerattan (2012). Analysis of the variance decompositions showcases some contribution to output in the short run. However, this contribution displays a degree of constancy over the long term, with only a marginal uptick in the outer periods. This aspect of the analysis may warrant further investigation into the current structure of the public expenditure programme. In the private sector, it potentially speaks to a possible alignment of private sector investment with economic growth. However, consideration has to be given to the suitability of the proxy utilised for private sector investment as it may not give a complete perspective of actual private sector investment. Ultimately the results highlight the limited yet positive impact of increased investment to trigger potential economic growth over the long run whilst also pinpointing the significant potential gains to growth that can be generated from expansions in labour force participation, particularly among females and youths.

The impulse response functions, and variance decompositions highlight that improved labour force participation is a prominent feature of improved potential output. Policy actions should therefore be aimed at expanding LFPR, coupled with an investment strategy that aligns well with development objectives. This strategy as a pathway to improved growth is consistent with the findings of Bryant et al. (2004), who found that output could be improved by targeting increased participation, particularly among women. Paul, Hosein and Deonanan (2018) suggest that half the decline in labour force participation is attributable to an ageing population. This may potentially point to a need to consider an increased retirement age, though admittedly, this falls outside the scope of the research. Attempts should also be made to offer disincentives for early retirement. Casey (1998) speaks to the adoption of gradual retirement versus early retirement, where persons gradually reduce their number of work days

between the point at which they qualify for early retirement and at which they retire. In general, research has found that the macroeconomic environment has a strong impact on labour force participation (Downes, 2006 and Grigoli et. al, 2018). Labour force participation tends to be stronger in positive economic times, given that the demand for labour increases in these periods, which is also typically associated with higher wage rates. Paul, Hosein and Deonanan (2018) also allude to this, suggesting a positive causal relationship between GDP growth rates and the LFPR.

To improve the demand for labour, the Government can act as a facilitator to allow the private sector to engage in new types of businesses, particularly in the export-oriented non-energy sector. This will call for greater competitiveness among the various non-energy sector entities. A commitment to such policies can encourage the establishment of new high-end businesses that will transform knowledge into commercial value in the form of increased productivity and new products, processes, services, and systems. The Government should also focus on facilitating new areas of growth, such as those in the blue and green economy, the digital and sharing economy, and the orange (or creative) economy. As an extension, the added economic prosperity can reduce reliance on the State and facilitate a reduction in transfers and subsidies, which was identified by Paul, Hoesin and Deonanan (2018) as having a negative relationship with LFPR. Monetary policy action should also be executed with fiscal policy in facilitating macroeconomic stability, as this can foster greater labour force participation.

Additionally, greater access to opportunities must be explicitly generated among the youth and female populations, as increased opportunities will facilitate higher participation in the labour market. This is imperative given the lack of evidence to support increased male participation's notable effect on potential output. Improvements in youth labour force participation appeared particularly impactful in stimulating potential output. In the youth-only iteration of the model, improvements in participation were a notably informative feature of potential output, in the long run, accounting for just over 30 per cent of the variation. Regarding youths, emphasis can be placed on the development of programmes that generate employment (and hence greater labour market participation) in the realms of entrepreneurship, creative industries, vocational training programmes, in addition to the more prominent 'science, technology, engineering and mathematics' (STEM) education. This is consistent with policies proposed by the OECD and ILO (2014). Yoo (2018) also noted that these policies were useful in improving youth labour force participation in the People's Republic of Korea. In this particular case, the programme was also expanded to ensure the minimisation of mismatches between skills and employment opportunities. Also, are less academically inclined students could be allowed to enter the labour force earlier via apprenticeship programmes. Notably, the literature suggests that in Europe, this practice had varying results, particularly in the aftermath of the global recession (Blossfeld (2019); Scherer (2005)). While creating opportunities is essential, it is also imperative that these avenues are reachable and accessible to different strata of the population. In this regard, there is an opportunity for private-public partnerships in education and training. Private sector firms can invest directly in the development of human capital through funding of niche or specialised programmes that specifically relate to the work undertaken at these firms, which can act as a training ground for youth employment back into these same firms. Shankar et al. (2016) noted the potential usefulness of such collaborative efforts in curbing youth unemployment in South Africa. The authors, however, identified the need for buy-in, particularly in the profit- driven private sector. Early entry of youths into the labour force can also be facilitated by adopting a merit-based approach to subsidising tertiary education. This will allow those not academically inclined to enter the labour force earlier.

Regarding female participation, the impact on potential output strengthens over the long run. Notably, the impact is not as pronounced as in the youth-only iteration of the model but far more pronounced than in the male-only iteration. Notwithstanding, the results allude to a positive impact on potential output via improved female labour force participation. Policy action should therefore support this. The Government can consider providing childcare subsidies to low-income households for young children within a stated age bracket. In an analysis of seventeen

OECD countries, Jaumotte (2013) suggested that this could improve female labour force participation, which was further supported by Thévenon (2013). Consideration can also be given to increasing the length of paternity leave to equalise the economic costs of hiring women (for paid maternity leave). Implementing more flexible working arrangements with initiatives such as a work from home policy may also help attract greater participation from women who have to weigh the opportunity cost of being a homemaker versus entering into more traditional types of labour. Furthermore, the Government could consider amending the Equal Opportunity Act (2000) to include that men and women should receive *equal remuneration for work of equal value*. Mahabir and Ramrattan (2015) noted that, at the aggregate level, there appears to be a significant difference between male and female wages in Trinidad and Tobago. Data on the average monthly wages by gender in Trinidad and Tobago from 2011 to 2016 (see **Appendix A.2)** confirms that the gap widened over time. In this vein, amendments to the Act may aid in closing the gender wage gap and incentivise greater female labour force participation.

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## Appendix 1: Diagnostic and Stability Tests

A.1.1 Descriptive Statistics of the Model Variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
WTI (Log)	3.582	3.448	4.602	2.669	0.597	42
Total Investment (Log)	9.300	8.980	10.449	8.261	0.876	42
Potential Output (Log)	11.504	11.499	12.071	10.907	0.462	42
Total Labour Force Participation Rate	60.073	60.250	63.900	54.800	2.212	42
Female Labour Force Participation Rate	46.132	46.880	53.140	37.420	4.923	42
Youth Labour Force Participation Rate	49.071	50.558	55.580	35.300	5.089	42
Male Labour Force Participation Rate	74.167	74.545	82.020	63.100	4.514	42

A.1.2 Stability Test
The model estimated for the Labour Force Participation Rate is stable (stationary) if all roots have modulus less than one and lie within the unit root circle.

Inverse Roots of AR Characteristic Polynomial
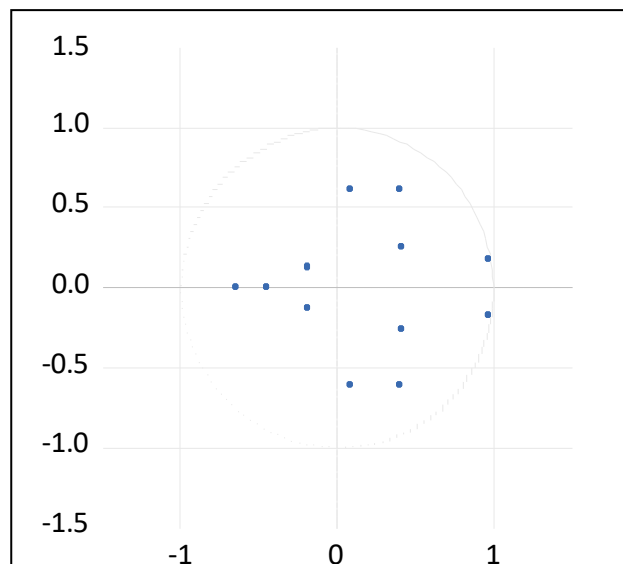
Source: EViews 11

A.1.3 Test for Lag Length
Although AIC and FPE suggest a VAR(4) model, a VAR model with 3 lags was selected instead to ensure no heteroscedasticity and serial autocorrelation among the residuals.

Lag	LR Test Statistic	Final Prediction Error	Akaike Information Criterion	Schwarz Information Criterion	Hannan-Quinn Information Criterion
0	NA	1.20e-06	-2.282	-2.108	-2.221
1	130.600	4.84e-08	-5.498	-4.628	-5.192
2	165.436	3.23e-10	-10.542	-8.975	-9.99
3	**48.191***	1.12e-10	-11.685	**-9.421***	**-10.887***
4	21.117	**1.10e-10***	**-11.876***	-8.916	-10.832

Source: EViews 11
Note: Bold cells refer to the lag length selected by the criterion.

A.1.4 Test for Heteroscedasticity – VAR(3)

Chi-sq	P-value
259.659	0.183

Source: EViews 11
Note: Null hypothesis significant at 1, 5 and 10 per cent levels.

A.1.5 Test for Serial Correlation – Var(3)

Lag	LRE- Stat	Prob.
1	**24.625**	**0.077**
2	**23.585**	**0.099**
3	**21.595**	**0.157**

Source: EViews 11
Note: Bold cells refer to no autocorrelation for associated probabilities greater than 5 per cent.

A.1.6
Estimated Results of the SVAR Model: Full Sample

| Log likelihood	232.988			
LR test for over-identification:				
Chi-square(1)	3.154		Probability	0.076

Source: EViews 11
Note: Null hypothesis significant at 1 and 5 per cent levels.

A.1.7a
Accumulated Response of Potential GDP - Total Investment and Total Labour Force Participation

Accumulated Response of DLOG(HP_GDP) to Total Investment
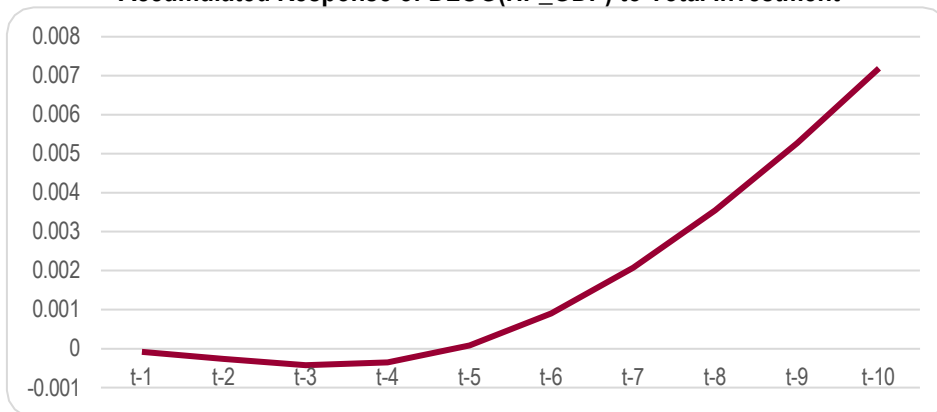
Accumulated Response of DLOG(HP_GDP) to Total Labour Force Participation Rate
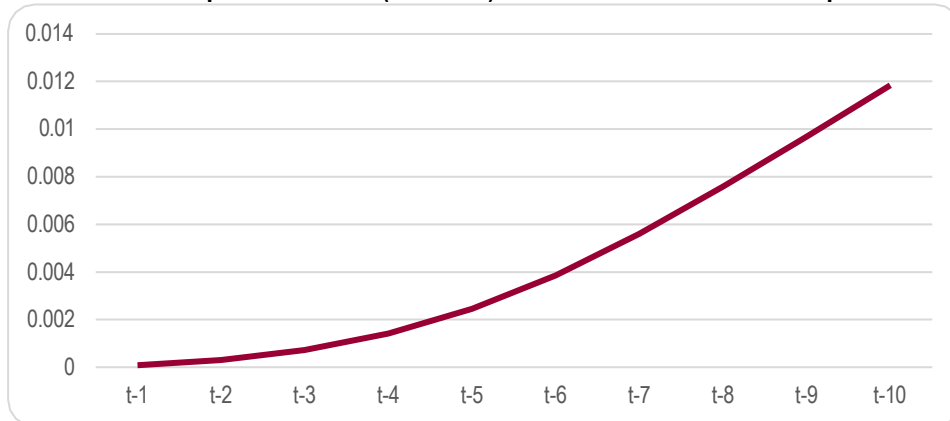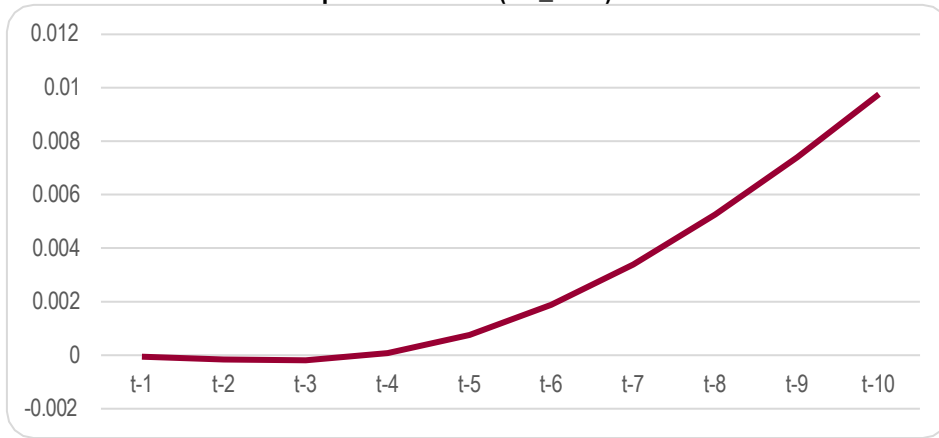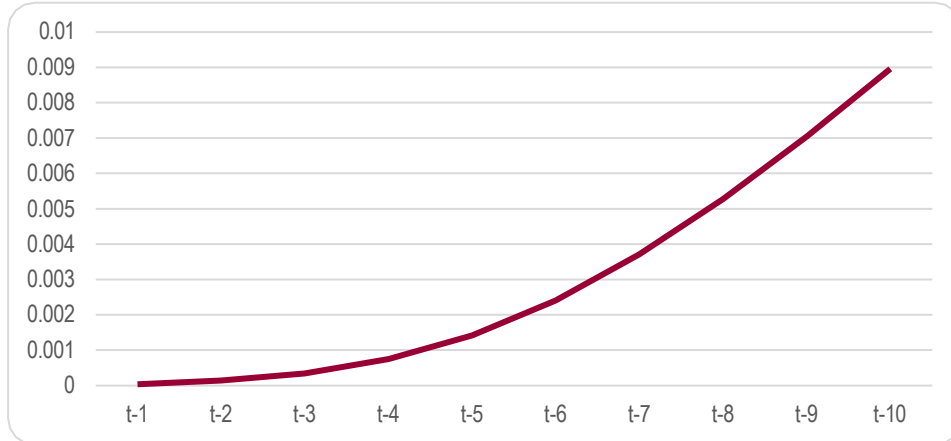

Source: EViews 11

A.1.7b
Accumulated Response of Potential GDP - Total Investment and Female Labour Force Participation

Accumulated Response of DLOG(HP_GDP) to Total Investment

Accumulated Response of DLOG(HP_GDP) to Female Labour Force Participation Rate

Source: EViews 11

A.1.7c
Accumulated Response of Potential GDP - Total Investment and Youth Labour Force Participation

Accumulated Response of DLOG(HP_GDP) to Total Investment

Accumulated Response of DLOG(HP_GDP) to Youth Labour Force Participation Rate

Source: EViews 11

A.1.7d
Accumulated Response of Potential GDP - Total Investment and Male Labour Force Participation

Accumulated Response of DLOG(HP_GDP) to Total Investment

Accumulated Response of DLOG(HP_GDP) to Male Labour Force Participation Rate
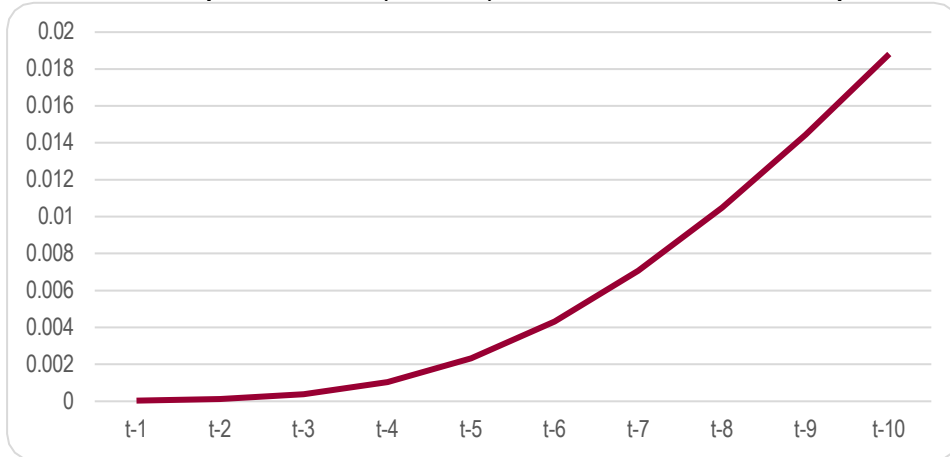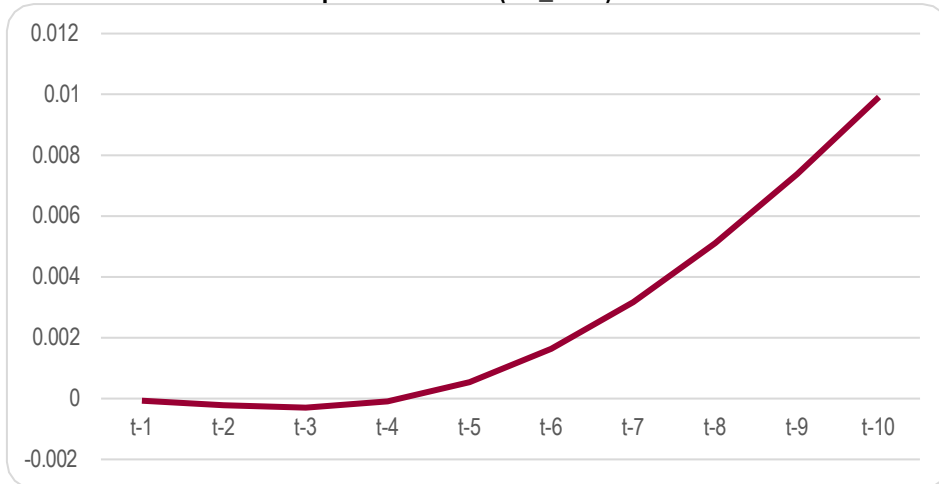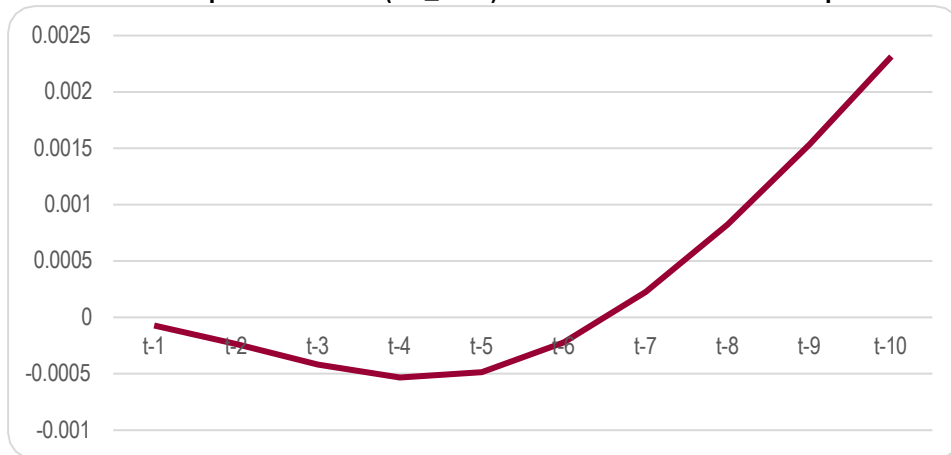

Source: Eviews11

A.1.8a
Variance Decomposition of First Iteration Involving Total Labour Force Participation Rate

Period	WTI	Total Inv	LFPR	HP_GDP
t-1	0.565	9.121	8.803	81.511
t-2	1.125	6.467	9.053	83.355
t-3	1.271	2.844	9.774	86.111
t-4	1.324	1.154	11.676	85.846
t-5	0.907	2.003	13.811	83.279
t-6	0.517	3.982	16.085	79.416
t-7	0.337	6.102	18.048	75.514
t-8	0.310	8.085	19.420	72.186
t-9	0.376	9.927	20.224	69.473
t-10	0.499	11.613	20.669	67.219

Source: Eviews11

A.1.8b
Variance Decomposition of Second Iteration Involving Female Labour Force Participation Rate

Period	WTI	Total Inv	FLFPR	HP_GDP
t-1	1.232	4.445	1.878	92.446
t-2	3.381	2.222	1.926	92.471
t-3	4.860	0.590	2.152	92.398
t-4	6.091	1.259	3.176	89.473
t-5	5.955	3.712	4.513	85.821
t-6	5.265	6.645	6.018	82.073
t-7	4.652	9.239	7.545	78.563
t-8	4.228	11.487	8.808	75.476
t-9	3.937	13.416	9.830	72.817
t-10	3.725	15.065	10.702	70.508

Source: Eviews11

A.1.8c
Variance Decomposition of Third Iteration Involving Youth Labour Force Participation Rate

Period	WTI	Total Inv	YLFPR	HP_GDP
t-1	0.769	9.510	1.979	87.742
t-2	7.141	8.152	1.249	83.458
t-3	11.637	5.650	2.983	79.730
t-4	14.152	3.134	6.813	75.902
t-5	14.396	1.613	11.774	72.218
t-6	13.923	0.842	16.950	68.285
t-7	13.248	0.484	21.756	64.512
t-8	12.627	0.331	25.801	61.241
t-9	12.143	0.278	29.127	58.451
t-10	11.761	0.274	31.842	56.123

Source: EViews 11

A.1.8d
Variance Decomposition of Fourth Iteration Involving Male Labour Force Participation Rate

Period	WTI	Total Inv	LFPR	HP_GDP
t-1	0.058	7.824	7.385	84.733
t-2	0.279	4.345	5.237	90.139
t-3	0.275	1.386	2.748	95.591
t-4	0.185	1.176	1.216	97.423
t-5	0.124	3.344	0.577	95.955
t-6	0.515	6.404	0.577	92.505
t-7	1.291	9.369	0.824	88.516
t-8	2.219	12.068	1.102	84.611
t-9	3.191	14.486	1.355	80.968
t-10	4.126	16.603	1.563	77.708

Source: Eviews11

Appendix 2

A.2
Average Monthly Earnings of Employees by Gender in Trinidad and Tobago

	Male	Female	Gap
	Local Currency (TT$)		
2011	5,036.6	4,569.5	467.1
2012	5,243.0	4,475.0	768.0
2013	5,371.0	4,839.6	531.4
2014	5,706.6	5,083.9	622.7
2015	5,822.3	5,224.6	597.7
2016	6,075.6	5,369.6	706.0

Source: International Labour Organization