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Thinking ahead for Europe

Optimal Adjustment Paths in a Monetary Union

Ansgar Belke and Daniel Gros

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Abstract

Adjustment to an external imbalance is more difficult within a monetary union if wages are sticky. Periods of high unemployment are usually necessary to achieve the required real depreciation (internal devaluation). Gradual adjustment is usually recommended to distribute the output and employment cost over time. This paper takes into account that gradual adjustment also has a cost in terms of higher current account deficits and thus a higher debt, and ultimately higher debt-service costs. We calculate the optimal path/speed of price and wage adjustment in terms of deeper parameters like the slope of the Phillips curve, the degree of openness, etc. Gradual adjustment is not always optimal.

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Introduction

If an external devaluation (of the exchange rate) is not possible, as within the euro area, internal devaluation may serve as a substitute, but requires significant and *politically costly* declines in both wages and prices (Wasmer, 2012, p. 769).

The optimal path for prices and wages involves a balance between two apparently conflicting objectives. One is to quickly restore competitiveness and the external balance. The other is to mitigate the deflationary effects resulting from an increase in the real value of private debt and the postponement of expenditure in case of deflation. "Debt outcomes are very sensitive to growth or variations in the speed of internal devaluation" (IMF, 2012, p. 90).

Recognising the above-mentioned trade-off, labour market reforms aimed at removing downward wage rigidities in deficit countries are expected to contain unemployment (as wages will become more responsive to changes in employment) and to speed up the structural adjustment process towards exports. At the same time, however, such policies might also adversely affect consumer demand, tilting the economy away from internal balance.[1]

Although they do not directly refer to an optimal pace of internal devaluation, some recent IMF working papers, such as those by Kang and Shambaugh (2013, 2014), Tressel et al. (2014) and Tressel and Wang (2014), emphasise some pattern. Above all they emphasise that the adjustment for the southern European countries has come along with a *substantial recession*, because unit labour cost improvements have been largely driven by falling employment, while much of the current account improvements have been achieved *through import compression* due to the recession (see also IMF, 2013, p. 25). For instance, there is empirical evidence that an

[1] In practice, relative prices are adjusting at different paces across countries and with different compositions of wage cuts and labour shedding. See Tressel and Wang (2014).

increase in the exports of programme countries might also result from a *lack of domestic demand* and hysteresis effects. In that case, firms stay in the market even if they incur losses in order to avoid exit and re-entry costs and thus switch from home to foreign markets (Belke, Oeking and Setzer, 2014).

A different question is *how fast the RER (real exchange rate) depreciation should be achieved* so as to bring the economy to internal *and* external balance simultaneously. In addressing it, this contribution strives to balance the benefits of restoring competitiveness against the deflationary effect of the devaluation. Some first considerations can be found in the following analysis.

The remainder of the paper proceeds as follows. In section 1, some fundamental conceptual issues are clarified. Section 2 develops the macroeconomic framework with an eye on the role of ideology and different schools of thought. In section 3, we come up with a simple model to assess whether gradual adjustment or a 'cold turkey' approach is preferable from a social welfare perspective. Among others, we derive the optimum speed of internal adjustment and assess the welfare effects of alternative policy instruments.

1. Towards an empirical assessment of the optimal path for internal devaluation

Before going into an assessment of adjustment programmes one needs to ask why they were needed. Official adjustment programmes are needed (and accepted) usually when a country, or rather its government, has lost access to capital markets. This type of situation usually occurs only after a so-called 'sudden stop' in capital inflows. Typically the country in question experienced a period of high capital inflows that financed the combination of a domestic boom with a large current account deficit. This implies that the country needing an official adjustment programme has usually accumulated a considerable stock of debt and faces two problems when the capital inflows stop:

- a stock problem, in that often a large proportion of the accumulated debt was short term and refinancing the stock might become impossible/extremely costly. Part of any adjustment programme is hence to re-finance pre-existing debt coming due (or to organise a restructuring, like in the case of Greece) (Shambaugh, 2012; Bornhorst and Arranz, 2013; Tressel, 2012); and

- a flow problem in that the current employment and production pattern has resulted in a current account deficit (i.e. the demand for tradables has exceeded the supply).

Our contribution focuses on the *flow problem*, i.e. how and at what speed to reduce the current account deficit. In the absence of official financing the country does not have any choice: the current account deficit must disappear when the capital inflows stop. This is what countries like Estonia, Lithuania and Bulgaria experienced around 2009. More specifically, the huge capital inflows that had financed current account deficits of 10 to over 20% of GDP had to disappear within a very short period of time because financing from private sources dried up and these countries did not receive (or ask for) official support (Giavazzi and Spaventa, 2010).

The cases of some of the euro area countries (and Latvia) were different. When their governments lost access to financing in private markets they were offered substantial financial support from official sources (the IMF, the European Union and the European Central Bank (ECB)).

This implies that for some countries, private capital markets basically forced the economy into external balance, leaving governments and domestic actors with little choice. By contrast, in the case of those undergoing official adjustment programmes the speed of external adjustment becomes a policy choice – and a hotly contested one. Governments of the countries concerned of course prefer a slow adjustment, because this lowers the required combination of a reduction in domestic absorption and lower wages. The creditor countries or other institutions providing finance of course prefer a quicker adjustment, since this reduces the amount of risk they have to take.

The real life constraint both sides face is that in the short run, a reduction in the current account deficit can be achieved mainly through a reduction of domestic expenditure, since domestic prices and wages adjust only slowly. Achieving external balance implies in the short run substantial costs in terms of unemployment. In the longer run, full employment can be restored if domestic wages and prices have fallen such that expenditure switching can work, through higher production of tradables and a switch in demand from imports towards domestically produced goods. From the point of view of the countries in crisis, slower adjustment is always better. However, this point of view overlooks the fact that a slower adjustment means that the current account deficit persists for longer, implying that in the long run the country has to service a higher level of external debt. Taking into account the longer

term budget constraint implies that the choice is not so much between slow or quick adjustment today, but between more adjustment today and less adjustment tomorrow (because more adjustment today means a lower future debt level).

In that case, there is a trade-off between internal devaluation and unemployment: lack of RER depreciation implies that a greater contraction of domestic expenditure will be needed to meet the external balance (usually depicted in a Swan diagram). A faster RER depreciation would allow the economy to meet the external balance without the need to depress aggregate demand so much. Since the RER depreciation in a country such as Greece under the Troika programmes was insufficient, the aggregate demand fell more than needed, with a special impact on investment, dooming the economy to a slower recovery and less ability to reallocate resources from the non-tradable to the tradable sector. Thus, according to this view, a faster RER depreciation would imply less contraction, not more. There would be no two conflicting objectives. In that respect, in our model section 3.2 we check whether a higher degree of openness makes the overall adjustment less costly and, in the same vein, whether a steeper Phillips curve or a more elastic supply curve of exports have the same effect.

Another argument that arises often in discussions about external adjustment is that a real devaluation increases the real value of debt denominated in foreign currency. This issue is independent of whether the devaluation is internal (when prices and wages decline) or external (when the nominal exchange rate depreciates). The real value of debt increases in both cases. And this will depress aggregate demand further. In this context, however, it is crucial to be precise about what is meant by an increase in the real value of debt. In the case of a nominal devaluation it is clear that the real value of all debt expressed in foreign currency will increase in terms of non-tradable goods as long as domestic prices and wages are sticky. Yet debt expressed in domestic currency might actually lose some of its value in terms of domestic goods as long as there is some, partial, flexibility in domestic prices and wages.

Within a monetary union there is no distinction in terms of the currency of denomination of debt. When domestic prices and wages fall the real value of all debt, in terms of the domestic good, increases. Still, the value of (all) debt will remain unchanged in terms of tradable goods, because the home country is usually taken to be a price-taker on global markets. Moreover, one has to distinguish between domestic and foreign debt. The fact that the real value of domestic debt increases should not have a large net impact on demand, since the creditors gain what the debtors lose. Finally, the debt owed to foreign residents has to be ultimately

serviced by a transfer of tradable goods. This implies that the real depreciation required for an external adjustment does not necessarily increase the real burden of existing foreign debt.

The increase in the value of all debt in terms of domestic non-tradables should not have, on net, an income effect, but it could *exacerbate borrowing constraints*. Thus, one could argue that a slower adjustment (i.e. a slower decline in domestic wages and prices) is a preferred strategy, since it leads to a reduction of borrowing constraints and thereby a smaller contraction of investment. In other words, with a slower adjustment in domestic wages it might be possible to increase the pace at which new capacity in the export sector is established, ultimately accelerating the external adjustment and the return to full employment.

2.   The macroeconomic framework: Ideology and different schools of thought

As we have seen in several cases in the past, *the ease with which internal adjustment can be implemented is influenced by the country's overall vulnerability to adjustment* and the government's ability to design reforms in ways that spare its core constituency (Walter, 2014). Hence, the optimality of the internal adjustment path is a function of political-economic constraints (like government ideology) in the home country. For instance, one may argue that the lower the political-economic obstacles are, the more speedily the internal adjustment should take place (Zemanek, Belke and Schnabl, 2010). This is because it implies less reliance on (external) financing, which reduces the danger of even more debt-sustainability problems in the future. Otherwise, the necessary internal adjustment might be thwarted by interest groups, and for instance, the resolution of the Greek crisis will continue to be a drawn-out, painful and politically costly process.

Note that even without the option of external adjustment, two additional crisis strategies remain, at least theoretically, for the Greek government in the current crisis besides an internal adjustment by the deficit countries: internal adjustment by the surplus countries and a quasi-permanent financing of the deficit. Of course, external adjustment in terms of a depreciation of the euro in general (as currently enacted through quantitative easing) is also an option and the ECB has been actively working towards a weakening of the currency. As stated, for instance by Biggs and Mayer (2014), owing to more generous external (credit) assistance for Greece, the optimal speed of internal adjustment could be slower and become conditional on "optimal" external assistance and, hence, even *indeterminate*. Anyway, materially slower adjustment would have required even more support (Gros et al., 2014). A coordinated break-

up of economic and monetary union has also been considered in policy circles and academic research (Walter, 2014, p. 8).

The discussion about adjustment in a monetary union has become highly politicised (in terms of 'Keynesian versus non-Keynesian') and at the same time the discussion *has not taken place with reference to any full-fledged model*. This is a key problem, since without an explicit framework it becomes very difficult to discriminate between different views. A formal model has the advantage that different views of the world can be distinguished through various specific restrictions and assumptions in the model. It was extremely hard to find any academic literature on the issue of the optimal speed of internal devaluation in the strict technical sense. That is somewhat surprising given that the implicit *welfare function* is generally taken to be convex in lost output or unemployment (usually the squared deviations from respective equilibrium values) and there are benchmark, if not consensus, macro-models that relate output to wages and prices in the presence of nominal rigidities. We show that the combination of these simple, standard elements leads to important insights.

So what is the core of the diametrically opposed Keynesian-type argument in favour of a trade-off between the external and internal balance? In that respect, Wren-Lewis (2012) states, "[t]he key macroeconomic question is how quick adjustment should be. Should competitiveness be restored quickly or slowly? Macroeconomics has a pretty clear answer which comes from the Phillips curve (of whatever variety) – *slow is much more efficient*" (emphasis added).

Wren-Lewis (2015) continues the argument with an eye on Latvia:

> Now this is all very stylised and partial equilibrium, but there is one important message that will survive complications. The Phillips curve tells *us that reducing the price level gradually over time is more efficient than doing it quickly* [emphasis added]. So even if you believe that you have to stick with a fixed exchange rate, a short sharp recession is much less efficient than a more modest but prolonged recession. Thinking about the convexity of the social welfare function reinforces this point.

> As a result, even if output growth this year and next year was over 5% p.a., and the country achieves a sustainable level of competitiveness, I would not call the Latvian experience a success story. The competitiveness correction will have cost the economy

a huge amount in wasted resources and unemployment misery, when it could have achieved this correction at a much reduced cost.[2]

We do not discuss how policy outside the country concerned could foster or even obviate the need for adjustment. For example, it has been argued that the (external and internal) adjustment by the deficit countries could be much reduced, in a general equilibrium perspective by a symmetric adjustment in the surplus countries. We take external demand as given and thus do not consider these general equilibrium effects. Moreover, the external adjustment in the euro periphery would also be facilitated by a depreciation of the euro.

3.   Gradual adjustment or cold turkey? A simple model

A critical problem of a country facing a 'sudden stop' in capital inflows is the optimal speed of adjustment. Countries receiving only limited financial support have little choice: when private capital inflows stop, and official financing is very limited, they have to adjust very quickly in the sense that the current account must almost instantaneously go into equilibrium. This was the case of the Baltic countries, as shown in Gros et al. (2014).[3] In the cases of the euro area countries under financial stress (like Greece, Ireland and Portugal), official financial support was relatively plentiful. There the speed of adjustment could be chosen by policy.

The main trade-off is simple: a quick elimination of the current account deficit has the advantage that it avoids the accumulation of further foreign debt (which tends to be expensive during a crisis). However, a quick turnaround in the current account requires an immediate sharp reduction in domestic absorption, because it takes time to increase exports, especially if the country does not have a flexible exchange rate.

At first sight, a cold turkey approach could require a sharper fall in demand and GDP than a more gradual approach, which would give time for domestic prices and wages to adjust so that higher exports could contribute to closing the external deficit, thereby sustaining demand and employment later. But when one takes into account that wages are likely to adjust faster when domestic demand is very weak, it turns out that a front-loaded adjustment improves the

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[2] For more on these arguments, see also "The case of Latvia's 'successful' (speedy) internal devaluation is not a model for the EZ periphery" (http://krugman.blogs.nytimes.com/2011/11/05/roubini-on-internal-devaluation/).

[3] Note in this context that the labour markets in the Baltics were rather flexible. See Purfield and Rosenberg (2010).

prospects for the future on two accounts: foreign debt will be lower and wages will have fallen in the meantime, improving competitiveness.

Our model allows one to put this trade-off into more precise terms. The key result is that the choice is not between gradual or rapid adjustment. With an intertemporal budget constraint the choice is only between adjustment today and adjustment tomorrow.

What remains, as an argument for a gradual (or rather slower) approach, is essentially that the future is discounted: future pain counts for less than pain today. Whether a gradual or a cold turkey approach is better depends on the strength of the discount on the future, relative to the price of the additional foreign debt incurred in a gradual adjustment (and the amount of future employment created by a quick adjustment).

The purpose of the simple model presented here is to formalise these relationships and the trade-off in a standard Keynesian-type model in which import demand depends on domestic absorption and domestic wages, which in turn react in a Phillips curve-type relationship to domestic demand (or rather the output gap). The model should be useful to describe the choices facing a member country of the euro area, or countries with a hard peg, like the Baltic countries whose currencies were linked to the euro.

3.1   The model

The purpose of our model is to capture the essential elements mentioned above. There are only two periods: the present and the future. The basic decision is thus only about the present period. We assume that policy-makers can somehow choose the state of the economy (in terms of the output gap) today. Once this decision has been taken, the future is determined, in the sense that any adjustment that has not been achieved today must come tomorrow.

The model consists of four basic relationships or building blocks:

1. The current account at any point in time (which is equal to the trade balance plus the interest payments on the accumulated foreign debt) depends on domestic demand in the same period and wages in the past.

2. Wages are sluggish, but they react to unemployment or the output gap.

3. The country faces an intertemporal budget constraint in the sense that the discounted sum of the trade accounts cannot surpass a certain limit (given by the availability of private and official financing).

4. Policy consists of minimising a standard social loss function.

The basic working mechanisms start from the observation that income and the real exchange rate determine the current account. This is an empirical relationship that is quite robust and has been estimated very frequently. Although the precise parameter estimates vary a great deal there is general agreement in the literature about this specification.

Formally, the first building block is a simple equation for the current account (or rather the trade balance given past debt):

(1) $cab_t = -\beta y_t - \gamma w_{t-1}$,

where y denotes income (which can be understood as the deviation from the equilibrium or trend) and cab_t is the current account balance. Domestic income (in the current period) has an immediate impact on imports and hence the current account. Higher income of course leads to a deterioration of the current account (beta is positive and indicates the degree of openness of the economy).

Exports, however, react to (domestic) wages, w_t, only with a lag. The current account in the present period (cab_t) is therefore a function of wages in the previous period (w_{t-1}). The parameter gamma is also positive, as higher wages should mean lower exports. A higher value of gamma indicates a higher elasticity of export demand to the real exchange rate measured in relative wages (foreign wages are given and taken as constant).

The second building block concerns the adjustment of wages. They are assumed to follow a standard Phillips curve-type relationship in the sense that when income is high (the output gap is positive) wages increase:

(2) $w_t - w_{t-1} = \phi y_t$.

Without loss of generality, the wage rate inherited from the previous period (w_{t-1}) can be normalised to zero. As shown below, this normalisation nonetheless has implications for the intertemporal budget constraint.

This mechanism for the adjustment in wages implies that the trade balance during the second period is given by

(3) $cab_{t+1} = -\beta y_{t+1} - \gamma w_t = -\beta y_{t+1} - \gamma \phi y_t$.

The trade balance in any period is thus a function not only of current demand conditions, but also, indirectly, of past ones.

This facilitates the exposition of the third building block, namely the budget constraint. It takes the form of the condition that the discounted value of the external deficits incurred in the current period and the future period must sum to zero:

(4) $\Omega cab_t + cab_{t+1} = 0$,

where the parameter Ω denotes the interest factor by which a deficit during the first period increases the overall foreign debt of the country at the end of the (first) period ($\Omega > 1$).

Using equations (1) and (3) in (4) shows how the output gaps in both periods are related, if the country has a ceiling on the foreign debt it can accumulate (or has to repay) over both periods:

(5) $0 = \Omega(\beta y_t + \gamma\phi w_{t-1}) + |\beta y_{t+1} + \gamma(\phi y_t + w_{t-1)}|$.

The wage rate inherited from the past (w_{t-1}) has been made explicit in this equation to show that a high initial wage rate corresponds with a certain level of external debt. This can be seen by rewriting the intertemporal budget constraint as

(5)′ $-w_{t-1}(\Omega\gamma\phi + \gamma) \equiv D = \Omega\beta y_t + |\beta y_{t+1} + \gamma\phi y_t|$.

A high, inherited wage rate ($w_{t-1} > 0$) is thus equivalent to having a certain amount of foreign debt ($D < 0$). We concentrate henceforth on the case of a country in need of adjustment in the sense that it enters the first period with a wage rate above the equilibrium level. The impact of this adjustment need on the external balance is summarised in the parameter D, which is therefore assumed to be negative.

D does not necessarily need to be negative. In the case of a country entering the current period with an undervalued wage rate ($w_{t-1} < 0$), D would be positive. More generally, D can be thought of as the sum of the total amount of financing available for the economy. In the case of countries under an adjustment programme, D would be the sum of the amount of official financing available during the present, i.e. the first period adjusted for the negative impact of high initial wages.

In the case of a country entering the first period already with foreign debt (and without the possibility of default), D would be negative even if the initial wage rate were at the equilibrium

level ($w_{t-1} = 0$), because in this case the country would need to run (on average) current account surpluses over the current and future period.

For the remainder, we continue denoting D as the algebraic sum of the external financing available plus the impact of the initial conditions resulting from deviations of the initial wage rate from its equilibrium level of zero. A negative value of D denotes an initial adjustment need.

The trade-off between demand today and demand tomorrow (ceteris paribus the external debt ceiling) is summarised by

(6) $-(\Omega + \gamma\phi/\beta)y_t + D/\beta = y_{t+1}$.

Higher demand today means lower demand tomorrow, because of both the cost of debt (omega>1) and the fact that higher demand today keeps wages up today and consequently reduces future exports.

This relationship is a key insight, because it shows that a gradual adjustment involves a trade-off between lower domestic activity today and tomorrow, not higher activity in all periods. The very term 'gradual adjustment' is actually not appropriate, since it suggests that somehow it is possible to have a higher average path for domestic demand than if the current account adjusts immediately. The intertemporal budget constraint implies that this is not possible: less adjustment today necessarily involves more adjustment tomorrow.

Inspection of relationship (6) shows that a steeper Phillips curve makes the trade-off between today and tomorrow steeper in the sense that a given adjustment today is followed by a stronger rebound in the second period.

The impact of a higher degree of openness (higher beta) on the adjustment speed is less clear. A higher degree of openness means that income has to fall less for any given adjustment in the external balance. Nevertheless, this effect works in the same way in both periods and hence has little direct bearing on the choice of whether to adjust today or tomorrow. But it is clear that a higher degree of openness reduces the amount of income reduction that is necessary for any given amount of the initial adjustment need as summarised by the parameter D. The higher the inherited adjustment need (or inherited debt), the lower will be the level of income (or output gap) that can be maintained (over both periods).

To simplify the notation it is convenient to summarise the influence of various parameters in equation (6):

(7) $(D/\beta) - \Gamma y_t = y_{t+1}$,

with $\left| \Omega + \frac{\gamma\phi}{\beta} \right| \equiv \Gamma > 1$.

The composite parameter, capital gamma, is larger than one because the trade-off between today and tomorrow is greater than one to one. More specifically, 'austerity', interpreted as a reduction in current demand, yields a double benefit in the future: lower debt-servicing costs (because of a lower external deficit today) and higher exports (because wages will have become more competitive).

The two parameters γ and ϕ always appear together because the indirect impact of lower demand on the (future) current account depends on both the slope of the Phillips curve and the elasticity of exports with respect to wages.

The constraint resulting from the external budget restriction and the working of the economy does not allow one, per se, to make any inferences about what policy should do. It only shows the trade-off between the two periods.

The fourth building block concerns the policy problem, which is to minimise the present value of the social loss from the (unavoidable) adjustment. The social loss is modelled in a standard way:

(8) $L = \Theta(y_t)^2 + (y_{t+1})^2$,

where Θ represents the degree of preference for the present of the social planner, with $\Theta > 1$. In a crisis situation, when risk premia are high one can assume that the market interest rate is higher than the social discount rate, and thus that $\Theta < \Omega$. It is under these circumstances that an adjustment programme makes sense.

Note that it is implicitly assumed that y_t is a policy variable. The government of course cannot determine demand directly, but it is assumed here that fiscal policy (austerity) has a direct impact on demand.

The rate of interest and time preference of course play an important role in any intertemporal problem. That is the case in this model as well. We show later how any difference between the

cost of funds for the country and the degree of time preference of the policy-makers affects the optimal time path.

Finally, we note that in any model with a Philips curve-type relationship one cannot emphasise only wages as the driver of the trade balance, since the Philips curve implies that wages are ultimately driven by domestic demand.

3.2 The optimal speed of adjustment

Minimising the social loss with respect to y_t, subject to the intertemporal budget constraint yields the standard first-order condition (FOC):

(9) $\dfrac{\partial L}{\partial y_t} = \Theta 2(y_t) + 2(y_{t+1}) \left[\dfrac{\partial y_{t+1}}{\partial y_t} \right] = \Theta 2 y_t - 2[(D/\beta) - \Gamma y_t]\Gamma = 0$,

where the second equality sign is based on the relationship between income today and the future from equation (7). This can then be simplified to

(10) $y_t (\Theta + \Gamma^2) - \Gamma(D/\beta) = 0$.

This equation can be solved for the income in the present period, which minimises the social loss, $y_{t,min\ socloss}$:

(11) $y_{t,min\ socloss} = \dfrac{D\Gamma}{\beta(\Theta + \Gamma^2)}$.

As expected, the best (or rather unavoidable) choice is to keep the current period income low if there is an initial over-valuation ($D<0$, or equivalently, if $w_{t-1} > 0$). The reverse is also true: a reduction of the debt, as in the Greek default (also euphemistically called PSI (private sector involvement)) operation of 2012, would increase D (make it less negative), allowing for a higher income level to be maintained. Equation (11) confirms that for a country without any adjustment need ($D=0$) the output gap should be maintained at zero.

This result (11) only shows the amount of adjustment during the current period. The important issue to be addressed here, however, is the time path of adjustment, i.e. income today versus income tomorrow.

Substituting the result for the current income that minimises the social loss (equation (10)) into the relationship between income today and in the future from the external budget constraint

yields a result for the optimal path of adjustment, i.e. the difference between the output gap in the two periods:[4]

$$
\begin{aligned}
y_{t+1} - y_{t,\min socloss} &= (D/\beta) - y_{t,\min socloss}(\Gamma + 1) = (D/\beta) - \frac{D\Gamma(\Gamma+1)}{\beta(\Theta + \Gamma^2)} = \frac{D(\Theta - \Gamma)}{\beta(\Theta + \Gamma^2)} = \\
&= \frac{D(\beta(\Theta - \Omega) - \gamma\phi)}{\Theta\beta^2 + \Omega^2\beta^2 + \gamma^2\phi^2 + 2\Omega\gamma\phi\beta}
\end{aligned}
$$

This equation confirms that the output gap should be zero in both periods if there is no initial adjustment need (D=0). But if there is an adjustment need (D<0), the numerator of the fraction in equation (12) suggests that the second period output gap is likely to be smaller (in absolute value) than the one in the first period. This implies that 'gradual' adjustment (defined as a policy under which the output gap is either stable or slowly increasing) is not an optimal policy. A sufficient, but not necessary condition for this result is that the cost of debt is higher than the discount factor in the social loss function (Ω>Θ). This is likely to be the case, since in a crisis risk premia are usually elevated for a country with an adjustment need (and a fortiori for a country that needs an adjustment programme, which becomes necessary only when the risk premia are so high as to preclude market access).

The optimal policy described in equation (12) does not imply a cold turkey approach either if one defines cold turkey as a policy under which the output gap is so negative in the first (adjustment) period that it can later become positive on the back of very competitive wage rates. Equation (11) together with equation (7) implies that if D is negative, the output gap should be negative in both periods.

The main result is that even if one takes into account the convexity of social loss functions and preference for later adjustment, one still finds that a certain initial overshooting in the adjustment remains preferable in the sense that the optimal output gap during the adjustment period is likely to be larger than the one in the following one.

Turning to the general case (in which D does not have to be negative), one can calculate the ratios of the output gaps in the two periods from the equations (11) and (7), which describe respectively social preferences and the intertemporal trade-off resulting from the budget constraint:

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[4] One needs to use (11) in (7) and solve for y_{t+1} and y_t.

$$(13) \Rightarrow \frac{y_{t+1}}{y_{t,\min socloss}} = \frac{D}{\beta y_{t,\min socloss}} - \Gamma = \frac{D}{\beta} \frac{\beta(\Theta + \Gamma^2)}{D\Gamma} - \Gamma = \frac{(\Theta + \Gamma^2)}{\Gamma} - \Gamma = \frac{\Theta}{\Gamma} = \frac{\Theta\beta}{\Omega\beta + \gamma\phi} \quad .$$

This result shows that the adjustment should be distributed over the two periods in a proportion, which is determined by the ratio of the time preference parameter in the social loss function to the other parameters of the economy. The bigger the weight is of the present in the social loss function (the higher capital theta), the more of the adjustment that will be postponed to the future. The level of external debt accumulation determines the level of income that can be maintained in both periods, but does not influence the ratio or the speed of adjustment.

The result (13) also implies that a higher cost of financing external deficits during the adjustment period (a higher value of capital omega) should encourage a stronger initial adjustment if D is negative. A more open economy (a higher value of beta) also implies an incentive to postpone the adjustment as well as a higher elasticity of export revenue with respect to wage costs (a higher value of gamma) or a steeper Phillips curve.

3.3 Alternative policy instruments

So far it has been assumed that the only policy instrument was 'austerity', i.e. depressing demand to lower imports and wages. The fiscal consolidations that had to be undertaken in the peripheral countries were in many cases achieved through tax increases. This raises the issue of which taxes should have been increased.

Increasing direct taxes could be seen as particularly inappropriate because exporters have to operate in the formal economy and might de facto be the one sector that actually feels an increase in effective taxation (whereas the non-tradable, often informal sector might be able to evade higher income tax rates). This would imply an increase in effective wage costs in the tradable sector, which could be modelled as $w(1+tax)$, where 'tax' indicates the increase in the tax rate during the second period. The external debt ceiling would then be satisfied by

$$(5)' \quad -D = -\Omega\beta yt + (-\beta y_{t+1} - \gamma\phi y_t) - \gamma tax \quad .$$

The trade-off between demand today and demand tomorrow (given the external debt ceiling), would then worsen to

$$(6)' \quad -(\Omega + \gamma\phi/\beta)y_t + D/\beta - \gamma tax/\beta = y_{t+1} \quad .$$

The fall in domestic demand, ceteris paribus, would have to be stronger. Still, this modification would not affect the incentives to push the adjustment into the future. The debt ceiling would be increased (in absolute value) by the impact of the shift of the implicit export supply equation, but the relation between income today and tomorrow in equation (13) would not be affected.

The same should also hold true of any exogenous wage reduction. The labour market reforms contained in the adjustment programme could be interpreted in two ways: some of the measures contained cuts in the public sector and in minimum wages (presumably, mainly for the private sector). Given that any change in minimum wages has an impact on other wages as well, this could be interpreted as an attempt to engineer an exogenous reduction in wages. In this model, that should have allowed a higher demand level to be maintained in both periods, but would not have affected the optimal speed of adjustment.

Other aspects of the labour market reforms, such as changes in wage bargaining systems, could be interpreted as making the Phillips curve steeper. As shown above this would strengthen the case for an immediate adjustment in demand (or austerity), because the payoff from a stronger fall in demand today in terms of lower wages would be stronger the steeper the Phillips curve.

3.4 Reducing the overall cost of adjustment

The overall cost of adjustment can be calculated in terms of the social loss function, which can be rewritten as

(14) $L = \Theta(y_t)^2 + (y_{t+1})^2 = (y_t)^2 \left[\Theta + \left((y_{t+1})^2 \Big/ (y_t)^2 \right) \right].$

Using the relationship (13), which determines the optimal speed of adjustment, and the formula for the loss-minimising income in the current period (equation (11)) yields

(14)′

$$L = (y_t)^2 \left[\Theta + \left(\frac{\Theta}{\Gamma} \right)^2 \right] = \left[\frac{D\,\Gamma}{\beta\,(\Theta + \Gamma^2)} \right]^2 \left[\Theta + \left(\frac{\Theta}{\Gamma} \right)^2 \right]$$

$$= \left[\frac{D}{\beta} \right]^2 \left[\frac{\Gamma}{(\Theta + \Gamma^2)} \right]^2 \left[\frac{\Theta\,(\Gamma^2 + \Theta)}{\Gamma^2} \right] = \left[\frac{D}{\beta} \right]^2 \frac{\Theta}{(\Theta + \Gamma^2)}$$

$$= \frac{D^2\,\Theta}{\Theta\beta^2 + (\Omega\beta + \gamma\phi)^2}$$

This equation can be used to determine the influence of parameters on the overall costs of adjustment.

Recall that $\Gamma = \Omega + \frac{\gamma\phi}{\beta} > 1$.

It follows that a higher degree of openness (a higher beta) makes the overall adjustment less costly. A steeper Phillips curve (or a more elastic supply curve of exports) also makes the overall adjustment less costly.

This might explain, at least partially, the different choices of Latvia and Portugal, for example. Latvia is much more open than Portugal and its wages reacted strongly to the crisis (Gros et al., 2014).

Moreover, the emphasis on labour market reforms in the euro area adjustment programmes was justified in the sense that a steeper Phillips curve reduces the cost of adjustment. Yet it is also clear from our analysis that labour market reforms can only reduce, not eliminate, the adjustment costs that arise when the economy has to switch resources from the domestic to the tradables sector.

Conclusions

This paper provides a framework to think about the optimal path of adjustment for a country, which starts the current period with either a large foreign debt or a wage rate above the level that would allow for external balance at full employment.

Modelling this situation allows one to show which parameters would justify a quick adjustment.

The question of the optimal path for prices and wages involves a balance between two apparently conflicting objectives. One is to restore competitiveness and the external balance, focusing on exports as the driver of growth. The other is the loss of output and employment that result from depressing demand during the adjustment.

Most policy evaluations of the adjustment process in the euro periphery have concentrated on the high cost in terms of unemployment, arguing that a slower pace of adjustment would have involved lower costs. However, this line of argument does not take into account that a slower adjustment (in terms of less unemployment and hence less of a fall in wages) also leads to a slower external adjustment, burdening the country with a higher foreign debt. A simple model

with an intertemporal budget constraint shows immediately that gradual adjustment is not a free lunch, but has its costs in higher future debt service.

One key result of our simple model is that a fairly rapid adjustment is optimal even allowing for the usual convexity of social loss functions in the output gap and a preference for later adjustment. Under the most likely parameter constellations, we find that bringing most, but not all, of the adjustment forward would be a policy that minimises the social loss.

Our model thus supports the general thrust of the adjustment programmes in the euro area periphery. A front-loaded fiscal adjustment was needed not only because of unsustainable initial positions, but also because a strong dose of initial austerity tended to support the wage adjustment, thereby accelerating the external adjustment and thus leading to a lower debt level the country had to support at the end of the adjustment period. The most successful example of this approach was of course Latvia, where the fall in GDP was sharpest, but also the shortest. In Portugal, Spain and Italy, by contrast, the initial fall in GDP was much more contained, but the recovery also took much longer. It seems that a quick adjustment did pay off.

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