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A critique to the expansionary austerity (part III): Empirical counter facts beyond theoretical weaknesses

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Abstract

In two previous contributions published in this working paper series, we pointed out the theoretical fragilities of the expansionary austerity theory (EAT). In this paper, we develop our critique even further by integrating the above theoretical investigation with an econometric model testing for the effectiveness of the mechanisms at the basis of the EAT. We consider a sample of developed economies composed by both monetarily sovereign and non-monetarily sovereign countries. Our time spell runs from 2007 to 2016 since that we are interested to assess the solidity of the EAT postulates in the post-crisis period. Our findings reinforce the validity of our original critique, and are fully consistent with out theoretical model. Since 2007, the core mechanisms of the expansionary austerity theory were not at work, to say the least. Austerity measures did not provide any expansionary impulse to economic activity since that the "expectation", "financial" and "external" channels were inactive at best, or they acted in the opposite direction with respect to what EAT advocates would have suggested. Further, austerity *per se* did not restore any sense of credibility about public finance solidity on financial markets. Rather, it exacerbated financial turbulences and speculation on the market for sovereign bonds. Interestingly, austerity measures delivered perverse results precisely in those non-monetarily sovereign countries where they were thought to be mostly effective.

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1. The expansionary austerity theory and its (empirical) critiques: A brief overview

The theory of expansionary austerity (henceforth EAT) is part of a long-standing debate in the economic literature on the effectiveness of fiscal policy (at least in relative terms with respect to monetary policy). Nonetheless, the EAT as we currently know it emerged at the beginning of the 90s when some economists stated that discretionary expansionary fiscal policies might have *non-Keynesian* effects, since that they may prove to be ineffective to stimulate economic activity and, at the same time, they may put at risk the solidity of public finances and of the whole financial system of the economy (see Giavazzi and Pagano, 1990 and 1996; Alesina and Perotti, 1997; Alesina and Ardagna, 2010 and 2012)[1]. Symmetrically, those economists also argued that well-conceived fiscal restrictions might actually stimulate private consumption and investment expenditures, as well as improve export dynamics, so that the overall economic activity might eventually expand rather than contract.

The supporters of the expansionary austerity stress that well-designed fiscal consolidations must take the form of deep, persistent and credible cuts in public expenditures, in particular public transfers and public employees' wages, perhaps followed by reductions in the tax burden on households (Alesina and Perotti, 1997). In their view, such a shift in fiscal policy constitutes a "regime change" that may immediately foster economic activity through three main mechanisms. First, successful fiscal corrections may positively affect the behavior of private economic actors through the so-called "expectation channel". Upfront public spending cuts, it is argued, may induce economic agents to elaborate optimistic expectations by anticipating future tax reductions and consequent increases in (permanent) income. This, in turn, may incentivize them to immediately raise consumption expenditures, giving momentum to current economic activity. Second, tough fiscal corrections that prove to be effective in reducing public deficits and public debt stocks can stimulate investments and growth by re-establishing bond vigilantes' trust in public finances' solvency and prompting a significant reduction in interest rates (i.e. the so-called "financial channel"). Last but not least, cuts in public wages that help to establish wage moderation on the labor market may give rise to a kind of internal devaluation that may eventually improve external competitiveness and foster net exports (let's label it the "external channel").

The economic literature that more strongly put forward the expansionary austerity standpoint is mainly empirical. It aims at supporting a theoretical and conceptually universal proposition (i.e. well-designed fiscal retrenchments can lead to quick economic expansions) through the cross-country analysis of a sample of relevant expansionary/contractionary fiscal episodes. From a technical point of view, the EAT literature generally builds up its empirical tests on the concept of cyclically adjusted primary public balances (CAPB henceforth), and takes significant shifts in countries' CAPBs as signs of discretionary expansionary or restrictive fiscal policies (see Alesina and Perotti, 1997; Alesina and Ardagna, 2010, 2012).

Most of the criticisms to the EAT also rely upon an empirical approach. Guajardo *et al.* (2011), and Baker and Rosnick (2014), for instance, stress that the concept of CAPB is not capable to completely remove the effects of the economic cycle on the evolution of public finances. Indeed, purely cyclical components of public balance that are positively correlated with the economic cycle are misinterpreted and wrongly accounted for a discretionary restrictive fiscal policy shocks. As a consequence, the positive correlation between apparent fiscal consolidation and economic expansion is easy to emerge, but it is the outcome of a biased empirical approach and the econometric misunderstanding of rather different economic mechanisms. Guajardo *et al.* (2011), and Baker and Rosnick (2014) also raise a

perhaps more relevant causality issue. Indeed, fiscal variables and economic growth feedback on each other. The causality runs both ways: fiscal policy can surely influence economic performances, positively or negatively. Economic dynamics, in turn, has clear implications in terms of improving or worsening public balances, as well as on the type of fiscal stances governmental authorities follow. The results of the CAPB-based literature may thus be misleading simply because they take changes in the CAPB as the exogenous explicative variable, whist it is the endogenous one.

In order to address such estimation problems, Guajardo *et al.* (2011) suggest an alternative method to identify episodes of fiscal adjustment. When this alternative approach is applied, the authors find a clearly negative effect of budget cuts and/or tax hikes on current economic activity even "in cases where one would most expect fiscal consolidation to raise private domestic demand (Guajardo *et al.*, 2011, p.29)". Actually, "even large spending-based fiscal retrenchments are contractionary, as are fiscal consolidations occurring in economies with a high perceived sovereign default risk (Guajardo *et al.*, 2011, p.29)".

The abovementioned findings are obviously consistent with the expanding empirical literature that has recently put forward the idea of a cycle-contingent fiscal multiplier, which may be particularly large and positive during recessions (Auerbach and Gorodnichenko, 2012; Qazizada and Stockhammer, 2015). This evidence is radically at odds with the concept of a negative fiscal multiplier implicitly advocated by the EAT.

This paper develops a perhaps more general critical analysis of the EAT with respect to the already existing prevalently empirical critique. We first move the focus of our analysis to the theory. At the best of our knowledge, only a few works have tried to *analytically* underline the logical weaknesses of the EAT from a heterodox perspective. However, we think these contributions to be unsatisfactory, either because they rely upon ad-hoc assumptions or because they describe austerity too roughly and superficially, without considering the specific policy measures composing well-designed (supposedly expansionary) austerity packages. In this paper we try to fill this gap by presenting a simple model, which formalizes the main *components* of a well-designed austerity package in more details, and also takes on board the crucial mechanisms of the expansionary austerity theoretical building (i.e. the expectation, financial and external channels). Our *theoretical* critique relies upon the finding that economic expansion is very far from being an automatic and straightforward outcome of fiscal retrenchments even when fiscal retrenchments are properly formalized, and the mechanisms through which they might boost the economy are taken into account. We show that even in such an "expansionary austerity-like theoretical framework", the expansionary outcomes of austerity policies cannot be taken for granted. Therefore, the theoretical fundamentals of the EAT turn out to be extremely fragile and state- or institution-contingent, to say the least. For sure, they cannot be taken as well-established and universal guidelines for conducting fiscal policy.

We then return to the empirical evidence. Differently from previous analyses, we do not investigate the methodological soundness of the EAT literature. Rather, we directly test for the empirical validity of the main mechanisms at the basis of the EAT in a sample of developed countries. We consider both monetarily sovereign and non-monetarily sovereign countries (read eurozone economies) in order to check for the operativeness of EAT's mechanisms according to the specific "monetary regime" in which both monetary and fiscal policies are implemented. Our findings support the theoretical perplexities raised in the first part of the paper. Since 2007, the expectation and external channels seem not to have plaid any significant role, or have gone in the opposite direction with respect to what EAT supporters would have expected. More importantly, in the context of eurozone countries, fiscal

contractions seem to have triggered off a "perverse" financial channel leading to hikes in sovereign bonds' yields and mounting financial distress rather than increasing governments' credibility and optimistic feelings on financial markets. In the case of monetarily sovereign economies, our empirical findings confirm that monetary sovereignty itself, and not austerity measures *per se*, has been the most fundamental factor creating a crisis-resilient macroeconomic environment.

To conclude, we propose a comprehensive theoretical and empirical critique to the highly influential assertion by Alberto Alesina (at least for the design of austerity measures in the Eurozone), according to which "many even sharp reductions of budget deficits [assuming that fiscal austerity effectively contributes to lower budget deficits] have been accompanied and immediately followed by sustained growth rather than recessions even in the very short run (Alesina, 2010, p.3)*"*.

2. A simple short-run model of the expansionary/contractionary effects of fiscal adjustments

Most of the critiques to the EAT focus on the debatable economic concepts (i.e. the CAPB), and the related econometric techniques used by EAT supporters to validate their non-Keynesian perspective of fiscal policies. To the best of our knowledge, only a few non-mainstream studies have aimed at showing the intrinsic theoretical fragility of the EAT.

Robert Boyer (2012) analyses the specific conjunctures under which, in the past, austerity measures might have been expansionary in a few small open economies. In doing this, he stresses that there is "no general theoretical reason to guarantee the success of any austerity policy (Boyer, 2012, p.297)". Although detailed, Boyer's analysis remains on a purely *argumentative* level. Boyer does not provide any formal treatment of his points, and he does not frame his arguments into a model through which one can quantitatively define the restrictive assumptions and perhaps implausible circumstances under which austerity-led expansions might hypothetically take place.

Thomas Palley (2010) shows the contractionary short-run effects of debt-capping fiscal rules. Yet, these effects are the straightforward *in-built* results of Palley's oversimplified closed-economy model, which is intrinsically at odds with the EAT theoretical apparatus. In our view, this fact makes Palley's critique rather sterile. In this paper, we try to challenge the EAT from the inside by presenting a more general model including some core EAT-like assumptions, and showing the extreme and unrealistic conditions under which expansionary austerity might in principle materialize.

Foresti and Marani (2014) propose a simple short-run model in which fiscal austerity might have expansionary outcomes depending on the degree of coordination between monetary and fiscal policy, and on the intensity of the accommodative stance taken by monetary policy in presence of fiscal retrenchments. In their work, Foresti and Marani (2014) define austerity as a given reduction in public deficit. By adopting this simplistic definition, they do not consider the specific policy composition (i.e. expenditures cuts versus tax increases) of fiscal retrenchments that, according to EAT supporters, might actually render austerity measures expansionary. On top of this, they unduly take the positive effect of fiscal corrections on public deficit as granted.

In this paper, we propose a simple model that tries to formalize the general argumentative analysis by Robert Boyer (2012). In doing this, we extend Palley's model by considering an open-economy model, and by avoiding in-built results of austerity measures. With respect to Foresti and Marani (2014), our model enters more into the details of the policy measures composing austerity packages. We explicitly model the cuts in public transfers and in public employees' salaries (plus future expected reductions in taxes) that EAT supporters advocate as potentially expansionary. Moreover, we also

allow for a wider range of outcomes of austerity measures on public deficit. Austerity measures may squeeze public deficits in the event they turn out to be effective and have an expansionary impact on economic activity. Such a result, however, is by no mean automatic. Austerity measures might alternatively lead to counterintuitive results, i.e. a worsening public balance deficit, if they make economic recession even deeper.

In this paper, we primarily aim at developing a theoretical critique of the EAT proposition according to which well-designed austerity measures can be conducive to growth even *in the very short run* and even during recessions (see Alberto Alesina, 2010). For this reason, our model has a short-run horizon, and focuses on short-run dynamics only, i.e. the effects of restrictive fiscal adjustments on economic activity and on public deficit. Accordingly, we assume all stock variables, i.e. the home economy capital stock K, the public debt D, and the outstanding amount of private sector's debt towards banks CR, as given.

In our model, we assume an open *demand-driven* economy. Perhaps surprisingly, the demand-driven nature of our economy is not at all at odds with the logic of the EAT. Sure, the advocates of the EAT notice that austerity measures can foster economic growth in the medium/long run through some supply-side mechanisms[2]. Yet, much of their emphasis is on the demand-side channels through which well-designed fiscal adjustments may boost economic activity by stimulating private consumption, investment expenditures and export demand. For instance, in a recent contribution on the validity of the EAT, Alesina, Favero, and Giavazzi (2015) clearly point out that a decisive aspect of successful austerity packages lies in their capacity to stimulate private sector's investment and consumption demand by fostering the private sector's confidence in the solidity of the domestic macroeconomic environment. Even more interestingly, they stress how such a peculiar aspect of (successful) expenditure-based fiscal consolidations versus (unsuccessful) tax-based adjustments "cannot be explained by (accompanying) supply-side reforms" (Alesina, Favero, and Giavazzi 2015, p.37). In a way, EAT's attention for demand-side factors is a direct consequence to its non-Keynesian perspective about the effectiveness of fiscal policies, and of its belief in a negative fiscal multiplier. Due to the short-run nature of the model presented in this paper, we focus our attention on the operativeness of the demand-side channels at the basis of the EAT only.

In this framework, equations (1) – (8) describe the supply side on the economy. We assume that production is carried out through a fixed-coefficient production function, in which α is the average labor productivity, and σ is the average productivity of capital. In equation (1), L stands for the total available labor force, K for installed capital, and Y^* for potential output. In order to make our analysis as simple as possible, we assume that bottlenecks on the supply side of the economy could possibly emerge due to lack of labor, whilst there is always some amount of idle capital stock (Lavoie, 2015). Accordingly, potential output (Y^*) effectively reduces to the production level that would be realized should labor force (L) be fully employed.

(1) $Y^* = min(\alpha L, \sigma K)$

In our demand-driven economy, current output (Y), the employment level (N), and capacity utilization ($\chi = Y/Y^*$), i.e. our measure of the output gap, are determined by effective demand. Accordingly, equation (2) defines the output/capital ratio as the product between capacity utilization χ, and $\beta = Y^*/K = \sigma K^f/K$ (i.e. the highest degree of capital utilization achievable when production is at full potential, K^f being the amount of "operative" capital out of the available capital stock).

(2) $\frac{Y}{K} = \frac{Y}{Y^*}\frac{Y^*}{K} = \chi\beta$

Equation (3) defines the employment level (N) as a function of the demand-determined level of output (Y), whilst equation (4) sets the unemployment rate ($u = (L - N)/L = U/L$) as a function of capacity utilization.

(3) $N = Y/\alpha$

(4) $u = \frac{L-N}{L} = 1 - \frac{Y}{\alpha L} = 1 - \chi$

Equations (5), (6) and (7) define the nominal wage rate w, the domestic price level p_H, and the real exchange rate q. In equation (6), domestic firms set the domestic price level p_H by applying a mark-up m on variable unit costs w/α. In equation (5), nominal wages are established through a bargaining process between trade unions and firms. We assume the nominal wage w to be positively related to the expected price level p^e and the degree of labor market protection z, which is in turn a positive function of unemployment benefits b_u. We also assume current nominal wage rates to be negatively influenced by previous period unemployment u_{-1}, since that it would reduce trade unions' bargaining strength in the current round of wage negotiations.

(5) $w = p^e l\big(\alpha, u_{-1}, z(b_u)\big)$

(6) $p_H = (1 + m)\frac{w}{\alpha}$

(7) $q = \frac{ep^F}{p_H} = \frac{ep^F \alpha}{(1+m)p^e l(\alpha, u_{-1}, z(b_u))}$

According to equation (8), the value of production is distributed among the total wage bill W and aggregate profits Π.

(8) $PY = W + \Pi = wN + \Pi$

Equations (9) – (14) describe the demand side of the economy. Equation (9) gives us the equilibrium condition on the goods market and makes explicit all the components of the aggregate demand, i.e. domestic consumption C, domestic investments I, public purchases G, and net exports NX.

(9) $Y = C + I + G + NX$

Equation (10) describes aggregate consumption as a function of wage earners' and profit earners' saving propensities, s_w and s_π respectively. Total consumption depends on disposable income. In the case of wage earners, this is defined as the sum of the total wage bill W ($= wN$), public transfers Tr^G and unemployment benefits $b_u U$ provided by the domestic social security system. The domestic

government levies a tax rate t_w on this kind of income. Profit earners' income is given by the difference between total profits Π minus interest payments on the total amount of (past and present) loans received from banks, i.e. $i_{cr}CR$. The tax rate levied on net profits is t_π. In this model, the domestic bank system gets interests on the outstanding amount of private loans (CR) and public debt D. We assume that it does not pay any interest rate on deposits possibly held by households. For the sake of simplicity, we also assume that banks save all their realized profits (i.e. the difference between positive and negative interests), so that banks' profits do not play any role in determining aggregate consumption. For the sake of simplicity, equation (10b) scales down aggregate consumption for the capital stock K. Accordingly, ρ and λ stand for normalized values of public transfers and private debt, respectively.

(10) $C = (1 - s_w)(1 - t_w)[wN + Tr^G + b_u U] + (1 - s_\pi)(1 - t_\pi)[\Pi - i_{cr}CR]$ or:

(10b) $\frac{C}{K} = (1 - s_w)(1 - t_w)\left[\chi\frac{\beta}{\alpha}(w - b_u) + b_u\frac{\beta}{\alpha} + \rho\right] + (1 - s_\pi)(1 - t_\pi)[r - i_{cr}\lambda]$

Equation (11) defines the current growth rate of the capital stock. Taking inspiration from Bhaduri and Marglin (1990), we assume (I/K) to be a positive linear function of capacity utilization χ and of the profit share r (with a and v as the corresponding parameters). Domestic investments are also negatively affected by the interest rate i_{cr} on banks' loans via parameter h. Keynesian-type animal spirits are captured by parameter η.

(11) $\frac{I}{K} = \eta + a\chi + vr - hi_{cr}$

Equation (12) gives us public purchases, once again normalized for the capital stock K, as an exogenous policy variable γ.

(12) $\frac{G}{K} = \gamma$

In equation (13), normalized net exports are a linear positive function of the real exchange rate q, whilst they depend negatively on domestic capacity utilization χ.

(13) $\frac{NX}{K} = \epsilon_q q - \epsilon_\chi \chi$

Finally, equation (14) introduces a crucial assumption that directly hinges upon the EAT logic. Equation (14) assumes that, in an intertemporal time framework and according to, say, a permanent income argument, current households' saving propensity may depend positively on the expected future tax rate t_w^e. Current cuts in public expenditures, if sufficiently strong and reliable, may induce households to increase current consumption since that they may expect a lower tax burden tomorrow. By the same token, we also assume households' saving propensity to depend negatively on public transfers. Indeed, it is reasonable to believe that a permanent cut in public transfers, perhaps due to the policy decision of downsizing the provisions of the domestic welfare system, may also induce households to save more today in anticipation of lower public transfers tomorrow[3].

$(14)\ s_w = f(t_w^e, Tr^G)$ with $(\partial s_w / \partial t_w^e) > 0;\ (\partial s_w / \partial Tr^G) < 0$

Last but not least, equations (15) – (17) formalize the public budget and the financial block of our economy, i.e. how the interest rates are determined and how they change.

Equation (15) defines public balance deficit as the difference between government outlays, i.e. government purchases, public transfers, the total amount of unemployment benefits and interest payments on public debt $i_d D$, and government revenues from taxes on households and firms. Equation (15b) normalizes the public balance deficit for the capital stock K, with $\Delta = D/K$.

$(15)\ B = G + Tr^G + b_u U + i_d D - t_w[wN + Tr^G + b_u U] - t_\pi[\Pi - i_{cr}CR] - t_\pi[i_{cr}CR + i_d D]$ or:

$(15b)\ \frac{B}{K} = \xi = \gamma + (1 - t_w)\left[b_u \frac{\beta}{\alpha}(1 - \chi) + \rho\right] + (1 - t_\pi)i_d\Delta - t_w w \frac{\beta}{\alpha} - t_\pi r$

In equation (16) we assume that banks establish interest rate i_{cr} on private loans by applying a mark-up rate μ on the interest on public bonds i_d. Indeed, in our model, financial operators, say commercial banks, hold two types of assets on their balance sheet. On the one hand, they buy domestic government bonds. On the other, they give loans to firms. Government bonds are generally considered "relatively" safer assets with respect to private loans. Following Mehrling (2011), government bonds constitute the collaterals financial operators use in refinancing operations with the central bank. Also, they can be "shifted" on the balance sheet of some other institution quite easily. This is not so for the case of loans made to the private sector. Once created, loans to the private sector more likely remain on the balance sheet of the originating institutions until maturity (unless shadow banking financial engineering transform and securitize them in allegedly riskless assets!), together with the corresponding creditor risk. Accordingly, financial institutions may ask for extra remuneration on loans to the private sector with respect to yields on government bonds.

$(16)\ i_{cr} = (1 + \mu)i_d$

In equation (17), we set out the determinants of the interest rate i_d on public debt:

$(17)\ i_d = \phi\left(\frac{B}{Y}, \Omega\right)$ with $\left(\partial\phi / \partial(\frac{B}{Y})\right) > 0$ if $\Omega = 0$; $\left(\partial\phi / \partial(\frac{B}{Y})\right) = 0$ if $\Omega = 1$

We first assume that i_d is a positive function of the current public budget deficit over GDP $B/Y = b = \xi/\beta\chi$, rather than of the debt-to-GDP ratio. We make this assumption due to the short-run nature of our model, in which the stock of debt is taken as given. We also do it in order to analyze in more details how final retrenchments, the ensuing change in some "sensible" fiscal variables – the fiscal deficit in first instance, and the interest rates on bonds (i.e. their measure of riskiness) may interact in the context of the implementation of austerity programs[4]. According to the logic of the EAT, in equation (17) we assume that policy-makers can possibly reduce financial operators' yield claims on government bonds by squeezing public deficit or, better, by squeezing it in such a large amount to prompting a reduction in the debt-to-GDP ratio.

Secondly, we assume that the abovementioned link between i_d and b is fundamentally influenced by the degree of monetary sovereignty characterizing the economy. In our model, we capture this point through the "institutional" variable Ω. We conceive Ω as a bivariate variable taking value 1 in the case of a monetarily sovereign country like the US, or 0 in the case of, say, eurozone Member States that issue bonds denominated in a supranational "foreign" currency. In a monetarily sovereign country, public bonds are usually taken as risk-free assets, since that they are denominated in the currency issued by the domestic central bank, and because the domestic central bank will likely intervene any time it likes in order to prevent default risks to emerge. Accordingly, we assume i_d to be insensitive to the evolution of the public deficit (surplus) over GDP. This assumption is underpinned by some recent empirical evidence showing that government bonds yields do not respond to economic fundamentals such as the solidity of public finances, the growth rate of the economy and surpluses in the current account of the Balance of Payments in the context of "stand-alone" (read monetarily sovereign) countries (see De Grauwe and Ji, 2013)[5]. The institutional setting of the eurozone is different. Eurozone rules impose national governments to find resources on private financial markets only, and forbid the ECB from buying public bonds (at least on the primary market), and directly financing national governments. As a consequence, the solidity of eurozone national finances is in the hands of financial operators. They would likely "downgrade" eurozone sovereign bonds by the same standard as other private corporate bonds issued on financial markets, with the corresponding degree of riskiness depending on the (perceived) soundness of public finances. The positive link between i_d and b will likely emerge.

3.1 The short-run macroeconomic effects of public transfers' cuts
In our simple model, we can find an explicit expression for the level of capacity utilization χ that ensures the equilibrium in the goods market. Analytically, by plugging equations (10.b) – (13) into (9) and, then, into (3), and by taking into account equations (16) – (17), we get:

$$(18) \quad \chi = \frac{(1-s_w)(1-t_w)\left(b_u\frac{\beta}{\alpha}+\rho\right)+[(1-s_\pi)(1-t_\pi)+v]r+\eta+\gamma+\epsilon_q q-[(1-s_\pi)(1-t_\pi)\lambda+h](1+\mu)\phi(.)}{\left[\beta-(1-s_w)(1-t_w)\frac{\beta}{\alpha}(w-b_u)-a+\epsilon_\chi\right]}$$

In a very Keynesian fashion, equation (18) states that current capacity utilization is a positive function of all demand injections, whilst it depends negatively on those factors that reduce investments, consumptions and/or exports.

Let us now assume that the government implements a restrictive fiscal adjustment such that the CAPB decreases by an amount equal to $-\theta$. Moreover, assume that fiscal consolidation mainly the form of a cut in public transfers (i.e. $dTr^G < 0$). In terms of our model, if we define the CAPB as $b^* = \frac{1}{\beta}[\gamma + (1 - t_w)\rho - t_w w - t_\pi(r + i_d\Delta)]$, we get:

$$(19) \quad db^* = -\theta = \frac{(1-t_w)}{\beta}d\rho = \frac{(1-t_w)}{\beta K}dTr^G, \text{ so that: } dTr^G = -\frac{\beta K}{(1-t_w)}\theta$$

with $\theta > 0$.

In our model, such a fiscal adjustment has a direct and simultaneous short-run effect on both current capacity utilization χ and the deficit-to-GDP ratio b. Totally differentiating χ and b, and taking into account the sign of equation (19), we get a system of 2 simultaneous equations for $d\chi$ and db:

$$(S.1) \begin{cases} d\chi = \dfrac{-\left[f_{t_w^e}(1-t_w)\left(bu\frac{\beta}{\alpha}+\rho\right)dt_w^e - f_{Tr^G}\left(bu\frac{\beta}{\alpha}+\rho\right)\beta K\theta\right] - (1-s_w)\beta K\theta - [(1-s_w)(1-t_w)\lambda+h](1+\mu)\phi_b db}{\left[\beta-(1-s_w)(1-t_w)\frac{\beta}{\alpha}(w-b_u)+\epsilon_\chi\right]} \\[4mm] db = -\dfrac{K}{\chi}\theta - \left[\dfrac{(1-t_w)(b_u/\alpha)}{\chi} + \dfrac{b}{\chi}\right]d\chi \end{cases}$$

with $f_{t_w^e} > 0$; $f_{Tr^G} < 0$; $(\phi_b|\Omega) \geq 0$; $dt_w^e < 0$

Equations (20) and (21) below give the solutions $d\chi^S$ and db^S of the system (S.1) reported above. What emerges is that there is not any clear-cut outcome of the restrictive fiscal policy we have assumed, due to the several conflicting forces possibly being at work simultaneously. The sign of equation (20) may be either positive, confirming the expansionary austerity hypothesis, or negative, in line with the traditional Keynesian concern about the recessionary effects of fiscal retrenchments. The same applies to equation (21). Public transfers' cuts might help reducing public deficit over GDP or, alternatively, they may be counterproductive and lead to an even higher deficit-to-GDP ratio in the event they trigger a tough contraction of economic activity.

$$(20)\ d\chi^S = \dfrac{\overbrace{\left[f_{t_w^e}(1-t_w)\left(bu\frac{\beta}{\alpha}+\rho\right)\right]|dt_w^e|}^{+\ or\ 0} - \overbrace{\left[(1-s_w)-f_{Tr^G}\left(bu\frac{\beta}{\alpha}+\rho\right)\right]\beta K\theta}^{-} + \overbrace{[(1-s_w)(1-t_w)\lambda+h](1+\mu)\frac{K}{\chi}\phi_b\theta}^{+\ or\ 0}}{\left\{\left[\beta-(1-s_w)(1-t_w)\frac{\beta}{\alpha}(w-b_u)+\epsilon_\chi\right]-[(1-s_w)(1-t_w)\lambda+h](1+\mu)\phi_b\left[\frac{(1-t_w)(b_u/\alpha)}{\chi}+\frac{b}{\chi}\right]\right\}}$$

$$(21)\ db^S = -\dfrac{K\theta}{\chi} - \left[\dfrac{(1-t_w)(b_u/\alpha)}{\chi} + \dfrac{b}{\chi}\right]d\chi^S$$

Despite such indeterminacy, a few points are worth stressing:

1. The expansionary outcome of fiscal adjustment heavily depends on the intensity of partial derivative $f_{t_w^e}$, and of $|dt_w^e|$, i.e. the expected reduction (here reported in absolute value) in the tax burden levied on households. The higher and the quicker is $|dt_w^e|$, the more rapidly and robustly private consumptions may respond positively to public budget's cuts. Interestingly, and perhaps paradoxically, such positive expectations will hardly materialize in an economy characterized by a high public debt stock, i.e. the economic scenario in which, according to EAT supporters, fiscal consolidation is primarily needed. Indeed, when public debt D is considerably high and a prolonged period of fiscal consolidation is foreseen, people will likely expect future tax reductions to be modest and take place much farther ahead (at least with respect to current spending cuts). In a way, a high degree of uncertainty may "surround" the extent and the timing of future tax cuts. In such a context, the "expectation channel" through which expansionary austerity may work is extremely weak at best, and likely more than compensated by the overwhelming contractionary effect of current public transfers' cuts.

2. Public transfers' cuts, EAT proponents argue, may also boost growth by reducing public deficit, hence interest rate i_d on public bonds and, indirectly, interest rate i_{cr} on banks' loans to the private

sector. Such a reduction in the cost of external financing may in turn spur private investments and induce the economy to expand. According to our model, such an effect of fiscal adjustments on interest rates can hardly take place in monetarily sovereign economies. Indeed, following equations (16) and (17), in the case of monetarily sovereign countries, the "financial market channel" through which fiscal consolidation may affect economic dynamics likely disappears (i.e. $\phi_b=0$). Accordingly, in equation (20), the allegedly expansionary impact of fiscal consolidation turns out to be even weaker at the very best.

The "financial" channel might be at work in the case of eurozone countries that issue public bonds denominated in a supranational currency, and in which the solidity of public finances and of the overall financial system hinges upon financial markets' sentiments. In such a context, one could be persuaded that front-loaded fiscal adjustments might reassure financial markets about the sustainability of eurozone countries' fiscal positions and that, eventually, they might more easily entail expansionary effects. This logic might hold true if fiscal adjustment effectively lowers the public deficit and the debt-to-GDP ratio. Yet, we are very far from taking such an effect of fiscal consolidation as guaranteed. Recent empirical evidence show that it is hard to find a way out from public balance disarrays without sustained growth (Ali Abbas *et al*., 2013), and that fiscal multipliers are high and positive when economies are in the midst of a recession or are operating below potential (Auerbach and Gorodnichenko, 2012; Qazizada and Stockhammer, 2015). If so, too severe and premature fiscal retrenchments may actually induce a short-run deterioration in fiscal and financial variables, instead of improving them, by jeopardizing growth performances[6].

Figure 1 graphically portrays such a perverse outcome of restrictive fiscal measures. In the upper panel of Figure 1, we report the left-hand-side (LHS) of equation 1 in system (S.1), i.e. a 45-degree sloping curve, as well as the right-hand-side (RHS) of equation 1. Note that the RHS curve depends on $d\chi$ due to the positive feedback economic expansion has on its own dynamics via its effect on the evolution of the deficit-to-GDP ratio. Changes in the position of the RHS curve depend on the "autonomous" direct effects discretionary budget cuts (i.e. θ) have on economic activity via the "expectation" channel and the "financial" channel. Upward shifts of the RHS curve stand for austerity measures that are expansionary on the onset. Donward movements of the RHS curve are due to an austerity-led initial contraction in economic activity. In the bottom panel of Figure 1 we show how the deficit-to-GDP ratio decreases ($db < 0$) when the economy expands ($d\chi > 0$) – see equation 2 in system (S.1). A relatively flat (steep) "db" curve stands for a deficit-to-GDP ratio that is relatively insensitive (highly responsive) to changing economic activity. The position of the "db" curve in Figure 1 depends on the negative *direct* effect austerity measures induce on public deficit.

Let assume that at the beginning of an austerity program, the "expectation" channel is weak, and/or interest rates do not respond enough intensively to the announcement of public budget cuts. In such a context, fiscal austerity likely reduces the economic activity and makes $d\chi$ negative (see downward movement of the RHS curve in the upper part of Figure 1). Fiscal austerity may initially reduce the fiscal deficit (see the initial leftward movement of the "db" curve, and the move from equilibrium point *A* to point *B*, in bottom part of Figure 1). Yet, it may subsequently turn out to be self-defeating and frustrate government's efforts to stabilize fiscal variables due to the above recessionary effects (see movement from point *B* to equilibrium *C* in Figure 1). Austerity-led recession may eventually widen fiscal disarrays rather then reducing them, and create further tensions on financial markets.

Things may get dramatically worse in presence of a strong "financial" channel, i.e. when financial operators overreact to changes in public deficits ($\phi_b \gg 0$); improvements in public balance are over-dependent on changes in economic activity ($((1 - t_w)(b_u/\alpha) + b)/\chi \gg 0$); austerity measures are even slightly contractionary on the onset. In such a context, the RHS of equation 1 in system (S.1) gets steeper than the LHS (see Figure 2). Correspondingly, the denominator in equation (20) turns out to be negative, and short-run Keynesian instable emerges. No short-run equilibrium exists. Despite discretionary budget cuts could per se reduce the public deficit, even a subsequent small economic contraction can eventually make public disarrays larger. Financial panic erupts due to worsening public finance conditions. Interest rates skyrocket. Economic recession gets deeper and gives rise to an endless "race to the bottom", which will inevitably end up in a public debt default and a tremendously painful economic dislocation (see *endless right-to-left* movement in Figure 2). This kind of dynamics sadly resembles that one observed in Greece since 2010. Eventually, the results of fiscal cuts could be opposite than those expected by EAT supporters even when the "financial" channel significantly affects macroeconomic real and financial variables.

3. Last but not least, after 2012, the monetary scenario prevailing in the eurozone resembles more closely that one characterizing the US since the outbreak of the worldwide financial crisis. Indeed, thanks to Mario Draghi's "whatever it takes" pledge to save the euro, financial speculation on peripheral countries' government bonds has calmed down, and interest rates i_d have decreased significantly. In such a context, it makes sense to question the effectiveness of the "financial" channel through which fiscal austerity is expected to positively contribute to economic recovery. As Roberto Perotti himself stresses, "if fiscal consolidations were expansionary in the past because they caused a steep decline in interest rates or inflation, it is unlikely that the same mechanism can be relied on in the present circumstances, with low inflation and interest rates close to zero (Perotti, 2012, p.309)".

3.2 The short-run macroeconomic effects of lower unemployment benefits

An additional proposition of the EAT is that well-designed austerity packages should also encompass cuts in public wages, reduction in public employment, and cuts in unemployment benefits b_u in order to establish a climate of wage rate moderation (i.e. a lower nominal wage rate w), and to improve the external competitiveness of the economy. In our model, system (S.2) formalizes the short-run effects of a reduction in unemployment benefits b_u:

$$(S.2) \begin{cases} d\chi = \dfrac{\overbrace{(1-s_w)(1-t_w)(\beta/\alpha)[(1-\chi)+(\partial w/\partial b_u)\chi]db_u}^{-}+\overbrace{\epsilon_q(\partial q/\partial w)(\partial w/\partial b_u)db_u}^{+}-\overbrace{[(1-s_w)(1-t_w)\lambda+h](1+\mu)\phi_b db}^{+}}{\left[\beta-(1-s_w)(1-t_w)\frac{\beta}{\alpha}(w-b_u)+\epsilon_\chi\right]} \\\\ db = \dfrac{(1-t_w)(1-\chi)}{\alpha\chi}db_u - \left[\dfrac{(1-t_w)(b_u/\alpha)}{\chi} + \dfrac{b}{\chi}\right]d\chi \end{cases}$$

with $(\partial w/\partial b_u) > 0$; $(\partial q/\partial w) < 0$; $db_u < 0$.

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Equations (22) and (23) give the solutions of system (S.2):

$$\text{(22)} \quad d\chi^{S2} = \frac{\overbrace{\left\{(1-s_w)(1-t_w)(\beta/\alpha)[(1-\chi)+(\partial w/\partial b_u)\chi]+\epsilon_q(\partial q/\partial w)(\partial w/\partial b_u)-[(1-s_w)(1-t_w)\lambda+h](1+\mu)\phi_b\frac{(1-t_w)(1-\chi)}{\alpha\chi}\right\}}^{?}db_u}{\left\{\left[\beta-(1-s_w)(1-t_w)\frac{\beta}{\alpha}(w-b_u)+\epsilon_\chi\right]-[(1-s_w)(1-t_w)\lambda+h](1+\mu)\phi_b\left[\frac{(1-t_w)(b_u/\alpha)}{\chi}+\frac{b}{\chi}\right]\right\}}$$

$$\text{(23)} \quad db^{S2} = \frac{(1-t_w)(1-\chi)}{\alpha\chi}db_u - \left[\frac{(1-t_w)(b_u/\alpha)}{\chi}+\frac{b}{\chi}\right]d\chi^{S2}$$

Once again, no clear-cut solutions exist, and the theoretical basis of the EAT appears as extremely weak. In particular, the direct effect of a cut in unemployment benefits is a lower demand injection in the form of lower consumption expenditures. This would certainly deepen recession instead of prompting recovery. The contraction in the domestic component of aggregate demand might be compensated by an increasing external demand for homemade goods that might emerge in presence of lower domestic nominal wages w and, thus, of a depreciated real exchange rate q. However, increasing net exports and, possibly, booming economic activity, strongly rely upon the sensitiveness of net exports to the real exchange rate (i.e. parameter ϵ_q in equation (22)), which in turn depends on to the sectorial composition of net exports themselves and to the degree of openness of the economy (see Taylor, 1991). It is perhaps not by chance that one of the most cited examples of successful expansionary austerity is that one taking place in Ireland in late 1980s. Ireland is a small open economy that is highly integrated on international goods markets, and that exports a restricted but highly dynamic variety of manufactured products (pharmaceutical products, for instance). At the end of the 1980s Irish exports were already accounting for more than 50 percent of Irish GDP. Perotti (2012) himself recognizes that a fundamental pillar of late 1980s Irish economic rebound was the solid expansion of Irish exports due to domestic wage moderation and fast reduction in inflation *plus* the initial one-shot devaluation of the Irish pound, and the economic expansion of Britain, i.e. Ireland's most important trade partner. Now: part of the above policy recipe, i.e. the devaluation of the domestic currency, is not available in eurozone countries any longer. Second, it is questionable that a small peripheral eurozone country like Greece could currently follow that same development pattern. Indeed, Greece is a small, *relatively closed* and *largely de-industrialized* economy. Accordingly, there are reasonable doubts that the emphasis on internal devaluation as sponsored by the EAT supporters would currently give rise in Greece to the same results as wage moderation supposedly did in Ireland when combined with other no-more available policy options, and when applied in a much more favorable worldwide economic scenario.

3. An empirical analysis of the foundations of the EAT.

In this section, we econometrically test the validity of the mechanisms through which EAT supporters claim well-designed austerity measures might deliver expansionary outcomes. We also test how the degree of monetary sovereignty characterizing an economy may affect the operativeness of EAT mechanisms, the "financial" channel first and foremost.

We collected a sample of 28 developed economies, which corresponds to an unbalanced panel dataset of 216 annual observations (see Table A.1 in the Appendix). We include both monetarily sovereign and non-monetarily sovereign (read eurozone) countries. We consider annual data from

2007 to 2016 in order to understand how austerity measures implemented in the aftermath of the worldwide financial crisis have worked.

After having ruled out the estimation of a random effect model through a Hausman test, we opted for a fixed effect model. The fixed effect model controls for unobserved time-invariant effects, and produces unbiased estimates under the assumption of strict exogeneity of independent variables (i.e. explanatory variables uncorrelated with idiosyncratic errors ε_{it} in each time period). This could be quite a strong assumption. Indeed, fiscal and monetary policy variables might be interpreted as *weakly* endogenous responses to the evolution of the economic cycle. This fact notwithstanding, after 2009, the spread of the "austerity mantra" has turned fiscal consolidation into something similar to a strictly exogenous policy stance to pursue regardless the specific state of the economy. Even the extreme actions taken by ECB president Draghi in 2012 in response to financial turbulences have all the characteristics of purely discretionary (therefore exogenous) policy choices, which could not be taken for granted at all. In addition to the above, the nature of our analysis, as well as the correspondent limited data availability, does not allow us to adopt more sophisticated modeling strategies that control for various degrees of endogeneity (e.g. IV estimators, GMM, etc.). Last but not least, our fixed effect model precisely follows the same approach used by most previous empirical investigations about the relationship between austerity policies and macro-financial variables (see, for example, Giavazzi *et al.*, 2005, as well as De Grauwe and Ji, 2013).

The structure of the relationship between the error term and the explanatory variables in a fixed effect model does not allow for the inclusion of time-constant variables. Actually, these variables are important in our analysis since we are interested in analyzing the role of institutional differences (i.e. monetary sovereign countries vs. non-monetarily sovereign ones) in shaping the effectiveness of macroeconomic policies. The most consistent way to overcome this issue is to interact time constant variables with relevant time-variant ones. This modality is superior to different estimations carried out on different samples split in accordance to the institutional factor at stake. When employing a fixed effect model, the choice of the goodness-of-fit measure is not straightforward. We follow the standard approach, and we choose the *within-R^2* measure, i.e. the amount of time variation in the dependent variable explained by the time variation in the explanatory variables.

We test the validity of our specifications using two standard tests. First, we test for the existence of unit-roots using both Fisher and Levin-Lin-Chu approaches (see Table A.2). Second, we assess the biasing presence of cross sectional dependence with Pesaran test, which also informed the inclusion/exclusion of time dummies in the various estimations (see Table A.3). All these tests support both our choices of specifications and the soundness of the estimations.

We investigate the econometric solidity of the EAT through a set of six equations. Equations (24) and (25) test the main mechanisms at the basis of the "financial" channel.

$$(24)\ i_d = a_1 \Delta CAPB + a_2 \Delta CAPB_{MS} + a_3 \left(\frac{D}{Y}\right) + a_4 \left(\frac{D}{Y}\right)_{MS} + a_5 CCA + a_6 CCA_{MS} + a_7 \left(\frac{D}{Y}\right)_{MDRAGHI} + a_8 g_i + \varepsilon_{it,1}$$

$$(25)\ i_{cr} = b_1 i_d + b_2 \Delta CAPB + b_3 \Delta CAPB_{MS} + b_4 g + b_5 i_{CB} + \varepsilon_{it,2}$$

In equation (24), we explain how interest rates on 10-year government bonds (i_d) are determined. We take yearly *changes* in the *CAPB* (*ΔCAPB*), i.e. the standard measure of discretionary fiscal policy in the EAT literature, as first relevant explicative variable. According to equation (17), we also check for

the relevance of public finance variables. In order to avoid multicollinearity issues with respect to changes in the *CAPB*, we use the *debt*-to-GDP ratio (*D/Y*) rather than the *deficit*-to-GDP ratio. Indeed, this is consistent with financial operators' common practices, which take the debt-to-GDP ratio as a leading indicator of public finance solidity. Beyond these variables, we consider the cumulative current account balance (*CCA*) from 2007 on as third factor influencing interest rates' determination. Following De Grauwe and Ji (2013), the *CCA* is a proxy for the international financial position characterizing an economy over the relevant time spell. A positive (and increasing) *CCA* is associated to countries that are creditors on international financial markets, i.e. Germany, Japan, and the other core eurozone countries. An increasingly negative *CCA* characterizes debtor monetary sovereign countries such as the USA and the UK, which have been able to continuously attract foreign capitals even after the 2007-2008 financial shock. A negative but decreasing (or stabilizing) net international investment position is associated to peripheral eurozone economies. In our regression, the *CCA* is meant to capture the important role that net creditor/debtor positions on international financial markets may have plaid in determining diverging dynamics of sovereign bonds yields in central and peripheral eurozone countries since 2008. According to the specification of equation (17) in our theoretical model, all the above variables are interacted with a dummy variable d_{MS} (see variables with subscript *MS*) in order to capture how monetary sovereignty may influence the functioning of the "financial" channel. This dummy variable takes value *1* if country "*i*" is monetarily sovereign, whilst takes value 0 if non-monetarily sovereign.

In the same vein, we introduce a "Mario Draghi" dummy (specific to eurozone countries) in equation (24), i.e. $(D/Y)_{MDRAGHI}$, in order to further assess the effects of the ECB president's "whatever in takes" statement on the determination of government bonds' yields in the eurozone after 2012.

Finally, the growth rate of the economy (g_i) is a control variable for the effects that a growing and expanding economy may have on government bonds' interest rates.

In line with equation (16), equation (25) tests the relationship between the lending rate on loans to the private sector (i_{cr}) and the interest rate on government bonds (i_d). Also, we check for any possible direct effect austerity measures may have on the costs of external financing. We run this analysis taking into account the specific monetary environment in which austerity measures are implemented. In equation (25), we detect the effects of the growth rate of the economy (g_i) on the lending rate, as well as the effects of the monetary policy stance adopted by the central banks as captured by the central bank policy rate (i_{CB}).

Equations (26) and (27) focus on the "external" channel:

$$(26) \ (\frac{1}{q}) = \ c_1 \Delta CAPB + c_2 CCA + c_3 CCA_{MS} + c_4 i_{CB} + \varepsilon_{it,3}$$

$$(27) \ g_{EX} = h_1 g_q + h_2 g_{RW} + \varepsilon_{it,4}$$

Equation (26) analyses the determinants of the inverse of real exchange rate (q)[7]. We investigate whether austerity measures effectively triggered off a devaluation of the real exchange rate (i.e. a reduction of 1/q), this way improving the external competitiveness of the economy. We also estimate the extent to which the real exchange rate is related to the net international investment position characterizing monetarily sovereign and non-monetarily sovereign countries (see *CCA* and *CCA$_{MS}$* in equation (26)), as well as the monetary policy stance by the central bank (i_{CB}).

Equation (27) aims at assessing for the relevance of changes in the real effective exchange rate (g_q) and in the growth rate of the rest of the world g_{RW} (with respect to any single economy included in our sample) on export dynamics (g_{EX}). We take the *percentage variation* of exports as dependent variable in order to avoid any autocorrelation problem.

Equations (28) and (29) test for the "expectation" channel, and the effects austerity may display on private consumption, and gross fixed capital formation:

$$(28) \; g_C = j_1 \Delta CAPB + j_2 \Delta WS + \varepsilon_{it,5}$$

$$(29) \; g_I = z_1 \Delta CAPB + z_2 i_{cr} + z_3 g_i + z_4 \Delta WS + \varepsilon_{it,6}$$

In equation (28), percentage changes in private consumptions (with respect to GDP) are explained as a function of discretionary fiscal policies ($\Delta CAPB$), and of changes in the adjusted wage share (ΔWS) on domestic income. On the one hand, the former estimates the direct "expectation" channel through which austerity measures might influence private consumptions. On the other hand, EAT supporters claim that well-designed fiscal packages should expressly aim at inducing an internal devaluation by establishing a climate of wage moderation and by causing a sort of wage (share) suppression. There is an increasing empirical evidence stressing the "perverse" distributional consequences of austerity measures on the wage share and, therefore, on consumption expenditures (see Ball *et al.*, 2013). The inclusion of the latter term in regression (28) aims at capturing the indirect effects that restrictive fiscal policies may have on domestic private consumptions by affecting functional income distribution.

Equation (29) verifies the relevance of (restrictive) discretionary fiscal policies in affecting entrepreneurs' expectations, their investment plans, and hence the growth rate of the available capital stock (g_I). Consistently with the theoretical specification of the investment function contained in our theoretical model (see equation (11)), we include as additional explicative variables the lending rate on private loans (i_{cr}), the change in the adjusted wage share (ΔWS), and the growth rate of the economy (g_i). The inclusion of ΔWS in equation (29) is meant to verify the sensitivity of private investments to the profit share. The growth rate of the economy represents a proxy for the evolution of capacity utilization. Accordingly, parameter z_3 estimates the well-known "accelerator" term characterizing standard post-Keynesian investment functions.

Similarly to the case of exports, also in equations (28) and (29) we take *percentage variations* (log-differences) in aggregate private consumptions and gross fixed capital formation in order to rule out any unit root problem.

Overall, the results of our empirical exercise tell us that, from 2007 to 2016, austerity measures did not deliver the expected results. Most of the time, their effects were contrary to EAT's hypotheses. Such empirical evidence fully endorses our search for a more general model, in which economic expansion is just one perhaps remotely possible consequence of austerity measures amongst many other far less favorable outcomes. More in details, Table 1 shows our findings as to equations (24) – (26). In Table 1, we provide the results related to two different specifications of equations (25) and (26). The distinguishing element between equations (25) and (25b) is the inclusion in the latter of the central banks monetary policy rate i_{CB} as additional explicative variable. In equation (26b), we drop the growth rate of the rest of the world from the set of variables describing the evolution of the real effective exchange rate.

Our empirical evidence on the determinants of 10-year government bonds' yields largely confirms the validity of the theoretical assumptions encapsulated in equation (17). First, the *debt*-to-GDP ratio (*D/Y*) turns out to be significant to explain i_d in the context of non-monetarily sovereign countries. As expected, the sign of the relationship between (*D/Y*) and i_d is positive. In non-monetarily sovereign countries, the higher the debt-to-GDP ratio, the higher the yields eurozone governments will remunerate to financial investors as a compensation for an allegedly higher creditor risk. However, such a relationship turns out to be extremely weak and almost irrelevant in the context of monetarily sovereign economies (i.e. $a_3 + a_4 = 0.0439 - 0.0365 = 0.0074$). In line with De Grauwe and Ji (2013), in monetarily sovereign economies financial operators seem not to consider the most common fiscal balance ratios as relevant indicators for the solidity of the public balance itself.

The same line of reasoning applies to the *CCA*. In the case of non-monetarily sovereign countries, the accumulation of a positive net investment position on international financial markets contributes to drive down interest rates on domestic public bonds. Vice versa, net debtor economies will have to pay higher and increasing interest rates on their own public bonds. This factor may explain the widening spread between central and peripheral eurozone country government bonds' yields in the aftermath of the 2007-2008 financial crisis. Following Merler and Pisany-Ferry (2012), yields initially shoot up in some peripheral eurozone countries as a consequence of their exposure to capital outflows rather than due to the fragility of their public accounts. The relationship between *CCA* and i_d remains negative even in the context of monetarily sovereign countries. Nevertheless, it becomes significantly weaker and negligible ($a_5 + a_6 = -0,0097$). This finding strengthens the idea that public bonds issued by monetarily sovereign governments are always appealing to the eyes of financial operators, in particular when financial turbulences mounts, no matter how high is the debt-to-GDP ratio or the external debt.

The empirical analysis of the direct effects of austerity policies on government bonds' yields largely support our critique to the EAT. In non-monetarily sovereign countries, a positive rather than negative link emerges. From 2007 to 2016, austerity measures drown up rather than down government bonds' interest rates in (peripheral) eurozone economies. On the one hand, these findings confirm the results by Born *et al.* (2014) as to the initial counter-intuitive effects (with respect to EAT postulates) of austerity measures on interest rates in contexts of "fiscal stress" (i.e. the prevailing condition in several eurozone countries in the aftermath of the crisis). On the other hand, our findings suggest that austerity measures could effectively trigger off a perverse "financial" channel in the context of non-monetarily sovereign countries (see figures 1 and 2). Fiscal contractions that curtail growth and increase the debt (deficit)-to-GDP ratio eventually raise rather than reduce public bonds' interest rates. In the case of monetarily sovereign countries, the relationship between i_d and *ΔCAPB* gets negative ($a_1 + a_2 = -0,1416$), in line with the prediction of the EAT supporters. This result seems at odds with the above findings on the insignificant relationships between i_d and (*D/Y*) and *CCA*. A possible explanation for this apparent paradox relies upon the "risk-free" status usually attached to public bonds issued by monetarily sovereign countries, rather than on the virtues of fiscal austerity per se. In the aftermath of the 2007-2008 financial crisis, all financial operators were reshuffling their financial positions away from "private" assets towards public bonds issued by monetarily sovereign countries. Their demand increased considerably, no matter how was the effective solidity of governmental finances (De Grauwe, 2011). In this context, austerity measures widened even further such a "notional" excess demand for "monetarily sovereign" public bonds by squeezing public deficits and reducing the supply

of new government bonds. Accordingly, the public bonds' yields decreased. Nonetheless, this event is ultimately due to the natural properties of public bonds issued by governments that cannot practically go bankruptcy (Kregel, 2012), rather than to the effects fiscal retrenchments might possibly have on public budget's soundness.

Interestingly, as partial confirmation of our previous argument, it is worth stressing that the coefficient associated to the "Mario Draghi" dummy variable is significant and *negative* ($a_7 = -0.0209$). Our empirical evidence suggests that, after 2012, Draghi's intervention has been effective in reducing pressures on the interest rates on bonds issued by peripheral eurozone governments. This significantly contributed to the creation of a "monetary environment" more akin to the one characterizing monetarily sovereign countries, this way striking financial speculation on peripheral countries government bonds.

Last but not least, the level of interest rates on government bonds is *negatively* affected by the overall economic growth of the economy ($a_8 = -5.6389$). This result reinforces the idea that economic growth, and not austerity, is the most important stabilizer of public finances.

Estimations associated to equation (25) confirm that government bonds' yields influence in a significantly positive way the interest rates on private loans. The latter also tend to increase in a growing economy (see the statistically positive relationship between i_{cr} and g_i), very likely as a consequence of an increasing demand for loans. The *direct* effect of fiscal restrictions on i_{cr} is negative, as EAT supporters would suggest. In this regards, two points are worth stressing. First, the distinction between non-monetarily sovereign and monetarily sovereign economies seems to be statistically irrelevant as far as i_{cr} is concerned (see the statistically insignificant dummy variable $\Delta CAPB_{MS}$ in equations (25) and (25b)). Secondly, and more relevantly, the direct effect of austerity measures is considerably downsized when we introduce i_{CB} as additional explicative variable in equation (25b). Indeed, i_{CB} displays a strong and positive effect on i_{cr} (i.e. the more expansionary is monetary policy, the lower is the lending rate on loans to the private sector). Simultaneously, the coefficient linked to discretionary fiscal policy shrinks from -0.2379 in equation (25) to -0.0769 in equation (25b). Accordingly, whilst the *direct* effect of an improvement in the CAPB on i_{cr} remains slightly negative, its overall effect (should we also include the *indirect* effect changes in the *CAPB* may cause on i_{cr} via i_d) turns out to be small and positive in the case of non-monetarily sovereign economies $\frac{di_{cr}}{d\Delta CAPB} = \left[\frac{\partial i_{cr}}{\partial \Delta CAPB} + \frac{\partial i_{cr}}{\partial i_d} \frac{\partial i_d}{\partial \Delta CAPB} \right] = -0.0769 + 0.2818*0.3634 = 0.026$.

The explicative power of the equations (26) and (26b) is extremely limited[8]. Austerity measures seem not to play any statistically relevant effect on the real exchange rate (*q*), differently from what expected by the advocates of the EAT and, more generally, by most open-economy mainstream models. If any, such an effect has the unexpected sign. Fiscal austerity seems to cause an appreciation of the real exchange rate (i.e. an increase of *1/q*, and a reduction of *q*), rather than a devaluation. At the end of the day, the central bank policy rate i_{CB} is the only significant explicative variable entering equation (26b) with the expected positive sign.

Table 2 enters into the details of the effects austerity policies have displayed on the main components of GDP from 2007 to 2016. Austerity measures do not play any direct statistically relevant role in determining the dynamics of private consumptions and export flows. If any, such a direct effect is negative and contrary to what expected by EAT supporters. In the case of exports, the above direct negative (although insignificant) effect is even magnified by the perverse indirect one passing through the appreciation of the real exchange rate. Actually, *q* is the only significant variable affecting export dynamics with the expected negative sign. As expected, private consumptions respond positively to

increases in the wage share. Consistently with Ball *et al.* (2013), an austerity-led reduction in the wage share will drain even further the most relevant component of domestic effective demand.

Evidence about austerity's effects on private investments is slightly more controversial. First, austerity measures seem to play a very limited *positive* direct effect (z_1 = 0.0086) on private investments. This fact notwithstanding, in the case of non-monetarily sovereign countries, fiscal austerity can eventually curtail rather than stimulate private investments through three additional pernicious "indirect" channels: (1) the increase of the leading rate i_{cr} on loans to the private sector (which has, as expected, a significantly negative effects on private investments z_2 = -0.0240); (2) the possible slowdown in overall economic growth, which positively influences investment through the accelerator (z_3 = 2.5334); (3) the reduction through time of the wage share, given the apparently wage-led nature of investment decisions in the economies under observations in the last decade (i.e. z_4 = 0.0104). In the case of monetarily sovereign countries, the fact that austerity policies may contribute to reduce the interest rates on private loans (via their effect on i_d) may surely help to revive private investments. Yet, the concerns about the indirect contractionary effects austerity may trigger off by hampering overall growth dynamics, and by squeezing the wage share are still valid. These concerns go hand-in-hand with our previous emphasis on the fact that austerity measures are, in general, hardly effective by themselves (see the evidence about non-monetarily sovereign countries). Indeed, it seems to be far more important to create a much safer "monetary environment", which stabilizes public finances and makes government bonds' "risk-free" by default.

4. Conclusions

In this paper, we develop a comprehensive critique of the expansionary austerity theory (EAT). Our critique is moved both from the theoretical and empirical terrains.
We first present a short-run model, which plays on the same ground of the EAT by allowing for some of its crucial assumptions and mechanisms, and by carefully formalizing the components of a supposedly well-designed austerity package.

Even admitting for these EAT-like features, austerity-led short-run expansions still remain highly uncertain events that could theoretically take place only under unrealistic and perhaps heroic circumstances (expanding private consumptions even tough permanent cuts in public transfers in the present and uncertain tax reductions in the future).

In the second part of the paper, we econometrically test the empirical solidity of the EAT building blocks. Table 3 provides a summative comparison between the main outcomes of the EAT, the wider range of results our theoretical model allows for, and the empirical findings of our econometric analysis.

[Table 3 here]

Our empirical evidence reinforces our theoretical doubts. Since 2007, austerity did not stabilize at all public finances in non-monetarily sovereign countries. Rather, it may have triggered off a perverse "financial" channel, in which hiking interest rates have fed back in widening public balance disarrays. In monetarily sovereign countries, the "safe haven" status traditionally attached to their own public bonds in time of financial turmoil may have been far more important than austerity *per se* in order to make public finances solid. Even further, the "external" and "expectation" channels seem not to have

been operative, or they operated in the opposite direction with respect to what EAT supporters usually claim.

In the end, our analysis suggests that EAT policy prescriptions should be taken as purely theoretical speculations relying on unrealistic assumptions and without strong empirical ground. Our findings suggest that EAT cannot provide any solid guideline for the conduction of fiscal policies aimed at obtaining positive society-wide objectives.

Endnotes

1. See Sutherland (1997) for the case of possible non-Keynesian effects of expansionary fiscal measures when undertaken in a context of *high public debt*. Perotti (2012) stresses that fiscal contractions may be expansionary in presence of *high interest rates*, in particular when they contribute to reduce risk premiums on financial assets, on government bonds first of all, and prompt a considerable reduction in nominal interest rates.

2. Alesina and Ardagna (2010) argue that lower public sector employment, lower public sector wages, and (or) lower degrees of labor market protection (say cut in unemployment benefits), tend to increase individual labor supply and reduce trade unions' bargaining power. It is easy to see how these effects of fiscal adjustments may stimulate growth in supply-side mainstream models.

3. The same logic may apply in presence of a reduction of public benefits to unemployed people that perhaps makes average *expected* income lower.

4. Indeed, assuming i_d to positively depend on the public *debt*-to-GDP ratio, instead of (or jointly with) the *deficit*-to-GDP, would have not changed the logic of the model. Rather, it would have made the model even more sensitive to any austerity-led contraction in economic activity (hence increase in the debt-to-GDP ratio). The perverse consequences of austerity packages would have emerged even more easily.

5. De Grauwe and Ji (2013) explicitly state that " [in the case of "stand-alone" economies] financial markets do not seem to be concerned with the size of the government debt and of the fiscal space […] despite the fact that the variation of these ratios is of a similar order of magnitude as the one observed in the Eurozone (De Grauwe and Ji, 2013, p. 24)".

6. Ali Abbas *et al.* (2013) note that "front-loaded consolidations have tended to increase public debt in the short run […] Empirically, fiscal effort has been more likely to reduce public debt when growth has been stronger [whilst] the debt-to-GDP ratio increases in the short run when fiscal consolidations come at the cost of lower economic activity. [In the end] while credibility effects can ease the pain of fiscal adjustment through lower risk premiums, this is unlikely to fully offset the short-run adverse impact on economic activity (Ali Abbas *et al.*, 2013, p. 3)".

7. In regression (26), we use ($1/q$) rather than q as dependent variable in order to be consistent with IMF data on the real effective exchange rate (REER), which are computed as the inverse of the theoretical formulation we adopt in equation (7). Accordingly, a depreciation (appreciation) of real exchange rate, i.e. a reduction (increase) in IMF's REER, corresponds to a decreasing (increasing) $1/q$ ratio (i.e. a raise (reduction) in q).

8. The *goodness-of-fit* measures of the various econometric specifications we adopt are not very large. This is partially due to the inclusion in our dataset of the years in the immediate aftermath of the worldwide financial crisis, in which variability in the main macroeconomic variables has been considerable. As stressed in the main text, the *within-R^2* assesses the effectiveness of our model in explaining the relationships between the variability of dependent and explanatory variables. We think that the *within-R^2* associated to our regressions are reasonably high if we take into account the abovementioned high variability characterizing our time spell.

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Figures and Tables

Figure 1 – Austerity-led economic contraction and rising deficit-to-GDP ratios.
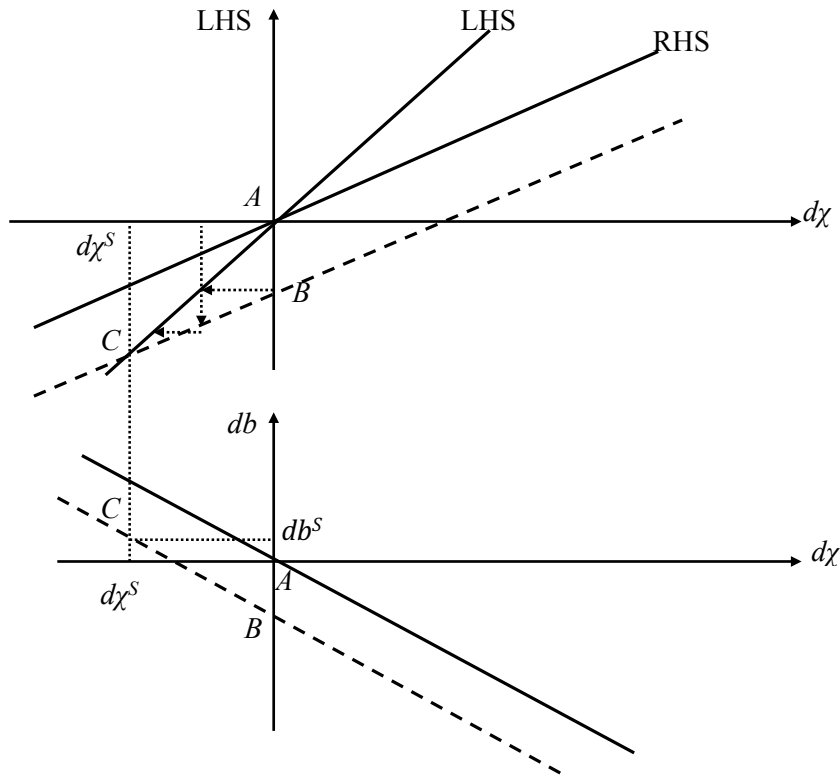

Figure 2 – Austerity-led "endless" economic contraction and explosive deficit-to-GDP (and debt-to-GDP) ratios in an *unstable* short-run setting.
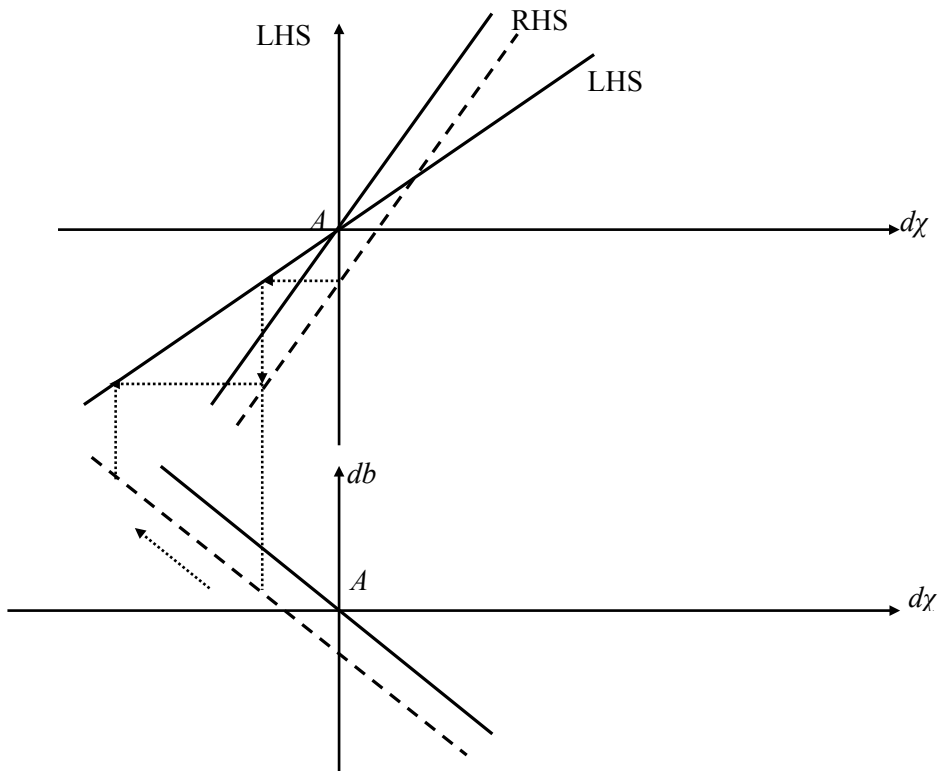
Table 1 – Estimation results for interest rates and the real exchange rate, 2007 – 2016.

Variables	Dependent Variable				
	i_d (24)	i_{cr} (25)	i_{cr} (25b)	$1/q$ (26)	$1/q$ (26b)
$\Delta CAPB$	0.3634*** (0.1017)	-0.2379*** (0.1272)	-0.0768*** (0.0269)	0.4994* (0.2726)	0.4154 (0.2852)
$\Delta CAPB_{MS}$	-0.5050*** (0.1235)	-0.2133 (0.2609)	-0.3405 (0.2658)		
g_i	-5.6389* (3.0776)	5.5091*** (1.8025)	3.2727** (1.4823)		
$\dfrac{D}{Y}$	0.0439*** (0.0065)				
$\left(\dfrac{D}{Y}\right)_{MS}$	-0.0365** (0.0177)				
$\left(\dfrac{D}{Y}\right)_{MDRAGHI}$	-0.0209*** (0.0052)				
CCA	-0.0500* (0.0269)			0.0329 (0. 0652)	0.0339 (0.0666)
CCA_{MS}	0.0403* (0.0231)			0.0483 (0. 1309)	0.1165 (0.1370)
i_d		0.3541*** (0.1272)	0.2818*** (0.0625)		
i_{CB}			0.4421*** (0.1038)	1.9354*** (0.5224)	1.7494*** (0.5594)
g_{RW}				-0.1585 (0.986)	
Time dummies	Yes	No	No	No	No
$Within - R^2$	0.6620	0.3987	0.4917	0.2474	0.1742
Number of observations	216	216	216	211	211
Wald test for $a_1 + a_2 = 0$ ($p - value$)	0.0026				
Wald test for $a_3 + a_4 = 0$ ($p - value$)	0.0032				
Wald test for $a_5 + a_6 = 0$ ($p - value$)	0.1277				
Wald test for $b_2 + b_3 = 0$ ($p - value$)		0.0000	0.0001		
Wald test for $\beta_3 + \beta_{3.1} = 0$ ($p - value$)					
Wald test for $c_2 + c_3 = 0$ ($p - value$)				0.2216	0.2272

Clustered at country level and robust standard errors are shown in brackets. *p<0.1, **p<0.05, ***p<0.01. The coefficients for year dummies are omitted.

Note: in equations (25b), (26), and (26b), i_{CB} is not available for Japan and Iceland. We use the money market interest rate as a proxy. We tested the robustness of our results by excluding these two countries from our sample in regressions (25c) and (26c) – see Table A.4 in the Appendix.

We checked and confirmed the robustness of our results in estimations (26) and (26b) by dropping the insignificant effect of CCA – see Table A.4 in the Appendix.

In equations (26) and (26b), Slovenia is excluded from these estimations since that the real effective exchange rate was not available.

Table 2 – Estimation results for main GDP components other than public consumptions and imports, 2007-2016

Variables	g_E (27)	g_C (28)	g_I (29)
$\Delta CAPB$	-0.0036 (.0026)	- 0.0006 (0.0008)	0.0086** (0.0031)
g_q	-0.4131** (0. 1841)		
g_{RW}	-.15323 (1.172)		
i_{cr}			-0.0211*** (0.0055)
g_i			2.5334*** (0.1756)
ΔWS		0.0104*** (0.0023)	0.0169*** (0.0047)
Time dummies	Yes	No	No
$Within - R^2$	0.7067	0.5304	0.6496
Number of observations	216	216	216

Clustered at country level and robust standard errors are shown in brackets. *p<0.1, **p<0.05, ***p<0.01.
Note: Equation (27b) checks and confirms the robustness of our estimations in equation (27) when drop the insignificant effect of the growth rate of GDP of the rest of the world.

Table 3 – Summative comparison between EAT hypothesis, our theoretical model, and the connected econometric analysis

	austerity − led effects on interest rates, real exchange rate and demand components					
Standpoint	$\frac{\partial i_d}{\partial \Delta CAPB}$	$\frac{d i_{cr}}{d \Delta CAPB}$	$\frac{\partial (1/q)}{\partial \Delta CAPB}$	$\frac{dI}{d \Delta CAPB}$	$\frac{\partial C}{\partial \Delta CAPB}$	$\frac{\partial E}{\partial \Delta CAPB} = \frac{\partial E}{\partial (1/q)} \frac{\partial (1/q)}{\partial \Delta CAPB}$
EAT	< 0	< 0	< 0	> 0	> 0	> 0
Our theoretical model	$\lessgtr 0$	$\lessgtr 0$	< 0	$\lessgtr 0$	$\lessgtr 0$	> 0
Estimated effect non − MS countries (2007 − 2016)	> 0	> 0	insign., > 0	$\lessgtr 0$	insign., < 0	insign., < 0
Estimated effect MS countries (2007 − 2016)	< 0	< 0	insign., > 0	$\lessgtr 0$	insign., < 0	insign., < 0

Appendix

Table A.1 Variables definitions, sources and composition of the sample

Variable	Definition	Source
i_d	Long-term interest rate on 10-year government bonds	AMECO + OECD
i_{cr}	Lending interest rate on loans to the private sector	IMF Financial Statistics + ECB statistics
i_{CB}	Central bank policy rate*	IMF financial statistics
q	Real effective exchange rate	IMF financial statistics
C	Private consumption expenditures at current prices	AMECO
I	Gross fixed capital formation at current prices	AMECO
E	Export of goods and services at current prices	AMECO
Y_i	Gross Domestic Product at current prices	AMECO
Y_{RW}	Rest of the World Product at current prices	$Y_w - Y_i$
WS	Adjusted wage share	AMECO
$CAPB$	Cyclically Adjusted Primary Balance	IMF Fiscal Monitor
D/Y	Debt-to-GDP ratio	IMF World Economic Outlook
CCA	Cumulative current account 2007-2016	IMF World Economic Outlook

Sample composition		
Non-monetarily sovereign countries	Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain	
Monetarily sovereign countries (MS)	Australia, Canada, Denmark, Iceland, Japan, South Korea, Norway, New Zealand, Sweden, Switzerland, UK, USA	

*We used money market interest rates for Japan and Iceland as a proxy for the central bank policy rate due to the lack of direct information on this last policy variable.

Table A.2 – Unit root tests (H_0 hypothesis: panel contains unit root)

$Variable$	Fisher test: $p - value$	LLC test: $p - value$
i_d	0.0260	0.000*
i_{cr}	0.0000	0.0000
$\dfrac{D}{Y}$	0.0000	0.0000
CCA	0.2350	0.0640
g_i	0.0000	0.0000
g_{RW}	0.0000	0.0000
$\Delta CAPB$	0.0000	0.0000
i_{CB}	0.0000	0.0000
q	0.0000	0.0000
g_q	0.0000	0.0000
g_I	0.0000	0.0000
g_C	0.0000	0.0000
ΔWS	0.0000	0.0000
g_E	0.0000	0.0000

Table A.3 – Pesaran test for cross sectional independence

Specification	$p - value$ without time dummies	$p - value$ with time dummies
(24)	0.0001	0.9943
(25)	1.0000	
(25b)	0.9932	
(26)	1.0000	
(26b)	1.0000	
(27)	0.9882	
(28)	1.0000	
(29)	0.0002	0.9566

Table A.4 – Estimation results for robustness tests, 2007-2016.

Variables	i_{cr} (25c)	$1/q$ (26c)	g_E (27b)
$\Delta CAPB$	-0.0729** (0.0254)	0.4237 (0.2658)	-0.0022 (0.0028)
$\Delta CAPB_{MS}$	0.0297 (0.04346)		
g_i	1.4929 (1.634)		
g_{RW}		-0.5204 (8.056)	
i_d	0.2480*** (0.0519)		
i_{CB}	0.4219*** (0.1026)	1.8378*** (0.4540)	
g_q			-0.5211*** (0.1155)
Time dummies	No	No	Yes
$Within - R^2$	0.5562	0.2720	0.7262
Number of observations	190	190	216

Clustered at country level and robust standard errors are shown in brackets. *p <0.1, **p <0.05, ***p <0.01. The coefficients for year dummies are omitted. Regression (25c) excludes Japan and Iceland.