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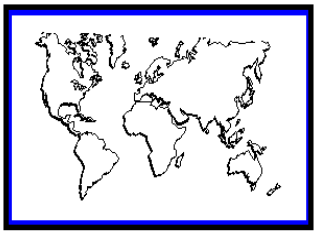

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# External imbalances in a monetary union. Does the Lawson doctrine apply to Europe?*

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**Abstract**

A monetary union raises new economic questions about the interpretation and the implications of high current account deficits for the economic performance of its members in the medium term. Recent literature has argued that conventional measures of external sustainability are misleading because they omit capital variations on net foreign asset positions. In this paper we analyze external sustainability making use of the database developed by Lane and Milesi-Ferretti (2007a) that incudes these valuation effects. The sample period studied covers from the launching of the monetary integration process in Europe (the creation of the "European Snake" in 1972) up to 2007. The econometric methodology used accounts for the increasing cross-section dependence among EMU countries as well as possible structural breaks endogenously determined. The results point to the need of abrupt adjustments, either led by the markets or promoted by pro-active policy measures in order to offset external disequilibria. The lack of these timely interventions together with the rigidities and institutional imperfections of the present EMU are on the ground of the excessive cost in terms of growth and employment of the current crisis.

**Keywords:** Current account imbalances, EMU, panel stationarity, structural breaks, cross-section dependence

**JEL codes:** F32, F41, C23

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# 1 Introduction

A monetary union raises new economic questions about the interpretation and the implications of large current account deficits for the economic performance of its members in the medium term. The increase in the degree of economic and financial integration occurred in the EU countries since the beginning of the nineties has affected expenditure decisions for two reasons. First, the significant improvement in the conditions of access to external financing, and, second, the prospects for future improvements in productivity that may have induced the agents to overshoot on their spending decisions. These overly optimistic expectations may have led to unsustainable current account deficits. While temporary current account deficits may simply reflect the reallocation of capital to countries where capital is more productive, persistent deficits may be regarded as more serious. Deficits may lead to increased domestic interest rates to attract foreign capital. Moreover, the accumulation of external debt due to persistent deficits will imply increasing interest payments that impose an excess burden on future generations. Now, adjustments to large current account imbalances are complex processes. The speed and economic effects depend on many factors. How much of the adjustment takes place through changes in asset valuation? How much through a reduction in absorption? How much through expenditure switching? The pattern of adjustment in this context after a shock, such as the tightening of credit conditions (induced either by an increase of their cost and/or by a reduction in its supply), can be gradual or intense. Larger deficits take longer to adjust and are associated with significantly slower income growth during the current account recovery (Freund and Warnock, 2007). Consumption-driven current account deficits involve significantly larger depreciations than deficits financing investment. Due to spill-over effects and the growing interdependence of euro-area economies, macroeconomics imbalances in a member state are a concern not just for the country in question but also for the euro area as a whole. Therefore**,** the aim of this research is to empirically test the long-term solvency and sustainability of the current account deficits for Economic and Monetary Union (EMU) countries. We analyze the solvency of the area as a whole and country-by-country, which allows us to distinguish between different country groups. For this purpose the traditional approach has been the classical intertemporal models based on the trade adjustment channel. However, recent literature has argued that conventional measures of external sustainability – the trade balance and the current account – are misleading because they omit capital gains or losses on net foreign asset positions (Gourinchas and Rey, 2007). In this paper we analyze external sustainability making use of the database developed by Lane and Milesi-Ferretti (2007a) that incudes these valuation effects. This new approach adds to the previous channel, a supplementary one, through changes in the valuation of assets (financial adjustment channel). The sample period studied covers from 1972, namely the creation of the European Snake, up to 2007. The econometric methodology used accounts for the increasing cross-section dependence among EMU countries as well as for possible structural breaks endogenously determined.

The remainder of the paper is organized as follows. Section 2 presents the global imbalances current situation at the EMU level, describing the main stylized facts and the adjustment mechanisms offered in the literature. Section 3 displays a revision of the previous empirical literature. In Section 4 we discuss the theoretical framework that guides our empirical investi-

gation on the mechanisms of international financial adjustment. Section 5 presents succinctly the econometric methodology and the empirical results and, finally, Section 6 concludes with some policy discussion.

## 2 Economic adjustment under monetary unions: Some stylized facts

Current account imbalances between different geographical areas of the world economy have been recently growing. As a result, the balance of foreign assets has also been increasing, which has sparked renewed interest in the study of the determinants of the dynamic adjustment of external imbalances. However, external imbalances of the members of the euro area have attracted little attention, partly because the eurozone as a whole had a relatively balanced current account. However, individual member countries have shown steadily divergent trends in their current account since the mid-1990 up to the present. While some member countries have improved their current account position (mostly Germany but also Finland, Austria and France), other countries (namely, Spain, Portugal or Greece) widened progressively their imbalances up to 2008 when the current economic crisis has forced an adjustment – see Figure 1. The most dangerous positions, with deficits above 10% of GDP, were those of Portugal and Spain in 2008 (and to a lesser extent, Greece); however, Italy and Ireland also worsened their balance from 2000 on. According to Blanchard (2007), these very large deficits in rich countries reflect mostly private saving and investment decisions. The question is why these countries have been able to experience such deficits without having suffered a reversal and, therefore, an adjustment. A possible explanation is that in a monetary union, the broad external balance of the European economy hides significant differences in external positions across individual European countries; this fact is especially relevant when some of the member countries, such as the Southern peripheral European countries, are converging towards the core EMU countries. Here, the external constraint that individual countries might have historically faced is not longer working in a monetary union leading to deeper external deficits. According to Lane and Milesi-Ferretti (2007b), the exposures across Europe are very heterogeneous (differences in trade patterns, financial exposures, and net external positions), so that the process of adjustment may constitute an asymmetric shock. This implies bilateral real exchange rate adjustments between creditor and debtor countries as members of the euro area. In fact, the current level of divergence in competitiveness, as measured by real exchange rates, does not appear extremely large by historical standards but its persistence does, reaching a peak in 2007 and remaining historically high since then (European Commission, 2009). This heterogeneity can be observed in Figure 2.

An alternative approach to assess the nature and dimension of external imbalances can be gathered by looking at the net foreign assets (NFA) position. Thus, the counterpart to the accumulation of large current account deficits in some member states has been the build-up of large negative NFA positions. In the euro area only some core members have had a persistent creditor position (Germany, France and Belgium) – see Figure 3 – being the net debtor positions the preeminent one for the rest of the euro area members. In 2007, Spain, Portugal and Greece

posted net external liabilities ranging between 80 and 100% of GDP, levels which may be considered as high relative to those reached in other indebted OECD countries. The negative values of the NFA position reflect the accumulated effect of persistent current account deficits, and therefore, the imbalance between foreign assets and liabilities. Many converging countries have benefited from the high degree of financial integration and have been able to finance their growing imbalances through foreign capital entries. However, the deterioration of the NFA position has been severe in many cases and calls for painful adjustments.

A country's current account balance is the usual indicator of the external equilibrium of the economy, as it measures its net borrowing requirement or net lending capacity and is equivalent to the difference between aggregate saving and aggregate investment. According to this approach, the external constraint can be interpreted as a long term issue and not on a year by year basis. Therefore, in the medium or long-term, current account imbalances in a set of heterogeneous countries are a normal occurrence. The countries with the highest growth rates, whether due to productivity or demographic differences, or just with a greater structural preference for the present will run current-account deficits in the medium term. However, recent studies undertaken by the European Commission (2009) show that the gap in the potential growth between countries only partially explain the dispersion of the current account imbalances in the eurozone. Several additional arguments have been added to account for this wider external position dispersion in a monetary union.

First, some authors, as Blanchard and Giavazzi (2002), stated that a monetary union reduces friction in capital flows and eliminates exchange rate risk, facilitating the harmonization of financial regulations and accounting standards. This fact lowers uncertainty and improves transparency of information having, as a result, deeper and wider financial markets that help to ease the financing of prospective external disequilibria between member countries.

Second, it is a well known fact that a monetary union fosters competition in the goods markets through the elimination of the so-called, monetary veil. This fact increase substitutability between goods produced by different countries, price convergence, and, therefore, variations in the real exchange rate that will lead to movements in current account balances. Prices have converged in the eurozone (mostly in the tradable sector) over the past decade as countries with comparatively low price levels in 1999 have seen larger average price increases than countries with price levels close to the eurozone average. The Balassa-Samuelson hypothesis predicts that if prices in the tradable sector are fixed and if wages equalize across sectors (tradable and non-tradable sectors), the cost of non-tradables (with low productivity growth) will rise and thereby the general price level will increase.

Finally, in a monetary union, authorities abandon implicit policies that target current account balances. In fact, from the early stages of the design of EMU, the prevailing idea was that the balance of payments' constraint of member countries would largely disappear. The arguments were, again, that the elimination of currency risk and the wider and deeper financial markets would facilitate the financing of external deficits.

However, there is a lack of clarity about the nature of the external constraint in this framework (Dolado and Viñals, 1992). Some authors believe that any current account imbalance is sustainable in a monetary union, which would eliminate the constraint role traditionally played

by the external sector on growth, while others think that the current account balance still continues to play a role. In this sense, there are major disagreements about the nature and implications of different patterns for adjusting the current account.

On the one hand, the external deficit could be seen as no more than a "side effect" of the process of economic integration that fades out overtime, while on the other hand, can be interpreted as a symptom of problems faced by agents when adjusting to a new environment under an economic integration process. Indeed, as far as dynamics are concerned, external imbalances can reflect different types of macroeconomic disequilibrium, and therefore, the growing imbalances in the less developed countries of the EMU would be consistent with two approaches. First, differences in the levels of current account balances may just reflect *lack of synchronicity in the economic cycle*. In a monetary union, cyclical differences can play a greater role due to a single monetary policy that, by setting average targets, is always too expansionary for economies in a relative expansion phase and too restrictive for the economies in a comparatively slower phase. In practice, the shift in the saving/investment equilibrium within the eurozone and the widening of imbalances occurred in a ten-year period during which monetary policy was accommodative for Spain, Portugal, and Greece, and restrictive for Germany. Second, the adoption of *a single currency constitutes by itself a lasting asymmetrical shock*. A monetary union means a steep reduction in the premia paid on external financing, which benefits greater to the weakest countries. Normally these premia are set by the market depending on the relative macroeconomic and institutional framework of each individual country. Therefore, they are higher in countries suffering from a lack of monetary policy credibility, evidenced by high inflation. The introduction of the euro led to a strong decrease in risk premia in euro-area countries and to an increased financial integration and competition, facilitating access to finance and easing credit constraints (Lane, 2005). The fall in real interest rates entailed an economic boom driven by domestic demand. In the eurozone, Spain, Portugal, Ireland, Greece, and Italy (to a lesser extent), have particularly benefited from a sharp cut in nominal rates in Phase 2 of EMU. Moreover, monetary union membership generated expectations of increasing economic convergence leading to an increase in spending and a drop in savings, with a consequent increase in current account deficits.[1] This would lead to an accumulation of foreign debt and a growing burden on future generations. It seems likely that overreaction by agents in their spending decisions has taken place when trying to adjust to the new economic scenario and, probably, the converging countries have incurred in unsustainable current account deficits.

If current account deficits move on a unsustainable path, countries belonging to a currency area can no longer rely on a devaluation of the nominal exchange rate, and must turn to other types of adjustment. Competitiveness adjustments are more costly when they require a cut in real wages achieved through higher unemployment. Financial adjustments cannot be ruled out either, although the notions of "country risk" is less relevant in a monetary union. The theoretical literature[2] has outlined three types of market adjustment mechanisms that can promote, either separately or in a jointly manner, a return to equilibrium in a monetary union:

[1] The EMU countries with the highest current account deficits are those that have had slower growth in exports of goods and services, as a result of a worsening in competitiveness that may be a reflection of inefficiencies in the functioning of the labor market, which may hinder its future growth (Peñalosa, 2002).

[2] See, for instance, De Grauwe (2009).

(i) price adjustment, (ii) migration, and (iii) financial adjustment.

A first adjustment mechanism for a country running an excessive current account deficit is through a competitiveness improvement. In an overheated country in a monetary union, the excessive demand will generate an overvalued real exchange rate that will lead to a decline of the aggregate demand. If prices and wages are rigid, the phenomenon will initially result in higher unemployment, followed by an inflation slowdown – see Figures 4 to 6. Let us analyze the case of the adjustment dynamics in a situation of real exchange rate (RER) misalignment and output gap. A country entering a monetary union with an undervalued RER (i.e., Spain on entering EMU) will witness a long period of inflationary pressure leading to a real appreciation and a worsening current account balance. The persistent inflationary process will continue to push the RER over its equilibrium level and this overvaluation will lead to an adjustment in output sending it back below its potential. An overvalued RER (Germany until 2006, Portugal since 2003) generates a long period of competitive disinflation that will stop once competitiveness is restored. Normally, the recovery will start from an improvement in the exports that will trigger economic activity and a positive price behavior.

A second adjustment mechanism, complementary to the previous one, that can reduce the adjustment cost is labor mobility. A country suffering from a negative competitiveness shock will raise its unemployment rate. The emigration of a part of the unemployed population and the consequent reduction in domestic demand would avoid a part of the adjustment via wage cuts. However, the empirical evidence available (De Grauwe, 2009) shows that about two-thirds of asymmetric shocks on employment and growth in the US are absorbed by internal labor migrations within a year, compared with less than one-third between eurozone countries. According to European Commission (2009) price adjustments to external imbalances do not only involve the export sector, they also implicate the domestic non-tradable (sheltered) sector. Current accounts and real exchange rates are not only connected via the performance of exporting companies but also via changes in the allocation of internal resources and demand across the tradable and non-tradable sectors. The ease with which resources can be reallocated in the economy will therefore play an instrumental role in determining the speed and the cost of adjustment. In principle, the more flexible labour and product markets are, the easier the adjustment will take place.[3]

Finally, in a monetary union, the sustainability of certain paths for net external positions can theoretically be restored through financial channels. In a monetary union a loss of investor confidence would not entail an abrupt devaluation (as under a flexible rate regime) but would drive up risk premia. This financial adjustment could be more painful than a currency devaluation because it would restore sustainability by lowering domestic demand rather than boosting foreign demand. Note that an exchange rate depreciation tends to stimulate employment while an increase in the financing cost would cause a rise in unemployment. Moreover, financial adjustment, unlike exchange rate adjustments, would not have an equal impact on all country members of a monetary union. All in all, in a monetary union is more difficult to discriminate between countries because the common currency induces risk-sharing (there are

[3]Recent econometric evidence backs the idea of a link between labour market flexibility and competitiveness adjustment. See European Commission (2008b).

negative external effects from highly indebted countries that spill over the rest of the union); an integrated financial system reduces information asymmetries between foreign creditors and domestic borrowers, and moreover, the institutional framework under a monetary union should reduce debt-monetisation risk and risk default. However, in the end, the burden of the adjustment will focus on the area's most heavily indebted countries. Higher public debt will ultimately result in future spending cuts or a future rise in domestic taxes, a burden mostly shouldered by resident agents.

Therefore, the analysis of the sustainability of current account imbalances remains a very relevant issue from an economic policy point of view even when countries belong to a monetary union. It has recently been highlighted by Gourinchas and Rey (2007) that the modern theory of the intertemporal approach of the current account, although it has been able to reasonably explain the dynamics of external adjustment that followed the oil shocks of the 70s and the fiscal deficits of the 80s, is currently unable to explain the dynamic adjustment of external imbalances because it does not consider gains and capital losses in the positions of the net external assets. Indeed, the recent wave of financial globalization has led to an increase in holdings of foreign assets and liabilities in different countries and therefore their asset portfolios can be seriously affected by variations in their prices, giving rise to extensive transfers of wealth between countries that are altering the dynamics of the stock of foreign assets. All in all, these valuation effects have not been considered by neither the theory nor by the official statistics until very recently and can be especially relevant in the case of the EMU because of the increasing cross-holding of foreign asset among its member countries.

This issue is of vital importance to understand the dynamics of adjustment to the expected current account imbalances existing in an environment of globalization of economic and financial transactions. Thus, for example, the intertemporal approach of the current account suggests the need to generate trade surpluses to reduce the imbalance, while the asset valuation approach indicates that the adjustment can be done by changes in national asset values owned by foreigners versus the foreign assets in our country. Much of this financial adjustment can be made through a change in the exchange rate immediately, facilitating the slower adjustment in the real sector of the economy. However, while it is true that cross-holdings of assets between countries can facilitate the adjustment of global imbalances, it is also true that the exposure of countries to turbulences in financial markets is increasing as well, rising the risk associated with an abrupt realignment of the expectations of investors. In fact, the current crisis in the US mortgage market has opened a period of uncertainty in international financial markets that is leading to added difficulties of financing to countries such as Spain, with high current account imbalances. The benefits of financial integration can become a liability if economic policy is not consistent with a credible medium-term policy aimed at maintaining internal and external balances of the economy, because the expectations (and preferences) of the investors may change rapidly.

The consequences on the economic policy of this new integrated approach to the current account imbalances are also different, implying a distinct channel through which the exchange rate affects the dynamics of external adjustment. Under more traditional frameworks, fiscal and monetary policy affects the relative prices of market goods or decisions on saving and

investment. However, in the Gourinchas and Rey (2007) model monetary and fiscal policies affect the relative prices of assets and liabilities, in particular through changes in interest rates and exchange rates. This means that the channel of transmission of impulses for economic policy may differ from what the standard New Open Macroeconomics models "à la Obstfeld and Rogoff" advocate. While the intertemporal model approach focuses on the intertemporal effects on the real interest rate of variations in the terms of trade or the real exchange rate (see Razin and Svensson, 1983), the unified model of Gourinchas and Rey (2007) focuses on the importance of changes in the value of the assets generated by these variables, at least, in the short run.

All in all, regardless of the exchange rate regime and the existence of more or fewer facilities for the financing, a country still has a restriction on foreign long-term solvency, defined as the condition that the sum of the discounted value of future spending over the value of their outstanding debt should be equal to the net present value of their income. It seems obvious that if the current path of accumulation of external debt of countries with higher current account deficits is unsustainable in the long term, at some point will require an adjustment. The question is whether this adjustment becomes a priority of the economic authorities and the necessary measures are taken or, rather, given that exchange rate variations in a monetary union are not longer available, it is considered that this adjustment will occur spontaneously as a result of the decisions of private economic agents, the so-called Lawson doctrine.[4] The risk at stake is that if the market adjustment is too slow, it can increase the likelihood of an abrupt adjustment that ultimately will cost more in terms of economic growth and employment.

## 3 Testing for external sustainability: literature review

The study of sustainability in the OECD countries case has been the subject of many empirical works – see, among others, Trehan and Walsh (1991), Otto (1992), Wickens and Uctum (1993), Liu and Tanner (1996), Wu (2000), Wu et al. (2001) and Holmes (2006). The concept of sustainability of the current account has been widely discussed in the literature. Mann (2002) believes that sustainability can be viewed from two angles, the domestic and the international finance one. A sustainable current account is the one that generates no effect on domestic variables (savings and investment) or does not lead to significant international portfolio adjustments that make substantial changes in interest rates. Milesi-Ferretti and Razin (1996) distinguish between solvency and sustainability. An economy is solvent if the present value of expected future trade surpluses equals the current indebtedness, that is, if the economy performs its external intertemporal budget constraint. Sustainability means whether the economy is able to meet its budget constraint without a drastic change in the private sector behavior or without the implementation of economic policy measures. As Milesi-Ferretti and Razin (1996) point out, the latter concept has more "structure" as it involves variations in the agents' behavior.

In addition to the "classical" intertemporal approach, there has emerged more recently a

[4] The "Lawson doctrine", named after Nigel Lawson, the Chancellor of the Exchequer who articulated it in the 1980s. This "doctrine" is basically a restatement of the first welfare theorem: To the extent that current account deficits involve private saving and investment decisions, that there are no distortions, and that expectations are rational, then there are no reasons for the government to intervene (Blanchard, 2007a).

new literature that extends the modern theory of portfolio optimization to the current account. Thus, Lane and Milesi-Ferretti (2001, 2002) have examined the relationship between current account and changes in the balances of foreign assets at market prices. Lane and Milesi-Ferretti (2004) suggest that the fluctuations in the foreign exchange have an impact on the returns of the accumulated stocks of foreign assets and liabilities in addition to the traditional trade adjustment channel. The large number of cross-holdings of foreign assets and liabilities suggest that the valuation channel of assets through exchange rate adjustments has been gaining relative importance compared to the traditional trade balance. More recently, Gourinchas and Rey (2007) have decomposed the external adjustment into a financial channel and a commercial one.

In this paper we propose testing for solvency and sustainability in a two step process following the distinction made by Milesi-Ferretti and Razin (1996). First, we test for solvency as the ability of an economy to meet its intertemporal budget constraint in the long term.[5] This concept is more general and does not depend on any particular structural model. Moreover, this concept of sustainability is a sufficient condition for the fulfillment of other concepts of external balance. One particular advantage of this approach is that it can be easily tested. As Trehan and Walsh (1991) have pointed out, the stationarity of the current account is a sufficient condition to ensure compliance with the intertemporal budget constraint. This can be tested easily through the application of unit root and stationarity tests, which has become the approach more widely used in the literature. However, it must be borne in mind that we are working in a context of expected values on future events; therefore, changes in the agents' perceptions on different factors – as the risk, the decisions on portfolio asset composition, economic policy variations, or changes in the transaction costs in international financial markets, among others – can lead to variations in the dynamic adjustment to the current account equilibrium. Our purpose is checking whether an over-indebtedness level can lead to unsustainable current accounts and capital flights in a monetary union using stock variables. Therefore, in a second step, we test for sustainability accounting for possible abrupt adjustments in the series. Many recent investigations are still based on the adjustment of the flows to measure the dynamics of the adjustment process – for example, Bussière et al. (2004) and Zanghieri (2004). This approach has a major problem, which is to ignore the changes in valuation of stocks of foreign assets and liabilities and assume that the current balance of foreign assets is sustainable. However, a country that is generating persistent current account deficits may, at the same time, improve its balance of foreign assets if there are capital gains in their assets that exceed those of its liabilities (Lane and Milesi-Ferretti, 2006). Additionally, if a country is situated outside its level of financial equilibrium, the current account deficit can be sustained precisely because the economy is adjusting to a higher level of long-term liabilities. Edwards (2001) shows that this adjustment process can lead to substantial current account deficits. As already mentioned, both the concepts of sustainability and solvency are not only related to the current level of deficit, either commercial and/or financial, but they are also function of the amount of the economy's stock level of debt. Thus, if the debt of the economy is high, larger interest rates are to be set in order to capture resources from foreign investors. This, in turn, might increase the financial deficit, reducing the possibilities of getting

[5] Note that this concept is called sustainability by Taylor (2002).

a persistent sustainable commercial deficit.

From our point of view, a "stock approach" can successfully solve this problem. In turn, stocks are less volatile and can provide a long-term relationship that might be easier to estimate. In fact, this approach has been implemented recently by several authors. First, Calderon et al. (2000) use the database by Kraay et al. (2000) to test a portfolio model in a range of industrial and developing countries. Additionally, Lane and Milesi-Ferretti (2007a) compiled and used a database of external wealth. Third, the IMF (2005) applies a similar methodology to show the different role played by valuation effects on industrialized and emerging economies. Finally, Gourinchas and Rey (2007) used monthly data and focused on an intertemporal budget constraint approach for measuring external imbalances in the US.[6]

In this research we analyze the current account imbalances in EMU countries and consider different country-groups, which allows us to draw conclusions about the role of the external restriction on EMU. For this purpose we empirically test the sustainability of the current account, improving previous work from different perspectives. First, we seek to test long-term stability conditions to nest different theoretical approaches. Thus we pay special attention to a key relationship for the validity of the external sustainability, i.e., the stationarity of the stock of net foreign asset position ratio to GDP. Secondly, the use of the database developed by Lane and Milesi-Ferretti (2007a) allows the implementation of the stock market value approach for outstanding amounts of foreign assets compared to the flow approach at historical prices. Thirdly, we discuss the implementation of the sustainability tests through non-stationary panels. We propose the use of a class of tests that allow for the existence of cross-section dependence and structural breaks in the time dimension of the panel.

From a methodological point of view, the literature on sustainability of the current account can be splitted into two alternative approaches. On the one hand, the one that uses a time series analysis to study the long-term relationship between exports and imports or the stationarity of the accumulation process of external debt (see Chortareas et al. 2004). With the exception of Liu and Tanner (1996), who consider the existence of structural changes, these studies generally found that the relations are not stationary for the major industrialized countries including US, UK, Canada, Germany and Japan. A second approach has applied unit root tests in panel data to improve the statistical inference that is obtained using individual based tests. The most popular unit root tests applied to panels include Maddala and Wu (MW) (1999) and Im, Pesaran and Shin (IPS) (2003), which jointly test for unit root against the alternative of, at least, a stationary variable using the Augmented Dickey-Fuller (ADF) statistic. Given the heterogeneous nature of the alternative hypothesis, it can be difficult to interpret the results. Examples of studies that use unit roots panel methods are Wu (2000), Wu et al. (2001) and Holmes (2006). Another additional problem is the presence of cross-section dependence, which can invalidate the inference. This kind of dependence is a common feature in economic integrated areas such as the eurozone. Therefore it is highly convenient to take the cross-section dependence

[6] The rationale behind this approach is that valuation effects are destabilizing in developing countries because their liabilities are dollarized (the famous "original sin" coined by Obstfeld (2004)) and therefore its value changes with the dollar exchange rate variations, so that the more a dollarized economy is, the worse the reaction will be derived from a depreciation of the dollar on their balance in foreign assets. Similarly, valuation effects can play a stabilizing role in the industrial economies.

into account in the applied work.

For this purpose we use a panel data unit root test that allows for the presence of structural breaks and cross-section dependence. From an econometric point of view the contribution of this paper is twofold. First, we test for the presence of structural breaks affecting the NFA time series, considering as a particular case the situation with no structural breaks. Once the presence of structural breaks has been investigated, then individual stationarity test statistics are computed. Second, such individual tests can be pooled to define panel data based test statistics, which permit an assessment of the NFA stochastic properties using more powerful statistical tools. The statistical inference is conducted taking into account the presence of cross-section dependence through the computation of the bootstrap distribution and the use of approximate common factor models. Finally, we also address the study of changes in the shocks persistence across the different regimes that have been detected.

# 4 The NFA valuation channel to external adjustment: some theoretical issues

The model presented in this subsection draws on Gourinchas and Rey (2007). They start from a country's intertemporal budget constraint and derive two implications. The first one is a link between the net foreign asset position and the future dynamics of the current account. If total returns on NFA are expected to be constant, today's net foreign liabilities must be offset by future trade surpluses (the so called "trade channel"). However, in the presence of stochastic asset returns, the expected capital gains and losses on gross external positions constitute a complementary adjustment tool called the "valuation channel".

The external constraint implies that today's imbalances must predict either future changes in the trade balance (flow adjustment), future movements in the returns of the NFA portfolio (changes in the stock of foreign assets), or both. In the short and medium term, most of the adjustment goes through asset returns, whereas at longer horizons it occurs via the trade balance.

The value of assets owned by domestic residents held abroad ($A$) minus the value of domestic liabilities to the rest of the world ($L$) is called the national NFA position. If its net foreign asset position is positive ($NFA > 0$), the country is a net creditor to the rest of the world. Conversely, if NFA is negative ($NFA < 0$) then the country is a net debtor. Combining this relationship with the definition of the current account, it follows that the change in net foreign assets position is the same as the balance on the current account:

$$NX_t + NFI_t + UT_t = CA_t = NFA_t - NFA_{t-1}, \tag{1}$$

which implies that the change in the net foreign asset position is the sum of net exports ($NX_t$), net foreign income ($NFI_t$), and unilateral transfers ($UT_t$) or the balance on the current account. Therefore, the current account represents the rate at which a country accumulates or decumulates foreign assets.

In order to derive the different testing hypotheses, let us consider the accumulation identity

for net foreign assets between $t$ and $t-1$:

$$NFA_t = (1 + r_t)NFA_{t-1} + CA_t. \tag{2}$$

Dividing by the level of GDP and imposing the foreign debt sustainability condition that the ratio of NFA to GDP be constant at $nfa^*$, we find that the critical net exports to GDP ratio, $ca^*$ is:[7]

$$ca_t^* = (\hat{y}_t - r)nfa^*, \tag{3}$$

where $\hat{y}_t$ is the growth rate of nominal GDP and $r$ is the rate of interest that the country pays on its foreign liabilities.

According to Kouparitsas (2005), a country's current net foreign asset position is considered unsustainable if the associated $ca^*$ is a relatively large fraction of GDP. Similarly, a current account deficit is considered unsustainable if it maintains or leads to an unsustainable net foreign asset position.[8] The IMF (2005) has proposed two methodologies based on an estimated benchmark "equilibrium" current account, namely, the so-called current account norm approach (CAN) and the net foreign asset stabilization (NFAS) approach. The difference between the two approaches lies in the notion of the equilibrium current account used. In the CAN approach, the current account that would prevail over the medium-to-long term is estimated on the basis of fundamentals related to a balance of the economy[9], while in the NFAS approach, the benchmark current account is the one that guarantees the stabilization of the NFA/GDP ratio at its current level.

Although the saving-investment equilibrium approach does provide an analytical basis for the evaluation of external positions, its main limitation comes from the fact that it is almost concerned with the evaluation of flows, which limits its ability to assess the viability and adequacy of external indebtedness, a stock problem by nature. Moreover, the practical difficulty with the previous approach is that, in principle, any level of external debt is consistent with solvency provided that sufficient trade surpluses are generated in the indefinite future (Milesi-Ferretti and Razin, 1996). Thus, to make this approach operational, researchers typically assume that the economy targets a given debt-to-GDP ratio ($nfa^*$), and consider the particular case in which current policy would remain unchanged into the indefinite future (Corsetti and Roubini, 1991). The approach to estimating equilibrium saving-investment positions can also be problematic because it requires heroic assumptions about equilibrium stocks of net foreign assets or liabilities along with assumptions about equilibrium real interest rates and equity yields. That said, this framework can serve as a useful tool for assessing the sustainability of the prevailing (or projected) net foreign liability position, which does not require any assumptions about equilibrium levels. Such applications are also referred to as the External Sustainability Approach.[10] The

[7] Note that lower case letters denote variables as a ratio to nominal GDP

[8] However, $nx^*$ depends not only on $nfa^*$, which is weighted by the difference between the growth rate of nominal GDP and the interest rate on foreign debt, but also on the current ratio of domestic gross foreign assets to GDP, $a^*$, which is weighted by the difference between the interest rates on foreign debt and foreign assets, and the typical ratio of unilateral transfers to GDP, $ut^*$.

[9] See Chinn and Prasad (2003) or Lee et al (2008).

[10] See Isard (2007).

arithmetic of sustainability is primarily concerned with the question of whether net external liabilities grow less rapidly than their (marginal) rate of return, so that the present discounted value of net liabilities converges to some finite quantity. In practical terms, the arithmetic of sustainability examines whether the net debt/GDP ratio grows more or less rapidly than the difference between the real interest rate and the economy's growth rate.

Following Chortareas et al. (2004), equation (2) can be rewritten dividing by GDP all the variables and substracting $nfa_{t-1}$ at both sides of the equation**:**

$$\Delta nfa_t \cong ca_t + \tilde{r}_t nfa_{t-1}, \tag{4}$$

where $\tilde{r}_t = r_t - \mathring{p}_t - \mathring{y}_t$ is the growth-adjusted real return on net foreign debt, $\mathring{p} = \Delta logP_t$, and $\mathring{y}_t = \Delta logY_t$. Assuming $\tilde{r} > 0$, solving (4) forward, and imposing the no-Ponzi game condition, the Intertemporal Budget Constraint (IBC) is:

$$nfa_t = -\sum_{j=1}^{n} \rho_t ca_{t+j}, \tag{5}$$

with $\rho_t = \Pi_{s=1}^{n}(1+ \tilde{r}_{t+s})^{-1}$. If this conditions holds, current and future discounted primary current account surpluses are sufficient to pay off initial indebtedness. Therefore, a test for external sustainability can rely on the use of unit root and stationarity tests to determine the order of integration of $nfa_t$.

In the present exercise we take account of the valuation effects of stocks of foreign assets and liabilities using the new External Wealth of Nations Mark II (EWN II) database provided by Milesi-Ferretti and Lane (2007a). According to them, the size of countries' external portfolios is now such that fluctuations in exchange rates and asset prices cause very significant reallocations of wealth across countries. The exchange rate plays, then, a dual role, as it influences both net capital flows and net capital gains on external holdings.

# 5 Econometric methodology and results

In this section we present the testing strategy we use to address the theoretical issues described above. The empirical application is based on a panel database that consists of 11 EMU countries. The sample covers the period 1972-2007, and the data has been obtained from the World Bank and the new External Wealth of Nations Mark II (EWN II) database provided by Milesi-Ferretti and Lane (2007a). The variable of interest is the net foreign assets stock as a percentage of GDP ($nfa_{i,t}$). We test, using panel methods, for the sustainability of net foreign assets position of our group of countries.

We have applied panel data based test statistics following a two-step testing strategy that addresses the problems related to the issues of multiple structural breaks and cross-section dependence.[11]

First, we have tested for the sustainability of external imbalances by allowing for multiple

[11] We have applied as well classical panel unit root and stationarity tests without structural breaks finding mixed results. These results are available upon request from the authors.

structural changes in a panel setting that, to the best of our knowledge, has not been applied yet in this literature. Previous evidence has revealed that there might be some events that affect the net foreign asset position in a permanent way. It is well known that non accounting for structural breaks biases both unit root and stationarity tests towards concluding in favor of I(1) non-stationarity.[12] Thus, this feature should be of special interest in our case, since this type of variables may be affected by major events such as currency crises or economic integration processes during the analyzed period.

Second, we consider the existence of cross-section dependence amongst the individuals in the panel. Cross-section independence is hardly found in practice, especially when using macroeconomic time series that derive from deeply integrated financial markets, as it is the present case. As panel data unit root and stationarity tests are known to be biased towards concluding in favor of I(0) stationarity when individuals are cross-section dependent – see Banerjee et al. (2004, 2005) – the issue of cross-section dependence is of great importance. Therefore, we suggest computing the test statistic proposed in Pesaran (2004) to assess whether the individuals in the panel are cross-section independent.

The application of this statistic reveals that cross-section dependence is present in the panel data sets that we study. Following the approach by Carrion-i-Silvestre et al. (2005) we compute the bootstrap critical values of the panel data stationarity test statistic, which allows us to consider a wide form of cross-section dependence. Further, we also base our analysis on the Harris et al. (2005) panel stationarity test, where cross-section dependence is modelled using common factors. In all cases, the analysis accounts for the possibility that multiple structural breaks are present in the data.[13]

Finally, note that proceeding in this fashion accounts for the existence of a tension or trade-off between cross-section dependence and misspecification concerning the presence of structural breaks: the former introduces a bias towards I(0) stationarity, while the bias due to the latter goes in the opposite direction. This feature implies that the empirical analysis of the current account balances should be addressed carefully to avoid the effects of this tension.

## 5.1 Testing for external sustainability through external debt solvency: panel analysis

### 5.1.1 Testing for the presence of multiple structural breaks

The first stage of our analysis consists of assessing the presence of structural breaks affecting the $nfa_{i,t}$ time series using the following specification:

$$y_{i,t} = \alpha_i + \sum_{k=1}^{m_i} \theta_{i,k} DU_{i,k,t} + e_{i,t}, \tag{6}$$

where $y_{i,t}$ is the variable of interest, whereas $t = 1, \ldots, T$, $i = 1, \ldots, N$, with $DU_{i,k,t} = 1$ for $t > T^i_{b,k}$ and 0 elsewhere – $T^i_{b,k}$ denotes the $k$th break point for the $i$th individual, $k = 1, \ldots, m_i$ –

[12] See Perron (1989) for univariate statistics, or Carrion-i-Silvestre et al. (2001) for panel data statistics.

[13] The approach that is adopted here is general enough to consider the non-break situation as a particular case embedded in the testing procedure.

and where $\{e_{i,t}\}$ are assumed to be a stationary process satisfying the strong-mixing conditions given in Phillips (1987) and Phillips and Perron (1988).

This specification permits a high degree of heterogeneity assuming that the structural breaks may have different effects on each individual time series. We argue that there are several reasons to believe that these variables may suffer from discontinuities. Previous evidence has revealed that there might be some events that affect the external debt in a permanent way. For this purpose, the analysis that we carry out allows the break points to be located at different dates for each individual, and the individuals may have different number of structural breaks. Under these conditions, the estimation of the number and position of the structural breaks, if any, can be carried out using the sequential testing procedure proposed by Bai and Perron (1998). When computing the statistic we have to specify a maximum number of structural breaks, which in this case has been set equal to $m_i = 5\ \forall i$. The number of structural breaks is estimated using critical values at the 5% level of significance.

It is worth mentioning that the application of the Bai-Perron methodology to estimate the number and position of the structural breaks requires the variables under analysis to be I(0) stationary, which is consistent with the null hypothesis that we have specified, i.e., that the solvency hypothesis holds. Furthermore, the test statistic that is used is consistent against the alternative hypothesis of I(1) non-stationarity, even when structural breaks are present in the analysis – see Lee, Huang and Shin (1997), Kurozumi (2002) and, Carrion-i-Silvestre (2003), among others.

Panel A in Table 1 reports the estimated number and position of the structural breaks for each individual in the NFA panel data set. We can see that, except for Germany, the procedure detects at least one structural break for each time series, which indicates that previous analyses in the literature that do not account for the presence of structural breaks may have led to misleading conclusions. It should be stressed that the estimated number of structural breaks does not attain the maximum that has been defined.

As the literature on current account reversals describes – see Freund (2005) and Debelle and Galati (2007), among others – the adjustment usually takes place once the current account imbalance reaches a certain threshold. The effect of the adjustment on the net foreign asset position would critically depend on the relative position of assets and liabilities when the event takes place. In this paper we rely on this idea to explain the evolution of external imbalances and its adjustment episodes along the process of monetary integration in Europe. Table 2 presents an approximation to the main events outlined by the "current account reversals' literature" as well as the main episodes related to the European integration process to explain the structural breaks found in the data. Namely, these events are five: the first oil shock (beginning 70's) and the launching in 1972 of the European Monetary Snake as a regional reaction to the increasing malfunctioning of the Bretton-Woods system; the collapse of the international monetary system together with a lack of enough symmetry and cooperation within the Snake led to its replacement by the European Monetary System in 1979 and its subsequent reform later on in 1987 (Basel-Nyborg Agreement) parallely to the second oil shock (beginning 80's); the final stage of the monetary integration process in Europe starts with the Treaty of Maastricht and the EMS crisis in 1992-93 and the Asian crisis. Finally, EMU was officially launched in 1999. This

presentation allows us to establish a comparison of the break dates and the direction of the changes that have been estimated. An arrow indicates the direction of the break (where ↑ stands for an improvement in the external position and ↓ for a worsening). In Table 2 we have limited ourselves to the main milestones in European integration and international economic events' agenda.[14]

First, at the beginning of the 70's, the first oil shock triggered the collapse of the Bretton Woods system inducing effects on different countries. Belgium and Austria decided to link its currency to the Deutsche Mark at the end of Bretton Woods – therefore, a policy change may have happened in 1974 and 1975 for Belgium and Austria, respectively. Second, a large group of countries had a structural break in the mid-eighties. Both Belgium and Germany followed recovery programs. For example, president Martens in Belgium devalued the frank in 1982 and started an export-led policy. Ireland also devalued in 1983 in an answer to a twin deficits problem, followed by a tightening of fiscal policy.[15] Austria in 1980 started a system of cooperative arrangement for its exchange rate. Finally, Portugal suffered a deep recession, with terms of trade losses, fiscal deficits and increase in foreign debt service. Third, another large group of structural changes is found during the beginning of the 90's. Most of the breaks are linked to the free capital movements in Europe, together with the EMS crises in 1992 and 1993. Portugal and France suffered a slowdown in economic activity in an effort to fulfill the Maastricht criteria. In the case of Austria, EU membership occurred in 1995, together with Sweden and Finland. The first structural break that Finland suffered occurred in 1996, just after EU accession, whereas the second one (in 2001) is placed at the peak of an economic expansion. Finally, the end of the nineties and the beginning of 2000 accumulates another group of structural changes. These breaks are mainly linked to the creation of the monetary union in 1999, the launching of the euro in 2001 and affects several countries, namely Finland, Greece, Italy, the Netherlands and Spain.

The different exchange rate regimes along these periods together with divergent competitiveness paths across member countries have led to several external crises episodes followed inexorably by adjustments originated either by market forces or policy measures. The new framework established by the monetary union led the economists to think that the external constraint was not playing anymore an important role. Economic theory backed this belief either based on the neoclassical paradigm and the subsequent convergence process inherent to all economic integration or to new and more optimistic agents' expectations within an intertemporal approach to the balance of payments. Under both theories, the ease of financing given by globalization of international financial markets has helped the growth and persistence of external imbalances. In this new environment, the price competitiveness adjustment channel, being still important, has given room to the net foreign position as key indicator to trigger external adjustments. The recent financial turmoil seems to confirm this point.

From a policy perspective it is crucial to assess the extent to which developments in com-

[14] Other issues, however, may explain a particular structural break.

[15] Membership of the EMS always posed problems for Ireland by virtue of the fact that the UK, the country's major trading partner, is not a member of the system. Such problems became most acute when a depreciation in Sterling put pressure on Irish companies in traditional industrial sectors. Such considerations prompted a devaluation of the Irish pound at the March 1983 re-alignment.

petitiveness and external performance within the euro area can be related to policy mistakes, market failures or any form of domestic macroeconomic imbalance at member state level. According to European Commission (2009) divergence in competitiveness can in part be traced back to benign factors such as Balassa-Samuelson effects, price convergence or cyclical differences. Moreover, as discussed earlier, current account dispersion in a process of monetary and financial progressive integration is a normal outcome. However, there are also less "benign" drivers of divergence in external performance, like inappropriate responses of wages to productivity shocks, domestic economic imbalances, sluggish productivity performance, accumulation of high private sector debt and the emergence of housing bubbles. The former should be left to the market forces for adjustment while the latter require some form of policy intervention. The distinction between harmful and benign changes in external performance largely depends on the extent to which are driven by market disfunction or policy mistakes. According to Blanchard (2007a), in a fully flexible economy the swings in competitiveness are temporary but if there exists market distortions (i.e. price and wages rigidities), then, there is a case for welfare improving policy actions.

### 5.1.2 Testing I(0) stationarity on individual time series

The analysis above is conditional on the maintained assumption that the time series are I(0) stationary, an assumption that should be tested. The estimation of the model in (6) with the break points that have been obtained above can be used to compute the individual stationarity test in Kwiatkowski et al. (1992) – henceforth, KPSS statistics – given by

$$\hat{\eta}_i(\lambda_i) = \hat{\omega}_i^{-2} T^{-2} \sum_{t=1}^{T} \hat{S}_{i,t}^2, \tag{7}$$

where $\hat{S}_{i,t} = \sum_{j=1}^{t} \hat{e}_{i,j}$ is the partial sum process that is obtained using the estimated OLS residuals of (6), $\hat{\omega}_i^2$ denotes a consistent estimate of the long-run variance of the error term $e_{i,t}$, which, based on the evidence reported in Carrion-i-Silvestre and Sansó (2006), has been estimated following the procedure described by Sul et al. (2005), using the Quadratic spectral kernel. In (7), $\lambda_i$ is defined as the vector $\lambda_i = (\lambda_{i,1}, ..., \lambda_{i,m_i})' = \left(T_{b,1}^i/T, ..., T_{b,m_{i,j}}^i/T\right)'$, which indicates the relative position of the dates of the breaks on the entire time period $T$ for each individual.

The computation of the individual KPSS statistic permits to get a first analysis of the stochastic properties of the net foreign asset position – see Panel A in Table 1. The statistics in Panel A offer the computation of the individual KPSS along with the corresponding simulated critical values at the 5 and 10% level of significance. The results point to the rejection of the null hypothesis of I(0) stationarity at the 5% level of significance for Austria, Italy and Spain. This individual based inference can be improved if we combine the individual statistics through the definition of panel data statistics. Thus, the literature on non-stationary panel data statistics argues that a better characterization of the stochastic properties of the time series can be obtained if we increase the amount of information when performing the inference. However, some cautions have to be taken when computing these panel-data-based statistics, since some

of them rely on the critical assumption of cross-section independence. This assumption is investigated in the next section for our panel data sets.

### 5.1.3 The issue of cross-section independence

In this subsection we test the null hypothesis of non correlation against the alternative hypothesis of correlation using the approach suggested in Pesaran (2004). He designs a test statistic based on the average of pair-wise Pearson's correlation coefficients $\hat{p}_j$, $j = 1, 2, \ldots, n$, $n = N(N-1)/2$, of the residuals obtained from an autoregressive (AR) model that includes dummy variables to capture the structural breaks. We estimate an autoregressive model to isolate cross-section dependence from the autocorrelation that might be driving the individual time series. In addition, the estimation of the autoregressive model includes dummy variables to capture the level shifts that have been detected using Bai and Perron (1998) in the previous section, which aims at isolating cross-section dependence from both autocorrelation and structural breaks in the individual time series. We then proceed to allow for the presence of the structural breaks when testing the null hypothesis of non correlation among the individuals in the panel. Under the null hypothesis of cross-section independence the $CD$ statistic of Pesaran (2004) converges to the standard normal distribution. The results in Table 1 show that the Pesaran's CD statistic strongly rejects the null hypothesis of independence, so that cross-section dependence has to be considered when computing the panel data statistics if misleading conclusions are to be avoided.

### 5.1.4 Panel data tests with cross-section dependence and structural breaks

The specification estimated above permits the computation of two different panel data stationarity statistics. First, we have applied the approach suggested in Carrion-i-Silvestre et al. (2005) to test the null hypothesis of panel variance stationarity allowing for multiple level shifts. Thus, note that the specification given in (6) is one of the two models considered by these authors. The OLS estimated residuals from (6) are used to obtain the individual KPSS statistics computed in the previous sections, which in turn can be combined to define two panel stationarity test statistics depending on whether we use an homogeneous long-run variance estimate – the statistic is denoted as $Z(\lambda)_{HOM}$ – or an heterogeneous one – the statistic is denoted as $Z(\lambda)_{HET}$. Since the time series in the panel have been shown to be cross-section dependent, we compute the distribution of the $Z(\lambda)$ statistics by bootstrap following the procedure described in Maddala and Wu (1999).[16] Panel B in Table 1 presents the $Z(\lambda)$ statistics along with the bootstrap critical values. According to these statistics, the null hypothesis of I(0) cannot be rejected at the 5% level of significance by either of the statistics.

Second, we have computed the $S_F$ panel data stationarity test statistic in Harris et al. (2005), which captures the cross-section dependence through the specification of a common factor model. The estimated break points for each country are the same obtained above, so that this statistic can help to shed light on the stochastic properties of the NFA panel. In order to check the robustness of the $S_F$ statistic to the specification of different number of common

[16] The bootstrap distribution is based on 2,000 resamplings of the $(T \times N)$-matrix of the OLS estimated residuals from (6) $\hat{e} = (\hat{e}_1, \ldots, \hat{e}_N)$.

factors, we have computed the statistic for up to six common factors – unfortunately, the use of panel BIC information criterion in Bai and Ng (2002) always selects the maximum number of factors that is set. The results shown in Panel B of Table 1 indicate that the null hypothesis of I(0) cannot be rejected at the 5% level of significance by the $S_F$ statistic, regardless of the number of factors that is used.

In all, we can see that the evidence drawn from the panel data statistics leads to conclude that the NFA panel data set is I(0) stationary. This in turn implies the solvency of the euro area, although when the countries are analyzed individually, three of them are not solvent. These countries are Austria (with persistent and increasing surpluses), Italy and Spain (with the opposite situation). Note that the period studied finishes in 2007, jut before the current crisis and the on-going present adjustment. Therefore, the results were pointing to the need of an abrupt adjustment for these countries. Concerning the rest of the countries, the presence of abrupt changes (structural breaks) that have been detected – with the only exception of Germany – evidences sustainability problems in their external positions along the sample period analyzed.

### 5.2 The nature of shocks changing persistence

So far we have established the stochastic properties of NFA identifying the presence of structural breaks that correspond with different policy regimes or fundamentals of the EMU economies. The goal of this section is to focus on the effects that such abrupt changes and adjustment measures might have had on the persistence of the regular shocks affecting the NFA variables. Although of great interest, our look at this issue has to be understood as a first approximation, since the limitations imposed by the lack of statistical information covering long periods avoid the specification of general models. Our approach is based on the estimation of changing parameter AR($p$) models as a way to approximate the persistence of recurrent shocks in different regimes. The AR model that is considered is given by:

$$nfa_{i,t} = \mu_{i,j} + \phi_{i,1,j} nfa_{i,t-1} + \phi_{i,2,j} nfa_{i,t-2} + u_t; \qquad t = T_{j-1} + 1, ..., T_j \tag{8}$$

$j = 1, ..., m+1$, where $T_0 = 0$ and $T_{m+1} = T$. Given that the $nfa_{i,t}$ variables that define this model have been characterized as I(0) stochastic processes, we can apply the Bai and Perron (1998) procedure to estimate the number and position of the structural breaks. As mentioned above, the limitation on the available statistical information has led to restrict the set of models to AR specifications that consider up to two lags. The estimated models are reported in Table 3. Some remarks are in order. First, note that both the estimated number of structural breaks and their position do not have necessarily to coincide with those estimated in the previous section, provided that we are estimating a different specification – we consider a dynamic model where both the parameters of the deterministic regressors and the lagged variable are allowed to change. Second, the reported models are the ones selected by the BIC information criterion after the AR(1) and AR(2) specifications have been estimated.

In order to measure the persistence of the shocks in the different regimes we have computed

the half-life (HL) of a shock, where HL denotes the number of time periods that takes for 50% of a shock to the $nfa_t$ variable to dissipate. Figure 7 summarizes the estimated HL in years for each country in each economic regime. For the AR(1) model the HL for the $i$-th individual in the $j$-th regime is computed as $HL_{i,j} = \ln(0.5) / \ln\left(\phi_{i,1,j}\right)$, whereas for the AR(2) model we need to compute the HL from the impulse response function.

As we can see, in most of cases the shock persistence at the beginning of the analyzed period was infinite – exceptions are Finland, France and Spain – although, in general, the integration process has led to a reduction in the persistence of the shocks (with the exceptions of Belgium, Greece, Portugal and Spain). Therefore, this evidence seems to point to a lack of timely policy interventions and/or structural reforms fostered by the economic authorities in these countries.

# 6 Conclusions and policy discussion

A monetary union raises new economic questions about the interpretation and the implications of high current account deficits for the economic performance of its members in the medium term. Recent literature has argued that conventional measures of external sustainability – the trade balance and current account – can be misleading because they omit possible valuation changes on net foreign asset positions.

In this research we contribute to the literature on external sustainability in several respects. First, we improve previous empirical work on the intertemporal model by testing for the stationarity of the net foreign assets stock by applying panel tests. Second, we allow for multiple structural breaks and cross-section dependence. Third, we relate the identification of the structural changes with the literature on current account reversals, trying to assess how the countries regain solvency through adjustment processes. Finally, we have assessed the changes in the persistence of the variable along the analyzed period.

Our results underline the increasing importance of the NFA to GDP ratio as a vital indicator to assess external solvency in the EU as financial integration and cross-section dependence between European markets are also higher. The evidence is in favour of external solvency and sustainability for the EMU area as a whole. Focusing on the individual statistics, we can see that the null hypothesis of I(0) cannot be rejected at the 5% level of significance with three exceptions. In general, the individual country results point to the fact that policy measures or, otherwise, abrupt readjustments, are still needed to keep the sustainability of the current accounts. In fact, the evidence obtained indicates that cross-section dependence has to be considered when computing the panel data statistics if misleading conclusions are to be avoided. Finally, our results show that there is evidence of the NFA to GDP ratio being an I(0) stationary process once structural breaks and cross-section dependence are allowed for with the exception of Austria, Italy and Spain, that showed a global external non-sustainable position up to 2007 before the current crisis and, therefore, this evidence was signalling the need of an abrupt adjustment in these countries**.** The endogenously determined break points serve us to detect adjustments either led by the markets, but mostly, promoted by pro-active policy measures. This study has sought to confirm the presence of stabilizing mechanisms for the NFA positions of the euro area countries from the launching of the EMS up to 2007.

Persistent and large current account imbalances have led to quite dramatic changes in the net international positions of the countries considered. Various feedback effects from foreign asset stocks may act as stabilizing mechanisms to prevent a continued increase of these NFA positions, and to ensure an eventual return to long-run equilibrium. These mechanisms can either come from the market itself or being the result of economic policy measures. This evidence would be against a smooth self regulating capacity of the markets, and therefore, against "laissez-faire", the so-called "Lawson doctrine". However, the increasing financial integration process among EMU countries may have been relaxing the external constraint. To avoid an overcostly adjustment when the current account deficit becomes too high, it may be preferable to use certain economic policy levers rather than let the adjustment occur spontaneously. The lack of these timely interventions together with the rigidities and imperfections of the present Single Market in the EU are on the ground of the abrupt adjustment that is taking place in the European economy and the excessive cost in terms of growth and employment of the present crisis in some EMU members. In this new environment the role of the monetary policy is mainly preventive, generating a tightening bias to block the formation of unsustainable positions. Only when the adjustment has begun (spontaneously or via a suitable national policy), monetary policy can be eased to help the adjustment. Although, according to Blanchard (2007), fiscal policy can be appropriate in a monetary union for a counter-cyclical policy, it is more debatable for dealing with a shortage (or excess) of external demand because its effects are small. Moreover, according to the Lawson doctrine, current-account imbalances are merely reflecting an optimal saving allocation. However, in the presence of market distortions and non rational behaviors, fiscal policy intervention can promote a return to sustainable paths. A restrictive policy would be suitable for large current account deficits caused by overheating; an expansionary policy may help to jump-start an economy experiencing disinflation despite trade and current account surpluses.

The existence of structural rigidities (in prices and wages) can hamper economic activity in countries whose current accounts pose large deficits and whose currencies would have been devalued in a flexible exchange-rate regime. The necessary real relative depreciation against other countries in the union generates expectations of lower prices and hence higher real interest rates.

Structural reforms aiming at making price downward-flexible may lead to a steeper rise in real interest rates ex-ante. In addition to migration and fiscal policies, compensatory policies can be introduced to lessen short-term adjustment costs. A redistributive policy could provide effective support for very swift structural reforms such as a reduction in nominal wages. If prices fall quickly enough, expected deflation will be weak, the increase in real interest rates will thus be moderate as well, and external demand will soon make up for the shortfall in domestic demand. Therefore, rapid and effective structural reforms could have an expansionary impact, and the distributive effects of the reforms could be offset by adequate transfer policies. For instance and for the case of Portugal, Blanchard (2007b) recommended to improve productivity, encourage emigration, reduce unit labour costs through VAT increase offset by a reduction in wages (via structural reforms) and moderate tax incentives.

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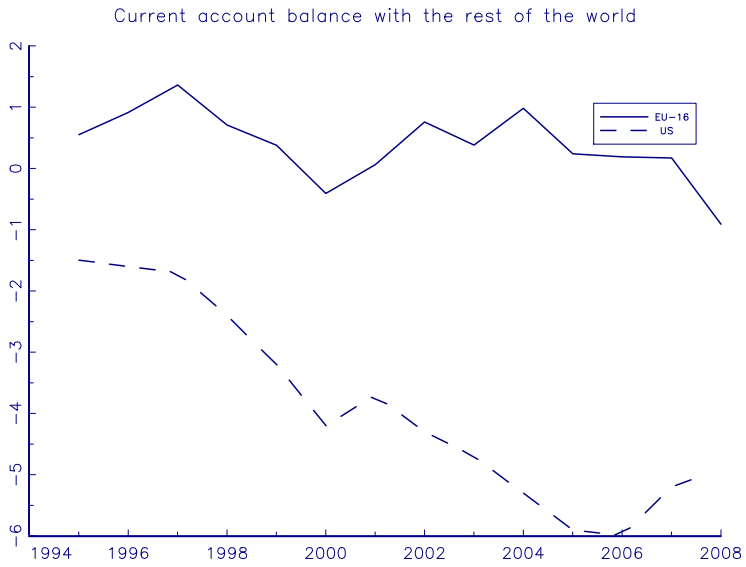


Figure 1: Current account balance with the rest of the world

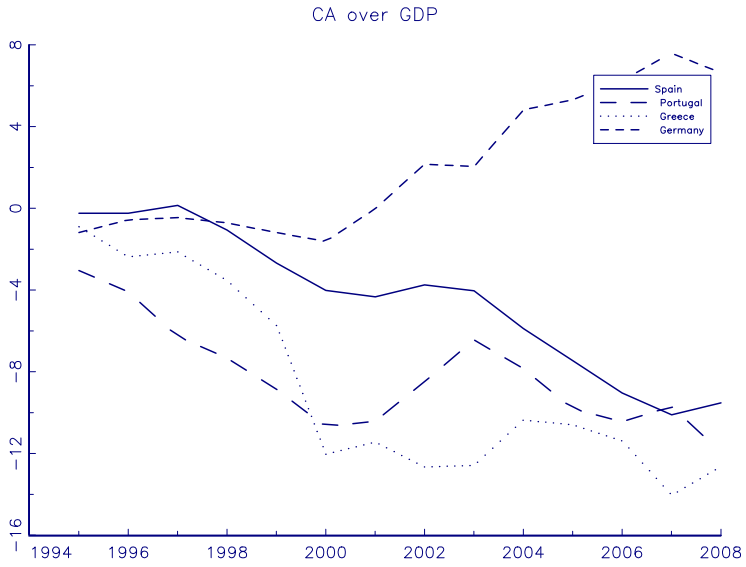


Figure 2: Current account over GDP

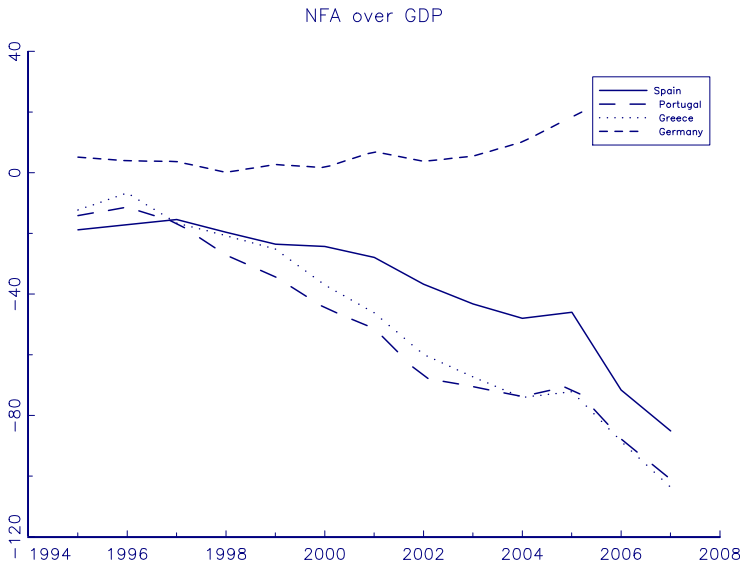


Figure 3: NFA over GDP

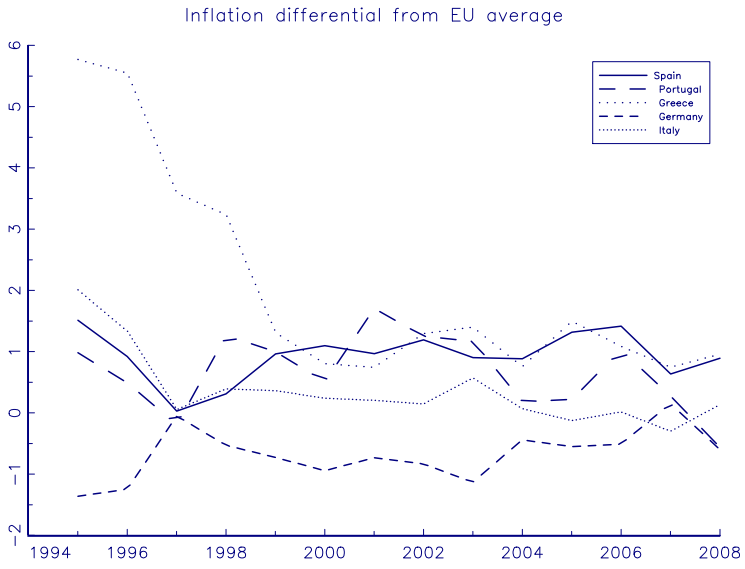


Figure 4: Inflation differential from EU average

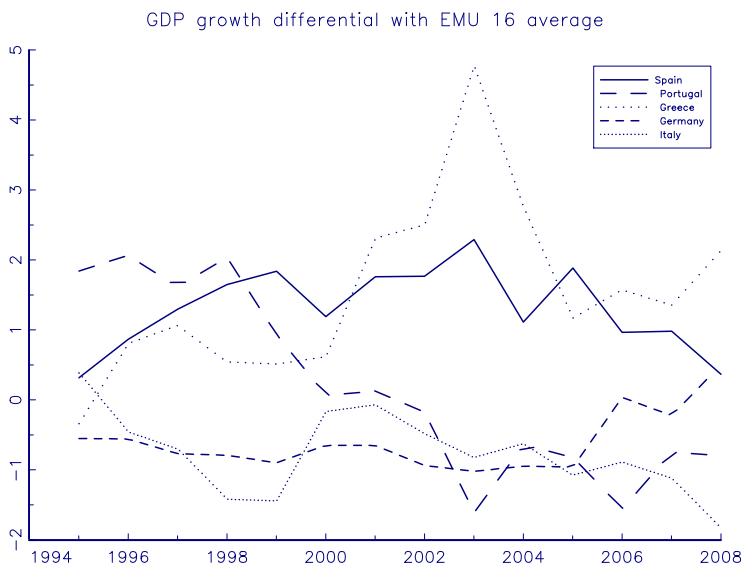


Figure 5: GDP differential with EMU 16 average

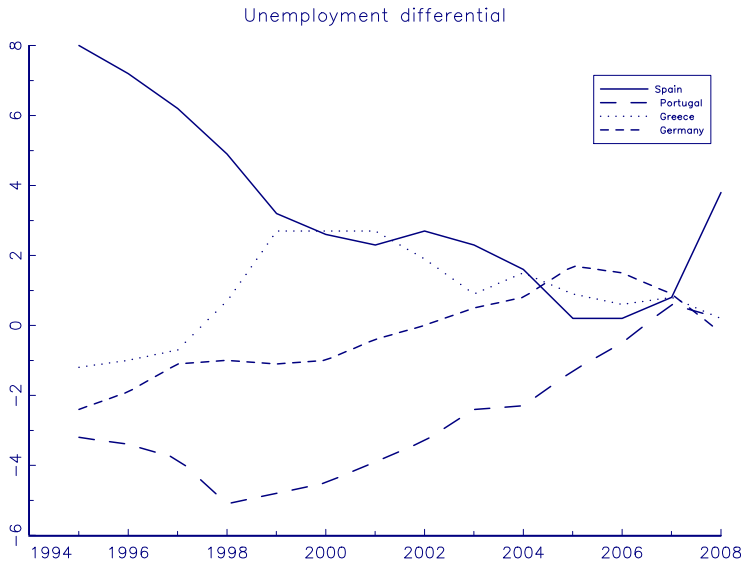


Figure 6: Unemployment differential

Table 1: Results for NFA variable with multiple breaks affecting the mean

**Panel A:** Individual information

| | Tests | $m_i$ | $T^i_{b,1}$ | $T^i_{b,2}$ | $T^i_{b,3}$ | Critical values 10% | 5% |
|---|---|---|---|---|---|---|---|
| Austria | 0.181** | 2 | 1976 | 1996 | | 0.137 | 0.172 |
| Belgium | 0.026 | 3 | 1980 | 1990 | 1996 | 0.075 | 0.087 |
| Finland | 0.096 | 2 | 1996 | 2001 | | 0.189 | 0.246 |
| France | 0.052 | 2 | 1982 | 1996 | | 0.099 | 0.116 |
| Germany | 0.153 | 0 | | | | 0.353 | 0.458 |
| Greece | 0.032 | 2 | 1980 | 2001 | | 0.142 | 0.182 |
| Ireland | 0.046 | 3 | 1980 | 1988 | 1996 | 0.072 | 0.082 |
| Italy | 0.211** | 2 | 1984 | 2001 | | 0.118 | 0.144 |
| Netherlands | 0.052 | 2 | 1993 | 2002 | | 0.152 | 0.195 |
| Portugal | 0.054 | 1 | 2001 | | | 0.258 | 0.333 |
| Spain | 0.995** | 3 | 1980 | 1992 | 2002 | 0.079 | 0.091 |

**Panel B:** Panel data statistics

| | Test | p-value |
|---|---|---|
| Pesaran's $CD$ statistic | 4.103 | 0.000 |

| | | Bootstrap dist. | |
|---|---|---|---|
| | Test | 90% | 95% |
| $Z(\lambda)_{HOM}$ | -0.619 | 8.850 | 10.060 |
| $Z(\lambda)_{HET}$ | 4.715 | 4.628 | 5.381 |

| Number of factors | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $S_F$ | -1.095 | -0.738 | -0.501 | -0.163 | -0.352 | 0.245 |
| p-value | 0.863 | 0.770 | 0.692 | 0.565 | 0.637 | 0.403 |

Table 2: Main events and breaks found in the data

| **Main events** | **Countries and dates of change** | |
|---|---|---|
| | **Positive NFA** | **Negative NFA** |
| **Beginning 70s** (Bretton Woods ends) | | |
| First oil shock | | AUS(76) |
| **Beginning 80s** | BEL(80), FR(82) | GRE(80) |
| Second oil shock | | IRE(80), ESP(80) |
| **Mid-80s** | ITA(84↓) | |
| lower oil prices | | IRE(88) |
| **Beginning-mid 90s** | BEL(90,96) | ESP(92),AUS(96) |
| K mov, EMS crises | NET(93↓),FR(96), | IRE(96↑),FIN(96↓) |
| **End 90s, beginning 2000** | FIN(01↑) | POR(01),ITA(01) |
| Asian Crisis, EMU | | GRE(01),SPA(02) |

Table 3: Estimated AR model

| | $T_{b,1}$ | $T_{b,2}$ | $\mu_1$ | $\phi_{1,1}$ | $\phi_{1,2}$ | $\mu_2$ | $\phi_{2,1}$ | $\phi_{2,2}$ | $\mu_3$ | $\phi_{3,1}$ | $\phi_{3,2}$ | BIC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 1979 | 1994 | -0.003 | 1.022 | 0.248 | -0.119 | 0.372 | -0.565 | -0.193 | 0.192 | -0.116 | -8.108 |
| | | | (-0.156) | (1.872) | (0.349) | (-4.073) | (1.689) | (-2.397) | (-3.494) | (0.739) | (-0.465) | |
| Belgium | 1980 | 1997 | -0.119 | 0.772 | 1.138 | 0.021 | 1.564 | -0.365 | 0.098 | 1.045 | -0.348 | -7.83 |
| | | | (-1.841) | (1.269) | (1.074) | (2.131) | (5.169) | (-0.988) | (1.968) | (7.884) | (-2.408) | |
| Finland | 1987 | 1997 | -0.134 | 0.603 | -0.33 | 0.098 | 2.751 | -1.381 | -0.128 | 0.963 | -0.386 | -5.077 |
| | | | (-0.354) | (0.325) | (-0.206) | (0.669) | (8.207) | (-3.181) | (-1.750) | (8.678) | (-3.295) | |
| France | 1994 | | -0.006 | 0.626 | 0.218 | 0.090 | 0.070 | -0.354 | | | | -7.609 |
| | | | (-0.855) | (2.341) | (0.844) | (4.696) | (0.274) | (-1.799) | | | | |
| Germany | | | 0.018 | 1.375 | -0.542 | | | | | | | -7.405 |
| | | | (1.935) | (8.715) | (-3.030) | | | | | | | |
| Greece | 1984 | 1994 | -0.013 | 0.561 | 0.728 | -0.013 | 1.045 | -0.211 | -0.076 | 0.904 | 0.143 | -7.216 |
| | | | (-0.660) | (0.880) | (0.918) | (-0.272) | (3.227) | (-0.626) | (-2.795) | (4.210) | (0.617) | |
| Ireland | 1983 | 1998 | -0.005 | 1.139 | | 0.129 | 1.088 | | -0.144 | 0.114 | | -5.449 |
| | | | (-0.083) | (8.891) | | (3.359) | (15.018) | | (-4.351) | (0.787) | | |
| Italy | | | -0.009 | 0.982 | -0.028 | | | | | | | -7.711 |
| | | | (-1.216) | (5.622) | (-0.161) | | | | | | | |
| Netherlands | 1996 | | -0.059 | 0.940 | 0.334 | -0.036 | 0.162 | 0.197 | | | | -5.798 |
| | | | (-2.361) | (3.694) | (1.077) | (-0.828) | (0.809) | (0.948) | | | | |
| Portugal | 1984 | 1995 | -0.027 | 1.026 | | -0.039 | 0.605 | | -0.085 | 0.993 | | -6.356 |
| | | | (-0.841) | (11.155) | | (-1.363) | (5.709) | | (-2.176) | (14.209) | | |
| Spain | 1995 | | -0.032 | 0.969 | -0.198 | 0.036 | 0.835 | 0.545 | | | | -7.052 |
| | | | (-1.481) | (2.376) | (-0.508) | (1.019) | (4.502) | (2.122) | | | | |

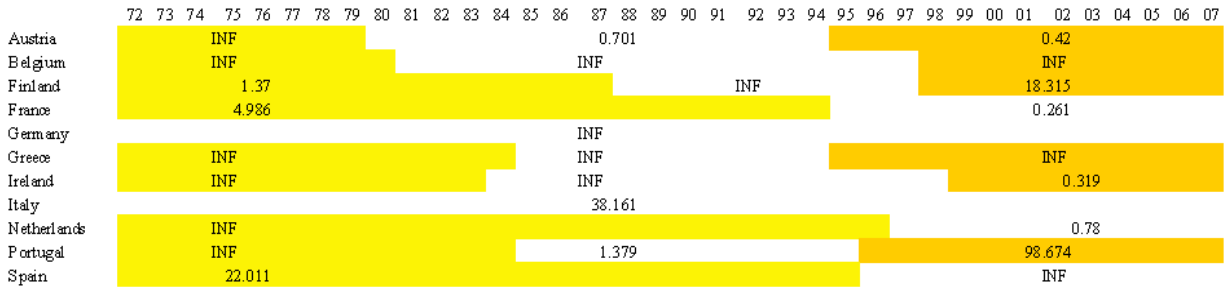


Figure 7: Estimated half-lives (in years) by regime