



Boundedness and nonlinearities in public debt dynamics: A TAR assessment



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ABSTRACT

This study aims to investigate the dynamics of *public debts* over more than four decades for two of the main developed countries: the USA and the UK. To do this, we apply nonlinearity tests and threshold models. While the first tests enable us to check for further changes in the data, threshold models are required to assess the switching-regime hypothesis and to apprehend the main changes in *public debts* through different regimes. Our results provide several interesting findings. First, for both countries, we noted several structural breaks associated with well-known economic downturns, oil shocks, debt crises and financial crashes. Second, public debt dynamics seem to be characterized by various threshold effects that can improve the modeling and forecasting of public debt evolution. It is important to note that public debts vary significantly according to the regime and that a regime can be induced by specific macroeconomic factors. Keeping a close eye on such factors may help economists and policymakers to better control future public debt evolutions.

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1. Introduction

Public debt (PD) encompasses all the liabilities that are debt instruments owed by governments and public administrations, companies and organisms. We identify domestic PD detained by resident economic agents and external PD that refers to foreign holders (China, Japan, oil exporting countries, Brazil, etc., for US PD for example), as well as short-term (less than one year), mid-term (up to 10 years) and long-term (over 10 years) PD. PD constitutes a crucial instrument for governments to finance public expenses, especially when it is difficult to increase taxes and/or reduce expenditure. Accordingly, PD is considered as a crucial issue for consumers, investors and policymakers, since a high PD-to-GDP ratio drags the whole economy down. It operates through different channels: public investment, private savings, total factor productivity, and sovereign long-term nominal and real interest rates (Checherita and Rother, 2010). The state of the international economic system after the recent financial downturn is now a well-known 21st-century example. Indeed, the subprime crisis that began in the United States in August 2007 induced a global financial crisis (2008–2009) that was marked by a considerable liquidity crunch and bank losses. In order to save their banking systems and limit the risk of a new Great Depression, the US and European countries decided to stimulate banking and financial market liquidity through credit channels. Consequently, governments borrowed large amounts from resident and non-resident economic agents. Government deficit ratio and debt thus increased

rapidly in the United States and the United Kingdom, as in many other developed and emerging countries. This led PD to reach exceptional levels for several developed and emerging countries and sovereign default risks also exceeded historic levels (e.g. the Greek crisis).

In addition, as illustrated in Fig. 1, PD in most countries has been increasing for several years. In particular, there was a considerable increase in PD after the 1980s and after 1990 for most countries (especially Europe) due to a fall in economic growth and to high spread between interest and growth rates. In France, according to the INSEE (National Institute for Statistics and Economic Studies), PD increased by 43.2 billion euros in the second quarter of 2012, reaching 1832.6 billion euros, in other words, 91% of GDP and 90.2% in the end of 2012.¹ In the United Kingdom, PD also reached extremely high levels due to the increase in public expenses and the nationalization of several banks since 2008. PD stood at 82.49% of GDP in 2010 and 85.3% in 2011, while it had not exceeded 42.7% before 2006. In the USA, the situation is even more dramatic as PD was about 102.93% of GDP in 2010, against 65.6% in 2006, due to tax reductions, military expenses, etc.² A common feature is the abrupt increase that marked the entire PD of several developed countries following the subprime crisis. However, it is important to note that PD holders vary from one country to another. In addition, PD is not always expressed symmetrically in domestic or

¹ The PD/GDP ratio moved from 66.7% (2006) to 83.5% (2009), 86.26% (2010) and 86.10% (2011), source: CIA World Factbook.

² In the US, a critical threshold is fixed for PD, and the country is automatically considered as bankrupt if this threshold is exceeded. The threshold was passed in the US on December 26, 2012 (the fiscal cliff) and an exceptional agreement was signed to raise the ceiling of debt.

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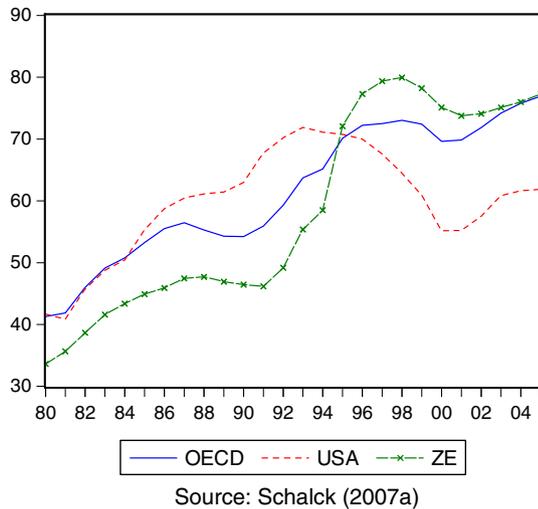


Fig. 1. Public debt evolution. Source: Schalck (2007a). Note: ZE refers to the Euro Area.

foreign currencies (various exchange risks), and central bank policies toward government debts differ.³

Furthermore, economists are far from unanimous about the approaches adopted to measure PD.⁴ PD repartition between governments and households varies according to the country. Overall, we can distinguish two models: the Anglo-Saxon model and the European one. In the first model, household debt is significant (around 100% of GDP in the UK), while the government is less 'indebted' but plays a limited role. The second model involves more debt however and a need for government reforms, with more savings capacity and less household debt. For example, French household debt in 2008 was under 25% of GDP. We should remember that PD includes two main components: budgetary balance and interest rates. Thus, the frequent revisions to country and debt notations by rating agencies affect interest rates and hence the dynamic and level of PD. Accordingly, with a high level of prior debt, high interest rates, absence of strong productive investment and moderate economic growth rates, it becomes very difficult for governments to stabilize PD. This is especially true in the Euro area where, in theory, debt monetization is not allowed (Central Bank Independence principle with reference to the Lisbon Treaty, article 101) and where the ECB only recently moved to acquire Treasury securities. This can indirectly justify the "Snowball Effect" observed in Fig. 1, which the current US and European fiscal directives are attempting to stop through the imposition of some degree of fiscal discipline. Of course, all these conditions and parameters result in a number of difficulties when treating PD data and dynamics.

In practice, several international and European measures and directives exist to try to limit government deficit and public debt, such as the Maastricht Treaty, the Stability and Growth Pact and the new Fiscal Compact in the Economic and Monetary Union (EMU), the creation of fiscal policy committees, or the Balanced Budget Amendment in the US. However, it appears that none of them is actually fully enforced due to the severity of the recent financial turmoil and economic recession. In order to put some discipline back into fiscal policy, and to reduce government deficit and expenses and public

debt, several governments, notably in Europe, have shifted to severe austerity programs. Concerning the US and the UK, as Jawadi and Sousa (2013) argued, fiscal austerity can be detrimental to growth in the short term. This therefore provides an interesting challenge regarding public debt and the different measures required and adopted to manage its evolution.

The main objective of this study is to clarify the challenges while investigating the dynamic of PDs and analyzing their main properties and the different cycles associated with their dynamics. In theory, neo-Keynesian economists recommend counter-cyclical fiscal policies in order to smooth production variations induced by changes to the economic cycle. Such measures can of course lead to decreases in public debt. However, the failure of expansionist fiscal measures in developed countries in the 1980s was accompanied by higher indebtedness, forcing these countries to call these policies into question.⁵ Furthermore, in practice, policymakers in developed countries often favor increases in public expenditure around election time (i.e., the election effect), potentially inducing an increase in PD. The alternation of different policy regimes is also a source of sometimes conflicting reforms that impact on fiscal policy and PD dynamics due to the difficulty in finding a consensus on fiscal consolidation (Alesina and Perotti, 1995). That is, PD dynamics are expected to be not only cyclical but also asymmetrical. This asymmetry is due to further asymmetry between economic cycle phases.

In order to better characterize PD dynamics, we focus on two major countries, the US and the UK, and attempt to clarify their debt dynamics (Fig. 2). In other words, rather than focus on research on PD factors that have been investigated in several previous studies, or on the effects of fiscal rules and PD on economic systems (Afonso and Sousa, 2012; Agnello and Sousa, 2011; Agnello et al., forthcoming; Sousa, 2012), we focus on the specifications of PD dynamics while attempting to develop appropriate econometric specifications to capture the time-varying aspect of PD. To do this, we check for further structural changes and nonlinearity in public debt dynamics. Our main contribution consists of proposing a dynamic on/off adjustment specification to model PD dynamics and apprehend their main changes. This specification has the advantage of being robust to abrupt multiple structural breaks in PD, which also can capture asymmetry and nonlinearity in PD data.

To our knowledge, this is the first essay that focuses on modeling nonlinearity in PD data. In the nonlinear literature, authors either focus on nonlinearity in fiscal rules (Jawadi et al., forthcoming; Schalck, 2007b) or on nonlinearity in PD effects on economic growth (Egert, 2012). Only two previous studies have focused on detecting structural breaks in PD data: Uctum et al. (2006) and Jawadi and Sousa (2013), but neither of them test or model nonlinearity in PD. The present study fills this gap.⁶

The paper is structured as follows. Section 2 dresses a literature review on PD dynamics. The econometric methodology is presented in Section 3. Section 4 discusses the main empirical results. Our concluding remarks are summarized in the last section.

2. Overview of the literature review

The literature on fiscal policies and PDs has been very rich for several decades, with excellent theoretical and empirical papers (e.g. Barro, 1974) that rigorously discuss PD determinants, mechanisms and effects. The recent and sharp deterioration in fiscal balances and

³ The ECB is less exposed to government debt (6%) than the Fed (12%) and the Bank of England (25%). This can be linked to the quantitative easing effect that stimulates the public debt financed by central banks.

⁴ Official PD measures are not anonymously accepted as they reflect gross PD rather than net PD and explicit government contracts. Moreover, the pre-cited PD figures can vary according to how PD is defined (Maastricht, OCDE).

⁵ Such measures are contrary to the ideas of several liberal and Keynesian economists. Indeed, Barro (1974), with reference to the principle of rational expectations, renewed the famous "Ricardian Equivalence" hypothesis, also called the Barro-Ricardo Effect, while suggesting that expansive fiscal policy (that generates an increase in PD) implies householders' savings increase so as to pay expected future taxes. Accordingly, there is some equivalence between debts and taxes, thus making any economic policies to relaunch the economy ineffective.

⁶ This study can be considered as an extension to the paper by Jawadi and Sousa (2013) as it uses the same data, allowing us to make some interesting comparisons.

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