THE TWIN DEFICITS AND THE NEW CAMBRIDGE APPROACH: ESTIMATING THE PRIVATE EXPENDITURE EQUATION FOR BRAZIL (2001-2018)

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Abstract

The twin deficit hypothesis is a theoretical proposition that seeks to establish the causal relationship between the public budget and the external sector's balance, the current account balance. Empirical studies try to gauge the causal relationship between the two balances, but the evidence does not form a consensus. This paper provides a critique of the methodology of such estimations, which do not elaborate on empirical, theoretical and methodological arguments to construct the econometric models for estimations. Conversely, we provide an alternative approach based on the modern New Cambridge approach, which does not assume the private sector as constant over time, to estimate a private expenditure equation for Brazil using quarterly data from 2001 to 2018. Results found agree with the critique to not assume the private sector as constant when constructing econometric models for Brazil in attempting to gauge at the causal relationship between the public budget and the current account balance. The private sector expenditure proves statistically significant with the stock of financial assets, stable relationship between private expenditure and private disposable income of the New Cambridge hypothesis, and that the housing sector is important in explaining private expenditure in the long run for Brazil.
Keywords: Twin deficits hypothesis; New Cambridge approach; Private expenditure estimation.
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1.   Introduction

The twin deficits hypothesis is a theoretical proposal that has influenced many empirical studies in different countries around the world. These studies attempt to provide estimations that try to test whether there is a causal relationship between the public budget and the current account balance of an economy and, if there is, what the direction of this causal relationship is or even if it is bi-causal.

These studies provide insightful and important evidence for discussing the twin deficits hypothesis, but they generally do not elaborate on theoretical, empirical, or methodological issues. Usually, these empirical studies attempt to perform sophisticated econometric estimations in an effort to find more robust results for a myriad of different countries, but they never reach a consensus on the twin deficits hypothesis.

This paper provides a critique of the methodology of such estimations, which do not elaborate on empirical, theoretical, and methodological arguments to construct the econometric models for estimations. Conversely, we provide an alternative approach based on the modern New Cambridge approach, which does not assume the private sector as constant over time, to estimate a private expenditure equation for Brazil using quarterly data from 2001 to 2018.

Results found agree with the critique that it is not advisable to assume the private sector as constant when constructing econometric models for Brazil in attempting to gauge at the causal relationship between the public budget and the current account balance, because the private sector expenditure proves statistically significant with the stock of financial assets. Results also demonstrate the stable relationship between private expenditure and private disposable income of the New Cambridge hypothesis and show that the housing sector is important in explaining private expenditure in the long run for Brazil.

The paper is divided into five sections. The first section is this introductory one. The second section presents the traditional interpretations regarding the twin deficits hypothesis and discusses a few of the results of studies on the subject. We then provide a critique of the methodology of these papers and demonstrate an alternative based on the modern New Cambridge approach of empirical stock-flow consistent modeling, based on the three sectoral balances used by Wynne Godley that influenced the models of the Levy Institute and many others based on this modern approach. In the fourth section, we estimate the

private expenditure equation based on this alternative methodology, and in the fifth section the final remarks are made.

2.   The twin deficit hypothesis's traditional interpretations

The twin deficits hypothesis is a theoretical proposition that tries to establish the causal relationship and connections between the public budget and the external sector's balance, the current account balance. Inspired by many standard macroeconomics textbooks and traditional interpretations, it generally states that a worsening of the public budget has a direct impact on a country's transactions with the rest of the world. These interpretations have many arguments and views regarding causal relationships and possible outcomes, and they greatly influence positions on policies inspired by these many assessments.

The different interpretations are twofold, separated into theoretical proposals empirical studies, and econometric estimations that intend to verify which theory finds merit in actual time series verification. When reviewing this subject's works, one notices how there is no consensus regarding this issue, and diverse theoretical interpretations and empirical evidence are provided, which either support or reject many of the underlying arguments posited by the different views. They usually have the starting point of well-known national income identities of systems of national accounts, and with a few theoretical assumptions and algebraic transformations, show how the public sector might affect the current account balance of an open economy.

It is possible to classify the theoretical interpretations into four basic understandings. "(1) budget deficits cause current account deficits, (2) current account deficits cause budget deficits, (3) there is a bi-directional causality between the two variables, and (4) the two deficits are not casually related." (Mukhtar, Zakharia & Ahmed, 2007, p. 64)

The first one is based on a traditional Mundell-Fleming IS-LM-BP open economy macroeconomic model, notoriously used for comparative static exercises in intermediate to advanced level of macroeconomics lectures, that essentially states how the public budget connects to the current account balance of a national economy. The work of Blanchard (1985) is referenced in many of the studies in the area as the model's reference to fundament the methodology for the econometric estimations.

This theoretical relationship defends the causal relationship parting from the government's budget to the current account balance. For this first view, when the public

sector worsens its balance sheet, i.e. spends more than tax revenue and increases the public sector's budget deficit, domestic absorption exceeds domestic savings and, in turn, the domestic economy is not able to respond to the augmented pressure, which stimulates a rise in imports, a deficit in the trade balance and, ultimately, a deficit in the current account balance. This traditional view is common in standard macroeconomics textbooks that teach orthodox Keynesian IS-LM-BP open economy models, and provides a causal relationship between the public budget and the current account balance that is characteristic of the first theoretical view of the twin deficits.

The second view stems from the work of Summers (1988) and advocates a similar interpretation, but on the inverse causal determination, is known as the "current account targeting" view. "According to the "current account targeting" hypothesis (Summers, 1988) the government of a country may resort to fiscal policy to adjust its external position: this leads to a reverse causality nexus, running from the current account to the budget deficit" (Bagnai, 2006, p. 138). Thus, for this interpretation, when the government attempts to use the budget trying to ameliorate the current account balance, the causation is inverted, concerning the first interpretation above.

The third view attempts to showcase how there is a bi-causal relationship between the public budget and the current account balance, and empirical estimations try to demonstrate how there is no possibility of establishing a unidirectional causal relationship because both sectoral balances are underdetermined and intertwined. That is, public budget fiscal policy decisions not only affect but are also affected by the external sector balance. For example, if the government tries to spend on a productive sector that is experiencing capital outflows, foreign direct investment in the same sector can be incentivized.

A fourth and final theoretical interpretation branches from New Classical macroeconomic contributions of Barro (1974) and Buchanan (1976) and is known as the Ricardian Equivalence Hypothesis (REH). They challenge the traditional view and postulate that there is no causal relationship between the public budget and the current account balance in the long run. For this interpretation, any public budget decision regarding fiscal policy is ineffective, because economic agents are rational and are able to anticipate that when the government tries to stimulate economic output by increasing the deficit, for example, this will ultimately result in a tax increase later on, which cancel out the effect. Output is

determined by real business cycles, and economic policy authorities are unable to affect activity by public expenditure decisions, for example.

All of these main interpretations commented above have influenced a profusely fruitful academic production of studies regarding the twin deficit hypothesis, gauging at the issue from these different views. When reviewing these studies, it is possible to note that there is no established consensus among the investigations, each and every one finding results that either support or reject any of the four assessments of this relationship between the public budget and the current account balance. What is striking about many of these empirical investigations is that they usually share a commonality of attempting to provide econometric sophistications to the estimations, but do not specifically try to elaborate more on the theoretical and methodological assumptions of the model.

Bagnai (2006), for example, studies the twin deficits hypothesis for 22 OECD countries and finds results that either support one or other interpretation.

> […] in seven countries (Denmark, Germany, Italy, Spain, Sweden, Switzerland and Turkey) the existence of twin deficits can be ruled out by analyzing the orders of integration of the relevant time series; in another country (Portugal) we are unable to find any evidence of cointegration between the model variables; in Austria and the Netherlands the impact of the budget on the external deficit is statistically insignificant. In the other twelve countries we are able to identify a long-run twin deficits relation, and in ten out of these twelve countries the relation becomes statistically significant only once the presence of structural breaks is taken into account. (BAGNAI, 2006, p. 152)

Kalou and Paleologou (2012) find evidence that supports the Current Account Targeting for Greece. Araujo et al. (2009) provide results for Brazil that are consonant with the first traditional view, that public deficits cause external deficits. Baharumshah, Lau and Khalid (2006) also find results that concur with the Keynesian orthodox traditional view for Asian countries. Alternatively, Ganchev, Stavrova and Tsenkov (2012) test the twin deficit hypothesis for Central and Eastern European countries using VAR analysis and panel data estimations, stating that "we can conclude from VAR analysis, that the twin deficit hypothesis cannot be confirmed in the narrow sense" (Ganchev, Stavrova & Tsenkov, 2012, p. 15), and "it does not confirm the existence of robust positive relationship between the current account and the fiscal balance but rather the opposite. […] At this stage the rational expectations and structural gap theories seem to be a better explanation of the existing data than the twin deficit hypothesis" (p. 16).

Mukhtar, Zakharia & Ahmed (2007) test the twin deficits hypothesis for Pakistan, finding evidence of cointegration between public budget and current account balance and also assessing that the results confirm a bi-directional causality for the two balances. Normandin (1999) considers the case for the US and Canada, studying how birth rates might affect the public budget and then the current account balance, finding evidence that the effect of birth rates is small despite being statistically significant, and that the public sector budget persistence is important to understand the behavior of the current account balance, in consonance with the orthodox Keynesian traditional view. Bird, Pentecost & Yang (2019) studied OECD and BRICS countries and found little evidence of a relationship between fiscal imbalances and current account disequilibria.

Mellini & Silva (2022) also study the case for many countries, but provide an estimation and a Post Keynesian stock-flow consistent dynamic model to test the twin deficits hypothesis. They also find empirical support for the traditional Keynesian view, but defend that for Post Keynesians the twin deficits do not arise from lack of domestic savings, but because of fiscal policies that are incompatible with external equilibrium.

This paper attempts to tackle this issue from a different angle. Our interpretation is that, although the empirical studies are extensive and provide insightful and important evidence for the debate, they usually do not extend the arguments and basically jump right to the empirical and estimation studies. When reviewing a few of the papers on the subject, we reckon that they are lacking discussions in three aspects: the theoretical discussion of comparative static exercises, the theoretical discussion regarding the direction of causality that is the core of Post Keynesian critique, and a fundamental methodological assumption that makes all the difference for building the model, but without providing relevant empirical stylized facts that support this assumption.

The first discussion lacking from studies of the twin deficits hypothesis regards the theoretical discussion with comparative static exercises typical of Mundel-Flemming macroeconomic models, such as provided by Resende (2009). The author extends a thorough theoretical discussion on the model using these exercises but considers an array of different scenarios that have important implications for the model's results. To summarize, Resende (2009) considers the fiscal and monetary policy implications in an economy, in scenarios of full employment and below full employment, with full or null capital mobility, and in fixed and flexible exchange rate regimes. According to the theoretical discussion in Resende

(2009), the twin deficits hypothesis only holds in scenarios of fixed exchange rates on full employment economies with full or null capital mobility; and for the case of flexible exchange rates, only in the case of full employment economies with full capital mobility.

A few of the studies on the twin deficits hypothesis commented above test the causality not only for one country, but for a dozen or even more countries. These countries probably do not experience the same level of employment, exchange rate regimes or capital mobility for the extended period of the estimations, and this issue should be accounted for when attempting to study a hypothesis for different countries and economies.

When this theoretical discussion is taken for granted, the studies on the twin deficits hypothesis also accept many of the traditional macroeconomics views at face value. One of these assumptions is that the direction of causality, when constructing the national income model parting from the initial identity, runs from savings to investment. This is a fundamental critique of Post Keynesian interpretations because it inverts the causality and ignores the Principle of Effective Demand. Savings are a net result of expenditure decisions and, so, cannot be constructed in an empirical model as the determinant of expenditure, but rather as determined *ex post* by the expenditure decisions. In that way, it is no surprise for Post Keynesian authors to note that these studies are unable to pinpoint the direction of causality with the empirical estimations.

Lastly, one important assumption of the model is very important for the construction of the empirical estimations and constitutes the critical starting point of this study. To establish the causal relationship between public budget and current account balance, one has to assume that the private sector balance is constant over time. This is an assumption notorious of the 'New Cambridge' approach of Prof. Wynne Godley in the Cambridge Economic Policy Group in the 1970s, which attempted to assess the policy implications of the public budget in the external sector for the UK economy.

The original New Cambridge hypothesis assumed a direct connection between private disposable income and private sector expenditure (the sum of families' consumption and firms' investment). If this relationship is stable over time, it is possible to assume that the private sector does not fall into deficit or surplus territory in the long run and can be regarded as constant – it means that the private sector's net acquisition of financial assets is close to zero. With this assumption, it is possible to try and understand how the public budget and the external sector balance are connected over time, which is what the studies

commented above attempt to do. Our understanding is that this assumption started to be challenged even by Godley in the 1980s and, when working in the Levy Economics Institute of Bard College in the US, in the 1990s, this assumption did not make sense anymore when observing how the private sector in the US kept deteriorating more and more, increasing the potential for financial instability in the 2000s. We will elaborate on this argument henceforth.

3. An alternative New Cambridge approach: the methodology for estimating the private expenditure equation

When developing the methodology for studying the twin deficits hypothesis, studies part from the simple national income identity from the expenditure approach. Let us follow the simple equation of the classic New Cambridge approach. "New Cambridge School emphasized the role of the private sector's marginal propensity to spend" (Ganchev, Stavrova & Tsenkov, 2012, p.3)

$$(M - X) = (A_p - Y_p) + (G - T) \qquad (1)$$

In which M are imports, X are exports, A_p is domestic absorption, Y_p is national income, G is government expenditure, and T is tax revenue. "The New Cambridge School assumes that the private sector maintains a constant proportion of its net financial assets in relation to disposable income" (Ganchev, Stavrova & Tsenkov, 2012, p. 4). With this assumption, the relationship between internal absorption and private disposable income – that is income after taxes and transfers, "the relationship between expenditure and income in the private sector is derived from a ratio between the stock (net financial assets) and flow (disposable income)" (Ganchev, Stavrova & Tsenkov, 2012, p. 4).

When this happens, "the marginal propensity to spend equals unity, i.e. disposable income is equal to expenditure" (Ganchev, Stavrova & Tsenkov, 2012, p. 5) and we can rewrite equation (1) as:

$$(M - X) = (G - T) \qquad (2)$$

"In other words, the (internal) fiscal deficit equals the (external) current account deficit" (Ganchev, Stavrova & Tsenkov, 2012, p. 5). That is the core of the twin deficit hypothesis. However, "a modern variant of the New Cambridge School is not limited to the

twin deficit hypothesis and is based on a more general concept of so-called stock-flow consistent models" (Ganchev, Stavrova & Tsenkov, 2012, p. 5).

This modern variant developed in the Levy Institute when Wynne Godley moved to the US and was able to track many of the unsustainable processes that ultimately led to the financial collapse in 2007-8, commented in Godley (1999), for example. We will inspire from this modern variant and dismiss the assumption that the private sector will be constant over time; with this, net acquisition of financial aspects can be either positive or negative in the long run, and the twin deficits might emerge but not with a direct link between them. Instead of estimating the relationship between the public budget and the external sector balance, we will estimate the private expenditure equation as discussed by Anyadike-Danes (1982) inspired by Godley & Cripps (1983), the core of empirical stock-flow consistent models based on the three sectoral balances of the economy.

We follow Macedo e Silva and Dos Santos (2011) for a simplified guide to the Financial Balances, which explains the dynamics of interaction between institutional sectors and underpins the method. Being this a Keynesian model, we start from the GDP from the demand perspective:

$$Y = C_p + I_p + C_g + I_g + X - M \qquad (3)$$

Where Y is the national income, C_p and I_p are private sector consumption and investment, C_g and I_g are public sector consumption and investment, X is exports, and M is imports. We assume three sectors, which constantly conduct unilateral transfers and each sector makes payments to the other two. (Macedo e Silva & Dos Santos, 2011)

Assuming now that:

a.   T are taxes paid by the private sector to the government, minus net transfers from the government to the private sector, minus net property income paid by the government to the private sector;

b. Tr_{ge} are the net unilateral transfers from the government to the external sector plus the net property income paid by the government to the external sector;

c. Tr_{pe} are the net unilateral transfers made by the private sector to the external sector plus net private property income paid to the external sector;

We can rewrite (3) as:

$$Y - T - Tr_{pe} \equiv C_p + I_p + C_g + I_g + Tr_{ge} - T + X - M - Tr_{pe} - Tr_{ge} \qquad (4)$$

Identity (4) implies:

$$(Y - T - Tr_{pe} - C_p - I_p) \equiv (C_g + I_g + Tr_{ge} - T) + (X - M - Tr_{pe} - Tr_{ge}) \qquad (5)$$

Note that each of the three "brackets" in (5) basically represents the net balance sheet for the private, public and external sectors of the economy, respectively. Assuming, then, that:

a.   The Private Financial Balance is: $PFB = Y - T - Tr_{pe} - C_p - I_p$;

b.   The Government Financial Balance is: $GFB = T - C_g - I_g - Tr_{ge}$;

c.   The Current Account Balance is: $CAB = X - M - Tr_{pe} - Tr_{ge}$;

d.   Private Savings are: $SAV_p = Y - T - Tr_{pe} - C_p$;

e.   Government Savings are: $SAVg = T - C_g - Tr_{ge}$;

We can interpret (5), equivalently, as $PFB = -GFB + CAB$, that is, that the private balance sheet is equal to the sum of the public deficit to the current account result; or also rewrite (5) as:

$$SAV_p - I_p = -(SAV_g - I_g) + CAB \qquad (6)$$

Equation (6), as Macedo e Silva and Dos Santos (2011) show, is the well-known accounting fact of the national accounts system, which is always true that total savings equals total investment in any economy[1] – the left term, private savings net from investment is also the private balance sheet, equivalent to the terminology used in Zezza (2009) as net acquisition of financial assets. The private sector in the model encompasses the net equity results of households, firms and the financial sector, in which the financial sector conducts private sector financing. Thus, the balance sheet can take the positive form of savings, which is equivalent to interpreting in the form of retained earnings, whether in profits for firms, gains in stocks for households or in financial assets for financial institutions.

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[1] Note, too, that it is a result almost identical to the logic underlying the Kaleckian equation of profits ($P = I + C_k$), which is very famous in his analysis; the model thus has an important approach to the problem of financing for the growth of capitalist economies. The equation is also used in Minsky's (2015) study of the financial instability hypothesis, but expanded from Kalecki for an open economy with a substantial government.

What is the "norm" that establishes the relationship between period-by-period spending and disposable income that demonstrates a constant ratio of why the potential for fragility of economic sectors might not present itself?

The starting point is the observation of the private sector net income, period by period, in the form of equation (1) and its underlying logic. Following Zezza (2009), PE is private expenditure, then:

$$PE = f(YD, FA, Z) \tag{7}$$

It essentially depends on disposable income YD, financial assets FA, and the vector of other Z variables, generally modeled for the financial sector, loans, financing, and debt. The essence of the model is precisely to understand which financial sector-related Z-vector variables can explain private sector spending and to check for evidence of potential financial instability. This vector can vary drastically from one economy to another, given the historic trajectory and institutional archetype, which shapes the whole economic dynamics of each particular nation. For a developed country, over appreciated assets might be the unstable aspect, for example; for another, it might be the elevated private indebtedness; or, also, the over appreciation of real estate (bubbles that can trigger off financial crises).

How does equation (7) establish a stock-flow consistency direction? The logic resembles that of equation (1). If we abstract Z and capital gains, we assume a linearization that implies net equity income, as shown by Zezza (2009):

$$FA = FA_{t-1} + YD - PE \tag{8}$$

Adding now FA_{t-1}, we have the stock of financial assets from the previous period or the initial value of the stock of financial assets in the period. At steady state, this relationship grows steadily, with $FA = FA_{t-1}$; this implies $YD = PE$, and a constant ratio of disposable income to stock of financial assets. Therefore, the private sector is thought to be independent in the "New Cambridge" approach within this idea, as the sector could adjust to shocks through this ratio of income to assets. (Zezza, 2009)

Zezza (2009) then derives the results of steady-growing financial assets:

$$FA = (1 + g). FA_{(t-1)} \tag{9}$$

With g representing the steady growth rate of financial assets. Assuming a linear relationship between YD, FA and PE, and using (9) in (8), we have:

$$PE_t = \beta . YD_t + \gamma . FA_{t-1} \qquad (10)$$

Rearranging, that gives us:

$$\frac{YD}{FA_t} - 1 = g + \frac{\gamma}{1} - \beta \qquad (11)$$

Equation (11) is the general "norm" known as the "New Cambridge" hypothesis. In it, note that with steadily growing rates, the private sector maintains a stable disposable income ratio to its initial stock of financial assets. In the model, the research aims to verify, for example, whether real stock prices and private debt are growing beyond disposable income, which would cause destabilization of the income / asset ratio - which is to say that less spending is being directed towards the acquisition of real assets and more expenditures are intended for the financial sector, in the form of high valuation of its assets, whether equity interests, loans, financing.

Additional credit-related variables may vary the "norm" continuously and may even hinder economic growth over several periods. In the real-financial integration of the model, the approach can capture, mainly, as shown by Nikiforos & Zezza (2018), transactions such as:

a.   Stock implies income flow between debtor and creditor;

b.   New credit flows impact on private expenditure;

c.   The final wealth stock (which may also be debt) impacts on subsequent saving and spending.

The "New Cambridge" approach, therefore, focuses on net equity changes and subsequent changes that impact portfolio decisions. (Nikiforos & Zezza, 2018)

The difficulties of pursuing a line of research in this regard exist. Data unavailability, for example, may be the most important to highlight. As shown by Nikiforos & Zezza (2018), the approach has guided some work as for Denmark (Godley & Zezza, 1992), for the USA (Godley, 1999; Zezza, 2009) and Greece (Papadimitriou, Nikiforos & Zezza, 2013). Some other applications for Europe use calibration and simulation tools, rather than the fully empirical of the first models.

4.   Estimation and results for the Brazilian case

We refer first for a qualitative analysis of the time series data for Brazil using stylized facts. Observing Figure 1 bellow, it is possible to view how the crisis struck in Brazil from 2015. Private expenditure (consumption plus investment) and disposable income[2] demonstrate a close relationship during the period, as expected. Both followed a clear upward trend from 2001 to 2014, with the exception for 2008 in the GFC. Nonetheless, the steep fall was followed by a recovery in 2010, even surpassing pre-GFC disposable income – private expenditure recovery at the same time might be a result of active fiscal policy in the period, which intended to quickly repel the GFC's negative economic effects by stimulating the private sector (subsidies for main industries such as home appliances and auto industry, and increased unemployment insurance to prevent family's consumption to plunge during the crisis given rising unemployment).

After 2010, the government's understanding was that it was necessary to reduce intervention in the private sector which would allow for private investment to champion the economic recovery of the decade. The government reduced public investment and spending, and instituted tax exemptions to reduce employer's costs with employability bureaucracy. Interest rates remained elevated, but inflation did not give in in 2014, and the economy entered a recession. Instead of utilizing fiscal policy like in the post-GFC, fiscalist analyses proliferated, cementing the idea that the irresponsible government spending caused the recession and inflation. So, to combat the recessive scenario, the government launched an "expansionist austerity" in 2015, with profound fiscal adjustment and rising interest rates. Observing Figure 1, this strategy was unsuccessful in encouraging economic growth, causing a significant sacrifice ratio in the economy.

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[2] All data is deflated by the consumer price index IPCA and are transformed in indexes for better graphical representation and estimation.

Figure 1- Real Private Expenditure and Disposable Income – Brazil Quarterly 2001-2018
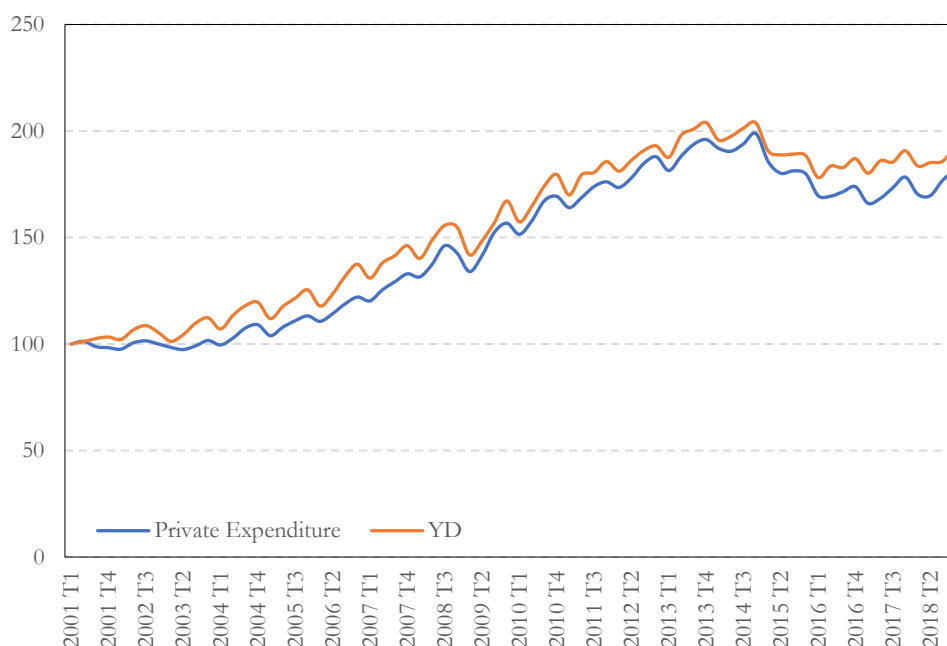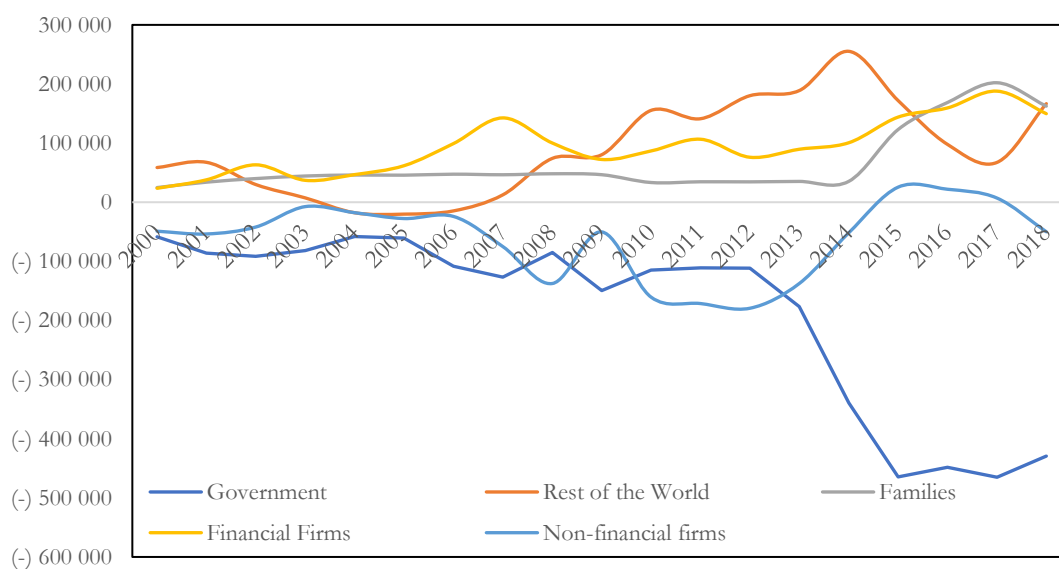

Source: own elaboration from Ipeadata's data.

It is also worthy of arranging a comparative exercise with other empirical SFC analyses, which are discussed in Zezza and Zezza (2019), for countries like the USA, Greece, and Equator. Zezza (2009) constitutes the main applied SFC approach in which we are based on, that identify unsustainable processes for the US economy that were already pointed out by Godley (1999). One of those is observing how private expenditure time series data, in many quarters, surpassed disposable income in the US. This was rendered as a first red signal for the analysis, since it is not common for the macroeconomic private sector to spend beyond the disposable income, consistently over time. Additionally, rising private indebtedness also flagged the potential instability in the US economy, observing how the private sector net results for the quarter were progressively negative, indicating a growing debtor position of families and firms in the US.

Observing Figure 1, however, it is possible to see how the situation for Brazil is not the same. In the case analyzed here, private expenditures actually remains consistently below disposable income for the period 2001-2018. This fact could indicate that financial instability is distant from the Brazilian economy. Other data visualization, nonetheless, might indicate different but troubling facts for the investigation.

The sectorial net results from Figure 2, for example, provide further evidence for troubles in the Brazilian private sector. First, we want to highlight how, the more we deepen the analysis, the approach to Minsky (2015); it is clear how the government, from 2012 onward, worsened its results while recuperating the situation of non-financial firms' negative results since 2005 (worsened from 2008). The question of "Can it happen again?" from Minsky (2015) is answered by the fact that the government guarantees the results of the private sector by increasing deficits and negative net results – at the same time this happens, in Brazil, families and firms' net results become increasingly positive. Evidence for a Minskyan moment for the Brazilian economy is strong in this matter.

Another point that needs to be raised is how financial firms are basically untouched for the entire period. This might be for two reasons: the net result is liquid of investment, and financial firms are the sector that least participates in gross fixed capital formation; also, banking in Brazil is very oligopolized, consisting of few private banks that concentrate a great share of credit for the private sector – in turn, banking spreads are elevated in Brazil, as we can see in Paula (2017). Even when indebtedness and high interest rates impede increasing credit, banks can protect their earnings through daily liquidity fixed rate assets such as LFT bonds and interbank deposit certificate equity.

**Figure 2-** Brazil Sectorial Net Balance Result – 2000-2018 (R$ millions)

Source: own elaboration from IBGE/SNA data.

Families and firms had had growingly negative net results, but at the same time private expenditure did not match entirely disposable income. This makes one question where disposable income was directed, if not for consumption and investment.

Observing Figure 3 below, more insights about the private sector arise. The price of financial assets is given by the median of Ibovespa, the Brazilian stock exchange index, being compared with private expenditure, disposable income and the price of housing. One can note how the price of financial assets soared pre-GFC, and have never recuperated their price level since 2008. The results post-financial crisis greatly created a boom in the stock market, way over private expenditure and disposable income, which quickly plunged after the economy was not able to maintain the results after 2010. One important argument for the broken transmission channel of monetary policy in Brazil is that asset prices may not influence private demand as much as regarded by the monetary authority, remembering figure 1.

Figure 3- Comparison between private expenditure, disposable income, Ibovespa's index and housing prices – Brazil Quarterly real indexes (2001-2018)
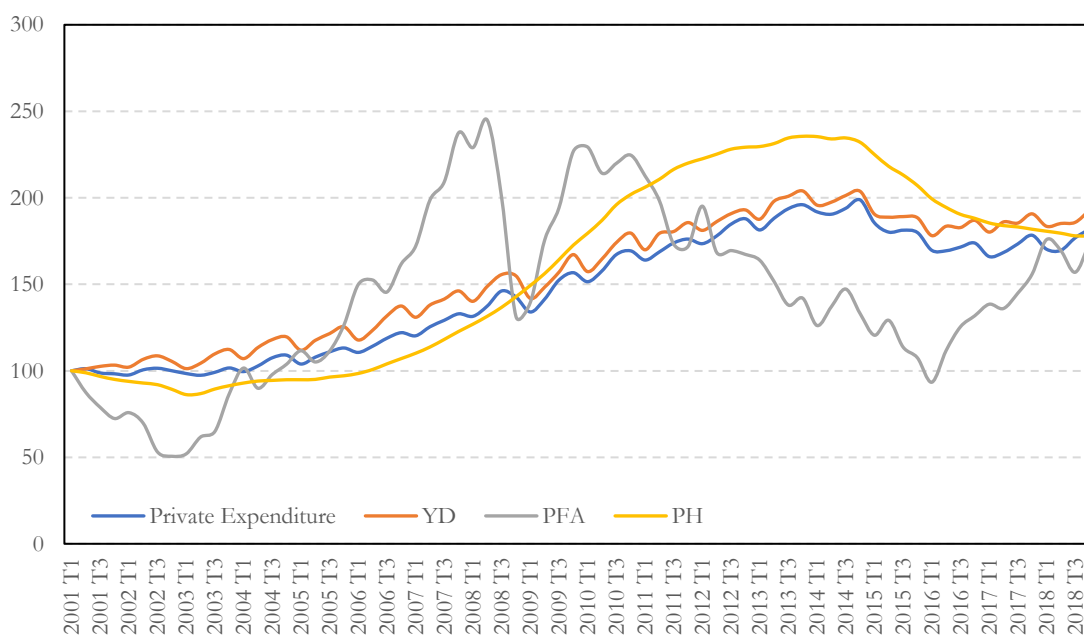
Source: own elaboration using data from Ipeadata, CBB and Bank of International Settlements.

Another possible cause for financial instability can be seen by observing the trajectory of housing prices. Steadily growing pre-2008, housing prices soared beginning in 2010, plunging drastically from 2015 together with the crisis. Civil construction is a very important

sector in Brazilian economic activity that was heavily encouraged by the government from 2009 through popular housing programs and, observing the data, took a substantial hit with the 2015 political and economic crisis in Brazil.

Lastly, there is a need to address the indebtedness issue for Brazil. We have seen earlier in the section how government, families, and non-financial firms accumulated significant negative results through the period. The government worsened its own result, in order to recover the private sector which, in turn, has not been able to champion an economic recovery – fiscal adjustment has been the order since the 2015 crisis, and even lowering interest rates have not sufficiently aided the economy.

In our understanding, the state of monetary dominance is disadvantageous for the Brazilian economy; the public sector has given up on active fiscal policy, but with the crisis, tax revenues also plummeted during the period. Even though the public sector has been increasingly indebted, private consumption and investment have not recovered from the crisis. Also, even though families and firms have been increasingly indebted, private expenditure does not rise accordingly. Our hypothesis is that indebtedness is more related to high interest rates, rather than excessive spending. Unable to solve the indebtedness, public and private sectors have been constantly hindered by their financial commitments, which period by period prevents income from being directed to consumption and investment.

The stock of financial assets in Figure 4 is composed of the public sector net debt and the external sector net result. In countries such as Equator, the public sector is actually a surplus instead of a deficit, with the external sector highly composed of foreign currency (dollar) from oil. For Brazil, the public sector is greatly indebted, but our SFC approach does not focus only on the primary deficit, but the net result, for a representation of the financial commitments of the public sector beyond net borrowing, because of the participation of LFT bonds in the public sector net debt.

Figure 4- Private expenditure, disposable income, stock of financial assets, stock of firms' indebtedness and families' indebtedness – Brazil, Quarterly Data (2001-2018)
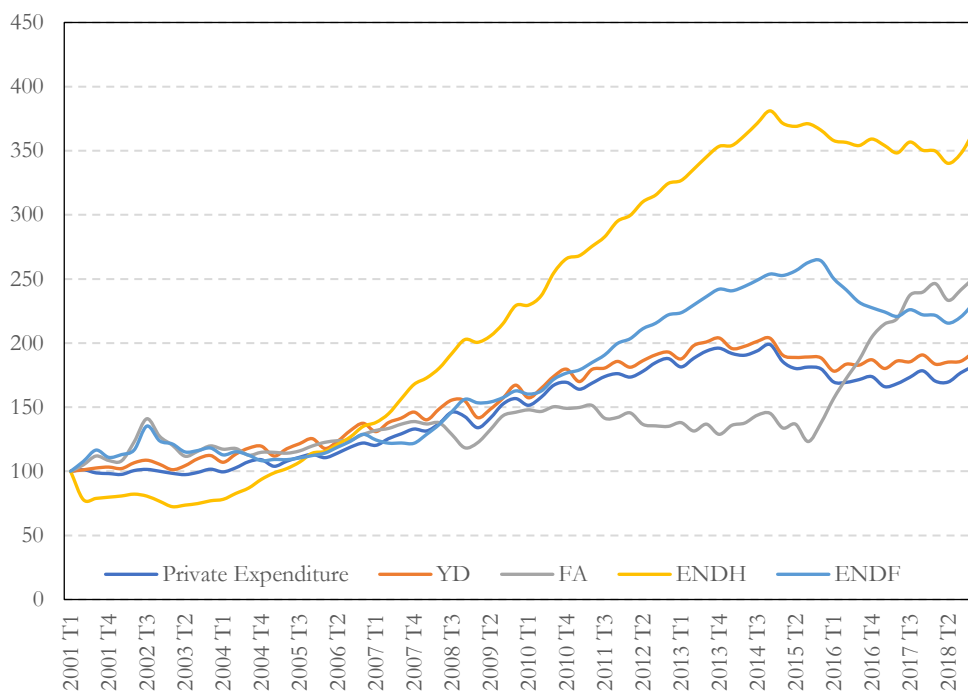
Although the wealth effect normally is highlighted by orthodox fiscalist authors, data from 2001 to 2015 suggest otherwise. The public sector actually did not keep an unstable trajectory with the private sector, beginning over indebtedness with the 2015 crisis – and even so, unable to encourage the private sector by increasing public debt. It seems that the wealth effect is not capable of affecting private demand.

But the visual representation that jumps the eye is the stock of private indebtedness. Firms have been struggling with debt since 2010, but families started as early as 2007. With the crisis, a slight downward trend for private indebtedness follows. Our main observation is that stock-flow relationships are less important than flow-to-flow relationships when understanding private demand. Even when debt stock is rising, this is not matched, in Brazil, by rising spending. Further examination upon flow-to-flow relationships (such as regarding assets prices and interest rates) is needed to comprehend how indebtedness elevated so significantly, but not necessarily followed spending.

We estimate a private expenditure equation for the case of Brazil, with quarterly data from 2001-2018 (72 observations), to better comprehend the challenges of the Brazilian economy in the 21st century. Our objective is to show how the stock of financial assets

influences private expenditure decisions alongside the private disposable income; in that way, it is not advisable for twin deficits hypothesis empirical verifications for the case of Brazil.

Figure 5- Visual representation of time series data for the Private Expenditure estimation for Brazil – Quarterly (2001-2018)
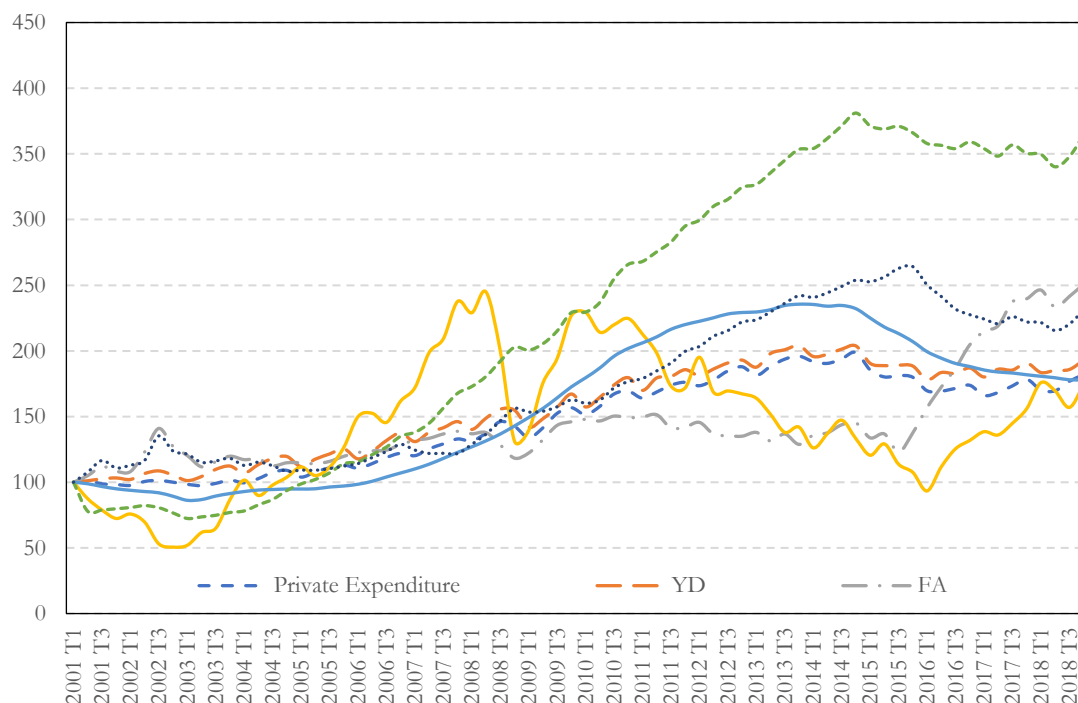
Source: own elaboration from data by IBGE, Ipeadata, CBB and BIS.

Figure 5 above shows the time series data for the econometric estimation. It is possible to note how virtually all data show an unstable relationship between income and private expenditure. Our purpose in estimating is to measure how the instability may be arising. For the US economy, for example, financial instability came from a financial bubble of soaring prices of financial assets. Appendix A shows more detailed information regarding the econometric steps that are discussed in this session.

Data are derived from Applied Economic Research Institute (IPEA)/Ipeadata, CBB Time Series Generating System, Bank of International Settlements (BIS) data, and the Brazilian Institute of Geography and Statistics (IBGE). All data is deflated by the consumer price index (IPCA) by IBGE, and are in indexes with 2001 as baseline = 100.

We conducted ADF-GLS (Elliot, Rothenberg & Stock, 1992) and KPSS (Kwiatkowski, Phillips, Schmidt, Shin, 1992) unit root tests, conjunctly, to check for first-difference stationarity, as reported in Appendix B, rejecting the idea that the series are integrated of second order I(2).

We ran an autoregressive distributed lag (ARDL) model. Correlogram statistics suggest no evidence of autocorrelation, and the F-statistics of the bounds test strongly suggest for rejecting the hypothesis of "no long-run relationship". The output and tests are reported on Appendix A.

The results for the ARDL model agree with many arguments previously discussed. A rise in disposable income of 1 index point generates a rise of 0,5 index point in private expenditure – way below models for other countries like USA (Zezza, 2009), Greece (Papadimitriou, Nikiforos & Zezza, 2013), Denmark (Godley & Zezza, 1992), or the UK (Anyadike-Danes, 1982). We expected a greatly closer relationship between these two variables, but maybe disposable income is "leaking" from the real to the financial sector, so further studying is required.

The price of financial assets, as well as firms' and households' indebtedness, do not greatly explain the private expenditure of Brazil. This could mean that the Brazilian financial system still needs to be better developed, since private equity does not augment expenditure significantly in the long run, despite the statistical significance.

The stock of financial assets in the model is the sum of the public sector deficit and current account balance. The stock of financial assets contributes to private expenditure in a proportion related to the other private expenditure equations mentioned above. This means that domestic and foreign financial assets are important to understand the dynamic of the private sector in the long run, so estimations that assume the private sector as constant are unfit for estimations.

Also, further investigation is needed to comprehend the low importance of stock-flow relationship to explain private expenditure, rather than significant flow-to-flow importance through disposable income and also by housing prices, in which a 1 index point rise means a 0.1 rise in private expenditure. This demonstrates how important the civil construction sector is important for the Brazilian economy, and might help explain the difficulty of a recovery, since housing prices have not recovered since the crisis. It is still required, as well, to add an external sector analysis to comprehend best the behavior of the private sector, because of the importance of commodities in the Brazilian balance of trade and the exchange rate importance for inflation.

5.   Final Remarks

This paper provided an alternative approach by the estimation of a private expenditure equation for Brazil. Traditional studies on the subject of the twin deficits hypothesis usually assume the private sector as constant and attempt sophisticated econometric estimations trying to gauge at the causal relationship between the public budget and the current account balance.

These estimations are based on four traditional macroeconomic interpretations of the twin deficits hypothesis. The first one is based on a traditional Mundell-Fleming IS-LM-BP open economy macroeconomic model and defends the causal relationship parting from the government's budget to the current account balance. For this first view, when the public sector worsens its balance sheet, i.e. spends more than tax revenue and increases the public sector's budget deficit, domestic absorption exceeds domestic savings and, in turn, the domestic economy is not able to respond to the augmented pressure, which stimulates a rise in imports, a deficit in the trade balance and, ultimately, a deficit in the current account balance.

The second view stems from the work of Summers (1988) and advocates a similar interpretation, but on the inverse causal determination, is known as the "current account targeting" view. For this interpretation, when the government attempts to use the budget trying to ameliorate the current account balance, the causation is inverted, in relation to the first interpretation above.

The third view attempts to showcase how there is a bi-causal relationship between the public budget and the current account balance, and empirical estimations try to demonstrate how there is no possibility of establishing a unidirectional causal relationship because both sectoral balances are interdetermined and intertwined. That is, public budget fiscal policy decisions not only affect but are also affected by the external sector balance.

A fourth and final theoretical interpretation branches from the New Classical macroeconomic contributions of Barro (1974) and Buchanan (1976) and is known as the Ricardian Equivalence Hypothesis (REH). They challenge the traditional view and postulate that there is no causal relationship between the public budget and the current account balance in the long run. For this interpretation, any public budget decision regarding fiscal policy is ineffective, because economic agents are rational and are able to anticipate that when the

government tries to stimulate economic output by increasing the deficit, for example, this will ultimately result in a tax increase later on, which cancel out the effect.

When reviewing a few of the papers on the estimations of the twin deficit hypothesis, we reckon that they are lacking discussions in three aspects: the theoretical discussion of comparative static exercises, the theoretical discussion regarding the direction of causality that is the core of Post Keynesian critique, and a fundamental methodological assumption that makes all the difference for building the model, but without providing relevant empirical stylized facts that support this assumption. Based on this critique, we build a methodology based on a modern New Cambridge approach, to estimate a private expenditure equation for the case of Brazil from 2001 to 2018.

Results found agree with the critique that it is not advisable to assume the private sector as constant when constructing econometric models for Brazil in attempting to gauge at the causal relationship between the public budget and the current account balance, because the private sector expenditure proves statistically significant with the stock of financial assets. Results also demonstrate the stable relationship between private expenditure and private disposable income of the New Cambridge hypothesis, and show that the housing sector is important in explaining private expenditure in the long run for Brazil.

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Appendix A

Econometric results for estimating private expenditure equation. Unit root tests.

Table 1 – Unit Root tests

	ADF-GLS p-value	KPSS LM statistic
PE	0,1*	0,26***
YD	0,08*	0,31***
FA	0,2	0,29***
PFA	0,00***	0,08***
PH	0,07*	0,48**
ENDH	0,69	0,34***
ENDF	0,21	0,17***

***: statistically significant at 1% confidence level. **: statistically significant at 5% confidence level. *: statistically significant at 10% confidence level.

Table 2 – ARDL (5, 0, 0, 0, 0, 0) model output

	Coefficient	Standard Error	t-statistic	Prob.*
PE (-1)	0,424835	0,066226	6,414954	0,0000
PE (-2)	-0,255007	0,067170	-3,796470	0,0004
PE (-3)	0,149795	0,069285	2,162008	0,0349
PE (-4)	0,195113	0,088890	2,195002	0,0323
PE (-5)	-0,265375	0,066300	-4,002652	0,0002
YD	0,518716	0,054184	9,573257	0,0000
FA	0,006440	0,009191	0,700741	0,4864
PFA	0,017747	0,009714	1,826855	0,0731
PH	0,103530	0,019615	5,277970	0,0000
ENDH	-0,021922	0,007937	-2,762022	0,0078
ENDF	0,082142	0,041562	1,976380	0,0530

Additional Information: R^2: 0,9981; Adjusted R^2: 0,9978.

Table 3 – Correlogram statistics

	AC	PAC	Q-stat	Prob.*
1	0,078	0,078	0,4261	0,514
2	-0,133	-0,140	1,6906	0,429
3	0,166	0,194	3,6758	0,299
4	-0,025	-0,086	3,7225	0,445
5	-0,047	0,020	3,8877	0,566
6	-0,126	-0,184	5,0855	0,533
7	-0,224	-0,188	8,9466	0,257
8	-0,029	-0,032	9,0112	0,341
9	-0,110	-0,138	9,9774	0,352
10	-0,134	-0,064	11,434	0,325
11	-0,185	-0,270	14,255	0,219
12	-0,039	-0,040	14,382	0,277
13	-0,070	-0,250	14,805	0,320
14	-0,121	-0,181	16,089	0,308
15	0,134	-0,013	17,685	0,280
16	0,118	-0,074	18,951	0,271
17	0,094	0,022	19,770	0,286
18	0,091	-0,165	20,553	0,303
19	0,135	0,066	22,308	0,269
20	0,089	-0,169	23,082	0,285
21	0,030	-0,020	23,173	0,335
22	0,060	-0,033	23,549	0,371
23	-0,071	-0,176	24,074	0,400
24	-0,157	-0,221	26,717	0,318
25	0,057	-0,113	27,074	0,352
26	-0,018	-0,031	27,110	0,404
27	0,118	0,181	28,733	0,374
28	-0,076	-0,102	29,409	0,392

Table 4 – Bounds test for long run relationship

Conditional Error Correction Regression				
	Coefficient	Std. Error	t-statistic	Prob.*
PE (-1)	-0,750640	0,073904	-10,15701	0,0000
YD	0,518716	0,054184	9,573257	0,0000
FA	0,006440	0,009191	0,700741	0,4864
PFA	0,017747	0,009714	1,826855	0,0731
PH	0,103530	0,019615	5,277970	0,0000
ENDH	-0,021922	0,007937	-2,762022	0,0078
ENDF	0,082142	0,041562	1,976380	0,0530
D(PE(-1)	0,175474	0,073722	2,380223	0,0207
D(PE(-2)	-0,079533	0,071203	-1,116988	0,2688
D(PE(-3)	0,070262	0,069555	1,010161	0,3168
D(PE(-4)	0,265375	0,066300	4,002652	0,0002

Levels Equation
Case 1: No Constant and No Trend

Variable	Coefficient	Std. Error	t-statistic	Prob.*
YD	0,691032	0,056161	12,30439	0,0000
FA	0,008580	0,012402	0,691834	0,4919
PFA	0,023642	0,012480	1,894365	0,0633
PH	0,137922	0,026478	5,208912	0,0000
ENDH	-0,029204	0,009827	-2,971953	0,0044
ENDF	0,109430	0,049074	2,229909	0,0298

F-Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic k	29,098566	10%	1,75	2,87
		5%	2,04	3,24
		2,5%	2,32	3,59
		1%	2,66	4,05

t-Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-10,15701	10%	-1,62	-3,7
		5%	-1,95	-4,04
		2,5	-2,24	-4,34
		1%	-2,58	-4,67