HOW IS THE INTERNATIONAL TRADE GROWING?

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ABSTRACT

This paper analyses the statistical properties of the series of export/GDP and import/GDP ratios for 54 countries in 1948-2005. We apply the test of Lee and Strazicich (2003) and find that almost all the series show a statistically significant structural break and most of them two. The first one, unlike that found by Ben-David and Papell (1997), might be related to the increasing effect of the late post-war monetary normalization on international trade. However, for over 50% of countries, the significance of the breaks does not eliminate the presence of a unit root in the series, which we associate with the strong and generalized increase of vertical specialized goods trade in recent decades.

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Key words: Openness, unit roots, structural breaks, vertical specialized trade

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1. INTRODUCTION

In a very well known article, Baier and Bergstrand (2001), using a gravity equation approach, show how income, trade barriers and transport costs, explain the growth of world trade (world exports) in the second half of the twentieth century. However, the three factors together only explain 40% of the growth, so the authors suggest that changes in the nature of trade have occurred in recent decades. In the second era of globalization, unlike that of the last third of the nineteenth century, decreases in transport costs and tariff barriers led to an international integration of markets through a disintegration of the production processes [Feenstra, 1998]. As shown in several articles [Hummels *et al*., 1998, 2001; Chen *et al.*, 2005], the disintegration of the productive processes or, in other words, the rise of vertical trade (increase of imports embodied in domestic exports), has been a generalized phenomenon in the last 30-40 years.

However, very little attention has been paid to the study of the international trade series to see how they show changes in the nature of trade. While the volume of literature for the study of the integration order of several macroeconomic series is enormous [1], there are only two works whose goal is the

[1] In a seminal article, Nelson and Plosser (1982) studied the integration order of fourteen macroeconomic series such as real GDP, nominal GNP, *per capita* real GNP, industrial production, employment, unemployment rate, GNP deflator, CPI, nominal wage, money stock, velocity, interest rates and S&P 500. The same series have been studied in many other works [for instance, Perron, 1989; Zivot and Andrews, 1992; Lumsdaine and Papell, 1997; Lee and Strazicich, 2003], where by applying more sophisticated econometric methods they have proved the stationarity of most of the series unlike in Nelson and Plosser (1982). Among the works analysing the properties of GDP and GNP, we can highlight Perron (1989), Stock and Watson (1986) and Walton (1988), Kormendi and Meguire (1990), Ben-David and Papell (1995, 1998), McCoskey and Kao (1999), Phillips and Moon (2000), Kapetanios (2002) and Carrión-i-Silvestre *et al*. (2005).

study of import and export shares of GDP and, generally speaking, foreign trade series. One of them is Ben-David and Papell's (1997) article, where the authors analyze, by using the Voglesang test (1997), for 48 countries, whether the behaviour of the international trade shares of GDP changed gradually or not in the second half of the past century. The second one is Serrano's *et al.* (2008) article where they study the statistical properties of the Spanish openness series in the very long run (1870-2000).

In the same line as Ben-David and Papell (1997), our goal is to analyze import-GDP and export-GDP ratios for a larger sample of countries between 1948 and 2005. The novelty of our methodology is that we use a unit root test that considers the presence of a structural breaks in order to establish the asymptotical properties of the series. The results suggest that, although most of the series have a unit root, around 30-40% of them have a stationary trend. We also find that if two breaks are taken into account, the allocation of the structural changes are very different from those in Ben-David and Papell (1997). Our findings show that the late post-war monetary normalization could be an important factor to explain the evolution of international trade.

The rest of the paper is organized as follows. Section 2 presents the series, the sources and the findings of the econometric analysis (with and without structural breaks). Section 3 provides an economic interpretation of the structural breaks and unit roots. Finally, Section 4 concludes.

2. UNIT ROOTS AND STRUCTURAL BREAKS

2.1. Unit root analysis

In this article, we enlarge the number of countries and years taken into account in Ben-David and Papell (1997). Our sample runs from 1948 to 2005. This is an especially interesting period because several GATT's (now WTO) trade agreements took place during it. We analyze 54 countries, emerging nations as well as highly developed economies. We use annual data to construct the ratios: import over GDP ratios (M/GDP) and export over GDP ratios (X/GDP). All, import, export, exchange rate and GDP data, come from the IMF International Financial Statistics; we use nominal terms of GDP, import c.i.f. and export f.o.b. data and we convert import and export values into national currency by using the annual averages of the official exchange rate or market exchange rate, depending on the country.

The analysis starts by applying two kind of tests. First, we apply unit root tests such as the Augmented Dickey and Fuller (1979, 1981), ADF; Phillips-Perron (1988), PP and Ng-Perron (1998), NP[2]. We also apply the Kwiatkowski *et al*. (1992), KPSS, modified test, whose null hypothesis is that series are stationary. An intercept and trend are included in the specification of each test and we use the variables in level form. To select the correct order of the autoregressive process in the ADF test, we use the Modified Akaike Information Criterion (MAIC) and, for the remaining unit root tests, we use the spectral estimation method of Quadratic Spectral kernel with the Andrews Bandwidth.

[2] In this group of tests, the null implies the presence of a unit root.

Finally, we modify the KPSS test by using the spectral estimation window proposed by Sul *et al*. (2005), since Carrión-i-Silvestre and Sansó (2005) demonstrated that, if it is used to estimate the long-run variance, the KPSS test shows a smaller size distortion and a satisfactory power. If we look at the NP test, the most powerful in the group, we find that nine countries are stationary for the M/GDP series (Colombia, Costa Rica, Denmark, Dominican Republic, Greece, Iceland, Jamaica, New Zealand and Switzerland) and seven for the X/GDP series (Egypt, Iceland, Mauritius, Norway, Portugal, South Africa and Venezuela)[3].

However, if we compare the findings of the two tests, for a unit root and for stationarity, we find a contradiction because the first one shows that most of the series have a unit root whereas the opposite is found in the second. The contradiction might be due to the existence of breaks in the series not taken into account. Thus, we need another type of unit root test that allows for breaks, given that, if breaks existed, unit root tests would overeject the alternative of stationarity when this hypothesis is true [Perron, 1989].

2.2. Unit root and structural break analysis

In this section, we consider the possibility that, in the second half of the XX century, the important movements towards market integration, prompted by trade liberalization and a decrease in transport costs, could determine the presence of structural breaks in the M/GDP and X/GDP ratios.

Unit root analysis with structural changes has generated a huge amount of literature since Perron's (1989) influential article, whose aim has been to

[3] Tables are available on request.

improve the previous tests in different issues such as break point endogeneity, the number of break points or questions related to non-linearity in the process of change[4]. Zivot and Andrews, ZA (1992), developed a test allowing for an endogenous break under the alternative hypothesis of a stationary variable[5]. After that, Lumsdaine and Papell, LP (1997), basing their studies on the loss of power when we ignore a break, suggested a unit root test allowing for two endogenous breaks (instead of one) under the alternative hypothesis instead of one [ZA 1992]. Nevertheless, these approaches, derived by assuming no structural breaks under the null, might present problems in empirical applications [Lee and Strazicich 2003] because the rejection of the null does not necessarily imply the rejection of a unit root *per se*, but may imply the rejection of a unit root without breaks. Similarly, the alternative hypothesis does not necessarily imply trend stationarity with breaks, but may indicate a unit root with breaks.

Lee and Strazicich, LS (2003) show that, if we do not consider breaks under the null in tests with endogenous breaks, the test statistics may diverge and lead to a rejection of the null when the DGP is integrated with structural breaks, as in the LP test. Thus, they propose an endogenous two-break Lagrange multiplier test that allows for breaks under both the null and alternative hypotheses, so rejecting the null unambiguously implies trend stationary.

Following these econometric advances and the idea that allowing for only one structural break may be too restrictive, we use LS's (2003) test, which is able to recognize two structural breaks. The models proposed by these authors are two of the three structural break models considered in Perron (1989): the "crash" model

[4] *Additive Outlier model and Innovational outlier model.*
[5] Unlike Perron's (1989) test, which considers an exogenous break.

A allows for a one-time change in level; and the C model allows for a change in both the level and trend[6].

Consider the DGP as follows:

$$\text{PGD } y_t = \delta' Z_t + e_t \qquad e_t = \beta e_{t-1} + \varepsilon_t,$$

where Z_t is a vector of exogenous variables and $\varepsilon_t \sim iidN(0,\sigma^2)$. Two structural breaks can be considered as follows: model A allows two changes in levels so that $Z_t = [1, t, D_{1t}, D_{2t}]'$. D_{jt} is a *dummy* variable equal to 1 if $t \geq T_{B_j} + 1,\ j = 1,2$; and 0 otherwise; and T_{B_j} represents a break time. Model C allows two changes in both levels and trend, so that $Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]'$, where DT_{jt} = $t - T_{B_j}$ if $t \geq T_{B_j} + 1,\ j = 1,2;$ and 0 otherwise.

As such, the null and alternative hypotheses in model A are:

$$H_0 : y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + y_{t-1} + \upsilon_{1t},$$

$$H_1 : y_t = \mu_1 + \gamma t + d_1 D_{1t} + d_2 D_{2t} + \upsilon_{2t},$$

where υ_{1t} and υ_{2t} are stationary error terms, and $B_{jt} = 1$ if $t = T_{Bj} + 1,\ j = 1,2,$ and 0 otherwise[7]. Analogous argument can be applied to model C for both hypotheses:

$$H_0 : y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + d_3 D_{1t} + d_4 D_{2t} + y_{t-1} + \upsilon_{1t}$$

$$H_1 : y_t = \mu_1 + \gamma t + d_1 D_{1t} + d_2 D_{2t} + DT_{1t} + DT_{2t} + \upsilon_{2t}$$

LS (2003) demonstrate that the asymptotic distribution of the null hypothesis of the endogenous two-break LM unit root test for model A is

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[6] Without any risk of losing generality, Model B is omitted as it is commonly held that most economic time series can be adequately described by models A or C.

[7] The H_0 includes the *dummy variable* B_{jt} so it is necessary to ensure that the asymptotic distribution of the test statistic is invariant to the size of breaks (d) under the null [Perron, 1989].

invariant to the location and size of the structural breaks. Although the invariance property does not hold strictly for model C, the *minimum LM* test statistic, in contrast to the LP test, does not diverge in the presence of structural breaks in the null, even when the magnitude of the breaks is large.

To correct the auto-correlated errors, we have included augmented terms following the general-to-specific procedure described in Perron (1989) and suggested in Ng and Perron (1995) to determine the optimal number of lags (k)[8]. The location of the breaks is determined by analysing all possible two-break combinations in the sample[9] and choosing the pair of breaks where the test statistic is minimized. By using the Akaike information criterion to choose the most accurate model to simulate the DGP, we find that the series adjust better to model C for all countries except Spain, Morocco, Mauritania, Guatemala and Algeria in the case of the M/GDP series and Egypt, Italy, Mexico and the United States for the X/GDP series.

TABLE 1 ABOUT HERE

The endogenous two-break LM unit root test allows us to identify one more break than the Vogelsang (1997) test used by Ben-David and Papell (1997). Their test is too limited if we look at the significance of the break points in the LS test which shows that almost all countries in the sample (all but five) have a significant structural break and most of them two. The unit root analysis, whose results are presented in Table 1, shows that 15 and 21 of the 54 countries of the sample have a stationary trend in the X/GDP and the M/GDP ratios, respectively,

[8] We begin with a maximum number of lagged first-differenced terms k= 2.
[9] *Trimming* of 10%.

when two breaks are included under the null and alternative hypotheses. Thus, by considering the possibility of structural changes in the openness series, some of the countries with integrated series now show a stationary trend.

3. ECONOMIC EXPLANATION OF BREAK POINTS AND NON-STATIONARITY

The econometric analysis carried out in the previous section allow us to differentiate the trend stationary countries in Table 2 from the unit root countries, in Table 3, both with statistically significant break points. More importantly, the first structural change is very differently located to that found in Ben-David and Papell (1997). Our first break is concentrated before the Kennedy Round (1968), which was the trade liberalization factor associated with the structural change by these authors. On the other hand, our second break is similar in half the cases to those found by them.

TABLES 2 AND 3 ABOUT HERE

Of course, we wondered if the differences with Ben-David and Papell's findings were due to the shorter period of time that they analysed. To answer this question, we repeated our analysis for the same time period as Ben-David and Papell (1948-1993) and found that the first break is located in the late fifties and early sixties, as in our former analysis. Consequently, we suggest that this earlier break might reflect the expansive effect of monetary factors on the X/GDP and

M/GDP ratios, that is, the late post-war monetary normalization, which involved the convertibility of the main European currencies in the late fifties (United Kingdom in 1961), at the same time as there was a reduction of the quantitative trade restrictions until then in force. The restoration of the convertibility of the main European currencies around 1958 and of the Yen in 1964, together with the existing dollar convertibility, might be an explanatory factor for the increase in international trade, statistically reflected in our first break.

As for the second break, it presents more dispersion than the first one, so it might be caused either by different phenomena or by a single phenomenon affecting the countries at different times. Most importantly, even when we consider the presence of two structural changes in the series, the series still have a unit root. We relate this evidence to the disintegration of the production processes and the subsequent vertical specialization trade.

Baier and Bergstrand (2001) emphasized that bilateral trade growth is twice as fast as GDP growth in the OECD countries between 1958 and 1988. In order to explain bilateral trade growth, apart from standard factors like income increase, transport costs decrease and trade liberalization, these authors also suggest more recent explanations such as the vertical specialization phenomenon, defined as the increasing and generalized use of imported inputs embodied in exports [Hummels *et al.*, 2001]. The increase in the M/GDP and X/GDP ratios might be explained, apart from transport costs and tariff decreases, by the progress of the so-called vertical specialized goods trade or, in other words, by the rise of foreign added value in domestic exports. Recent studies [Hummels *et al.*, 1998, 2001; Chen *et al.*, 2005] estimate that vertical specialization has increased 30% and accounts for about one third of the growth of trade in the last thirty years, since goods in process cross multiple borders while they are being produced. Consequently, we find increasing trade/GDP ratios in most countries because the numerator of the ratio X/GDP is registered at final prices, that is, including the added value of the imported inputs embodied; in contrast, the denominator includes only the domestic added value of exports. Hence, the more the vertical specialization rises, the more this ratio increases. An analogous argument can be applied to M/GDP.

Reinforcing these arguments, Yi (2003) explains the remarkable progress of vertical specialization trade, based on a non-linear response of openness variables to tariff reductions when a critical tariff rate is reached[10]. So vertical specialization can serve as a propagation mechanism magnifying tariff reductions that lead to large increases in trade. One example is that of the Asian and New Industrialisation countries[11] (all of them with non-stationary series in our analysis), including countries like Mexico, which produces a huge amount of intermediate goods required by foreign companies, especially from the US. For developed countries, outsourcing could explain the great increase in the X/GDP ratios because the exported final product is registered at final prices, thus embodying the value added abroad[12].

Therefore, there are no reasons to think that the trade ratios have to be between 0 and 1. They can be bigger than one, as they, in fact, are in countries like Singapore. This is a significant issue since it allows us to understand the presence of the unit roots in import and export/GDP for the countries in Table 3.

[10] The standard trade models are not able to generate this non-linear feature. In contrast, the model proposed by Yi (2003) generates a non-linear trade response to tariff reductions and can explain over 50% of the growth of trade between 1962 and 2000 in the US.
[11] These countries present the largest increase in the ratio X/GDP.
[12] Following Feenstra (1998), the growth of manufactured exports has been considerably bigger than the growth of the exporters' added value in terms of GDP.

If we worked with bounded variables, it would be impossible for the long-run variance to increase indefinitely over time.

4. CONCLUSIONS

This paper analyses the statistical properties of the openness series (M/GDP and X/GDP) in 54 countries between 1948 and 2005. First, we apply unit root and stationary tests whose results suggest the presence of structural breaks in the series. Consequently, we use the LM-test [Lee and Strazicich, 2003], which considers two endogenous structural breaks under the null and alternative hypotheses and corroborates the statistically significance of two breaks for over 50% of the countries in the sample. Breaks are different from those in Ben-David and Papell (1997), who showed the matching of their only structural break with the years around the implementation of the Kennedy Round (1968). As a result, these authors associated the intense growth of the trade after the seventies with the liberalization agreed in the GATT's Round.

In contrast, we highlight that our first break is located in the late fifties and early sixties, always before the Kennedy Round. Hence, this break might be associated with the trade impulse of the late European monetary normalization after World War II. Moreover, our paper reveals that, by including a second break, the unit root is not eliminated in most of the series, a finding that we associate with the expansive effect of the internationalization of production on the openness rates. In the last few decades, the internationalization of the productive processes has been increasing. Rather than concentrating production of the entire good in a single country (horizontal-specialization scenario), modern companies spread production process over several countries; these countries specialize only in particular stages of a good's production sequence, so that the imported input embodied in domestic exports has noticeably increased and, with it, the ratio of exports over GDP.

The fact is that in the ratio X/GDP, while the numerator incorporates the final prices of exports (including added value from imported inputs embodied in exports), the denominator incorporates only domestic added value. Thus, under the current flourishing of these vertical specialized goods trade it might be assumed that the M/GDP and X/GDP ratios can be bigger than 1, so, they do not necessarily have to belong to 0-1 interval. For this reason we can rationalize the presence of unit roots in over 50% of the openness ratios here studied, which is the main contribution of this paper.

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Table 1. ENDOGENOUS TWO-BREAK LM UNIT ROOT TEST

Import

Country	LM- test	Break points	Sign.	Country	LM- test	Break points	Sign.
Algeria	-3.8219	1953; 1960	N2	Japan	-5.8325	1954; 1979	T1T2
Australia	-7.4783	1954; 1974	N2T2	Korea	-4.6533	1957; 1981	T1T2
Austria	-6.5714	1975; 1992	N1N2	Mali	-4.8445	1967; 1983	T1T2
Barbados	-6.4396	1962; 1983	T1T2	Malta	-5.0536	1969; 1983	N1T1T2
Canada	-5.3314	1956; 1995	T1T2	Mauritius	-5.1175	1977; 1994	N1N2
Colombia	-5.875	1960; 1981	T2	Mexico	-1.7851	1969; 1982	N2
Congo Rep.	-5.96	1961; 1987	N2T1T2	Morocco	-5.289	1967; 1977	T1T2
Costa Rica	-7.1098	1970; 1981	T1T2	Netherlands	-5.4275	1972; 1986	N1N2
Cyprus	-5.8136	1961; 1982	N1T2	New Zealand	-6.553	1971; 1995	T1T2
Denmark	-6.0363	1963; 1983	T1T2	Nigeria	-4.9863	1978; 1996	T1
Dominican Rep.	-5.5972	1956; 1983	N2T1T2	Norway	-5.1714	1961; 1974	N2T1
Egypt	-5.0989	1969; 1973	N1	Pakistan	-4.7987	1971; 1987	N1T1
El Salvador	-4.6201	1964; 1982	T2	Panama	-4.7849	1980; 1995	N1N2T1T2
Fiji	-5.1408	1970; 1985	T2	Paraguay	-5.2459	1954; 1992	N1T2
Finland	-5.8657	1971; 1995	T1T2	Filipinas	-4.1728	1968; 1974	T2
France	-5.237	1971; 1986	N1T2	Portugal	-5.2822	1956; 1987	N1T1T2
Germany	-5.3725	1962; 1972	T1	South Africa	-6.2156	1969; 1979	N1
Greece	-8.6455	1978; 1986	T1T2	Spain	-5.5906	1958; 1990	N1T2
Guatemala	-5.0098	1977; 1988	T1T2	Sri Lanka	-6.3284	1974; 1982	N1T1T2
Guyana	-4.6807	1965; 1978		Sudan	-5.0999	1981; 1985	N1N2T2
Haiti	-4.842	1981; 1994	T1T2	Sweden	-6.2127	1970; 1988	N2T1T2
Honduras	-4.3795	1955; 1960	T1	Switzerland	-7.2034	1953; 1991	T1T2
Iceland	-5.9156	1967; 1982	N2T1	Thailand	-5.8623	1979; 1993	N1N2T1
India	-4.6671	1954; 1974	T2	Trinidad and Tobago	-4.59	1971; 1981	N1T1
Ireland	-4.6648	1970; 1982	N2T1T2	United Kingdom	-5.315	1959; 1975	N2T1
Italy	-4.1488	1956;1978	N1N2	United States	-3.1249	1973; 1999	N1N2
Jamaica	-5.9538	1968; 1980	N2T1	Venezuela	-4.4989	1971; 1978	T1T2

* Denotes significant at 5%

Critical points in Lee and Strazicich (2003)

Sign: indicates significant break point

T 1, T2 = significant trend break point at 5% for the first and second break, respectively.

N 1, N2 = significant level break point at 5% for the first and second break, respectively.

Table 1. ENDOGENOUS TWO-BREAK LM UNIT ROOT TEST (Cont)

Export

Country	LM- test	Break points	Sing	Country	LM- test	Break points	Sing
Algeria	-3.6882	1953; 1983	T2	Japan	-4.8867	1968; 1982	N1T1T2
Australia	-6.831	1960; 1990	T1T2	Korea	-4.9441	1966; 1984	T1T2
Austria	-5.0199	1959; 1997	T1T2	Mali	-5.3554	1958; 1978	T2
Barbados	-4.7729	1961; 1975	N2	Malta	-4.5401	1968; 1982	T1
Canada	-4.5607	1954; 1994	T2	Mauritius	-4.5719	1967;1981	
Colombia	-4.2991	1956;1986	N2T1	Mexico	-4.2107	1955; 1980	T2
Congo Rep.	-5.0477	1952; 1982	N2T1T2	Morocco	-4.3144	1964; 1989	N2
Costa Rica	-4.7408	1957; 1982		Netherlands	-4.8475	1971; 1979	T1T2
Cyprus	-6.1091	1972; 1984	T1T2	New Zealand	-6.8947	1958; 1974	N1N2T1T2
Denmark	-4.9987	1953; 1966		Nigeria	-4.3681	1988; 1994	T2
Dominican Rep.	-4.6887	1962; 1974	T2	Norway	-8.4514	1970; 1984	N2T1
Egypt	-5.0928	1965;1994	T1	Pakistan	-5.7173	1965; 1971	N1T1T2
El Salvador	-5.5203	1969; 1978	T1T2	Panama	-4.523	1972; 1983	N1T1T2
Fiji	-5.5324	1964; 1983	T1T2	Paraguay	-5.1391	1985; 1991	T1T2
Finland	-4.5435	1983; 1997	N2	Filipinas	-6.8177	1980; 1996	N2T2
France	-5.3969	1971; 1994	N1N2T1T2	Portugal	-6.8307	1976; 1981	N2T1T2
Germany	-4.8487	1975; 1985	N1T1	South Africa	-6.3924	1974; 1989	T1
Greece	-5.0984	1958; 1984	T1T2	Spain	-2.9843	1954; 1993	N1N2
Guatemala	-3.0992	1963; 1978	N2	Sri Lanka	-4.4169	1973; 1984	T1
Guyana	-4.6861	1976; 1988	N2	Sudan	-5.5022	1953; 1980	N1T2
Haiti	-4.6222	1968; 1987		Sweden	-5.5222	1971; 1992	N1T2
Honduras	-4.3982	1974; 1994	N2	Switzerland	-5.1063	1973; 1992	
Iceland	-6.9128	1958; 1967	N1 T1T2	Thailand	-4.3934	1972; 1991	T1T2
India	-4.4816	1962; 1981	T1T2	Trinidad y Tobago	-6.7026	1969; 1979	N1T1T2
Ireland	-5.9997	1962; 1997	N2T1	United Kingdom	-4.8366	1962; 1974	N2T1T2
Italy	-4.4533	1973; 1989	T1T2	United States	-4.6701	1971; 1983	T1T2
Jamaica	-6.315	1974; 1996	T1T2	Venezuela	-6.5188	1970; 1981	N1N2T1T2

* Denotes significant at 5%

Critical points in Lee and Strazicich (2003)

Sign: indicates significant break point

T 1, T2 = significant trend break point at 5% for the first and second break, respectively.

N 1, N2 = significant level break point at 5% for the first and second break, respectively.

Table 2. STRUCTURAL CHANGE IN STATIONARY TREND OF M/PIB AND X/PIB

Import			Export		
Country	Breaks LM-test	Breaks David and Papell	Country	Breaks LM-test	Breaks David and Papell
Australia	1954; 1974	1973	Australia	1960; 1990	1964
Austria	1975; 1992	1968	Cyprus	1972; 1984	na
Barbados	1962; 1983	1973	Iceland	1958; 1967	1974
Colombia	1960; 1981	na	Ireland	1962; 1997	1973
Congo Republic	1961; 1987	na	Jamaica	1974; 1996	1976
Costa Rica	1970; 1981	na	Mauritius	1967;1981	na
Cyprus	1961; 1982	1984	Morocco	1964; 1989	1973
Denmark	1963; 1983	1980	New Zealand	1958; 1974	1983
Egypt	1969; 1973	1973	Norway	1970; 1984	1985
Finland	1971; 1995	1986	Pakistan	1965; 1971	na
Greece	1978; 1986	1971	Filipinas	1980; 1996	1982
Iceland	1967; 1982	1974	Portugal	1976; 1981	1979
Italy	1956;1978	1973	South Africa	1974; 1989	1976
Jamaica	1968; 1980	1978	Trinidad y Tobago	1969; 1979	na
Japan	1954; 1979	1985	Venezuela	1970; 1981	1979
New Zealand	1971; 1995	1973			
South Africa	1969; 1979	1976			
Sri Lanka	1974; 1982	1977			
Sweden	1970; 1988	1985			
Switzerland	1953; 1991	1977			
Thailand	1979; 1993	1981			

Ben-David and Papell's (1997) break is determined by using Vogelsang (1997)

na = non available in Ben-David and Papell's (1997) study

Table 3. STRUCURAL BREAK IN INTEGRATED M/PIB AND X/PIB

Import			Export		
Country	**Breaks LM-test**	**Breaks David and Papell**	Country	**Breaks LM-test**	**Breaks David and Papell**
Algeria	1953; 1960	1966	Algeria	1953; 1983	na
Canada	1956; 1995	1981	Austria	1959; 1997	1964
Dominican Rep.	1956; 1983	1984	Barbados	1961; 1975	1975
El Salvador	1964; 1982	na	Canada	1954; 1994	1983
Fiji	1970; 1985	na	Colombia	1956;1986	na
France	1971; 1986	1976	Congo Rep.	1952; 1982	na
Germany	1962; 1972	na	Costa Rica	1957; 1982	na
Guatemala	1977; 1988	na	Denmark	1953; 1966	1978
Guyana	1965; 1978	1975	Dominican Rep.	1962; 1974	1981
Haiti	1981; 1994	1968	Egypt	1965;1994	na
Honduras	1955; 1960	na	El Salvador	1969; 1978	na
India	1954; 1974	1973	Fiji	1964; 1983	na
Ireland	1970; 1982	1978	Finland	1983; 1997	1981
Korea	1957; 1981	1968	France	1971; 1994	1971
Mali	1967; 1983	na	Germany	1975; 1985	na
Malta	1969; 1983	1973	Greece	1958; 1984	1972
Mauritius	1977; 1994	1968	Guatemala	1963; 1978	na
Mexico	1969; 1982	1981	Guyana	1976; 1988	1981
Morocco	1967; 1977	1972	Haiti	1968; 1987	1972
Netherlands	1972; 1986	1985	Honduras	1974; 1994	na
Nigeria	1978; 1996	1980	India	1962; 1981	1986
Norway	1961; 1974	1977	Italy	1973; 1989	1975
Pakistan	1971; 1987	1977	Japan	1968; 1982	1977
Panama	1980; 1995	1973	Korea	1966; 1984	na
Paraguay	1954; 1992	1963	Mali	1958; 1978	na
Filipinas	1968; 1974	1979	Malta	1968; 1982	1975
Portugal	1956; 1987	1985	Mexico	1955; 1980	1981
Spain	1958; 1990	na	Netherlands	1971; 1979	1985
Sudan	1981; 1985	na	Nigeria	1988; 1994	na
Trinidad y Tobago	1971; 1981	1976	Panama	1972; 1983	1973
United Kingdom	1959; 1975	1973	Paraguay	1985; 1991	1982
United States	1973; 1999	1973	Spain	1954; 1993	na
Venezuela	1971; 1978	1976	Sri Lanka	1973; 1984	1969
			Sudan	1953; 1980	na
			Sweden	1971; 1992	1974
			Switzerland	1973; 1992	1975
			Thailand	1972; 1991	1968
			United Kingdom	1962; 1974	1976
			United States	1971; 1983	1972

Ben-David and Papell's (1997) break is determined by using Vogelsang (1997)
na = non available in Ben-David and Papell's (1997) study