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ABSTRACT

Tax Pot Episodes in OECD Countries*

How to use an unexpected increase in tax revenues (tax pots) has been an important issue in most OECD countries in the second half of the 1990s, the question being more precisely what to do with those windfall revenues: decreasing taxes, debt, increasing expenditures? In this Paper, we study such tax pot episodes in OECD countries over the last 40 years. To that end, we propose a definition of a fiscal pot episode. Once identification is done, we examine the macroeconomic environment of those episodes, the way this surplus of revenues has been utilized and the degree of success in reducing public debt and in fostering growth. As in the fiscal adjustment literature, we then obtain relatively orthodox conclusions about the use of windfall tax revenues, as it is generally better for future growth and debt level to use the money to reduce expenditures and taxes.

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1 Introduction

This paper proposes descriptive analysis of tax pots episodes in Oecd during the last forty years. By tax pot, we mean a unexpected and non deliberated increase in tax revenues.

The question of the use of unexpected tax revenues has been particularly accurate in France in 1999 and 2000. A first debate was about the size of those *cagnottes* (French word for pot), and the exact size is still a debatable object. The French newspaper *Le Monde* first gave an evaluation of 66 billions of French francs (Feb 5, 2000), which amounts to roughly .7% of Gdp. It seems now that this was above the real size of the tax pot, that the French government eventually estimated to be 35 billions of French francs. Of course, the government announcement was a strategic one, as confessing having some extra money opens the door to new revendication (tax cuts, more subsidies, transfers, wage,...). During the fiscal year 2000, France experienced again a unexpected increase in tax revenues, presumably of a larger amount that the 1999 one. The question was of course what do to with the money. Reduce public debt, increase expenditures, reduce taxes? Which taxes? Which expenditures? The French government decided to reduce slightly personal income tax, property taxes on housing and decided the abolition of the automobile *vignette* (yearly lump sum tax on cars), which was extremely unpopular. Our understanding of those decisions is that they were driven by electoral motives rather than economic ones. The present paper aims at providing guidance for the use of tax pots revenues, by looking at historical episodes of tax pots.

When a government decides to follow a fiscal adjustment policy, there are some lessons that can be drawn from the past. Starting with Giavazzi and Pagano [1990], Alesina and Perotti [1995] and Alesina and Ardagna [1998] (see also Ardagna [1999]), an important literature has studied episodes of large and discretionary reduction in primary deficit. The main lessons from this literature are the following. Adjustments can be done in two very different ways: by increasing taxes or by decreasing expenditures. During those episodes, public investment and subsidies are the most reduced expenditures, while personal and corporate income taxes are the most increased taxes. Successfully reducing public debt within 3 years is obtained, independently of the adjustment size, by reducing expenditures, not increasing taxes. Decreasing wage consumption and transfers increase the probability of reducing public debt, as opposed to decreasing public investment.

Here we ask whether such relatively orthodox lessons also apply to the use of tax pots. We shall use a panel of Oecd countries over the last 40 years, and will discuss successively the following points: *(i)* How to identify tax pot episodes? *(ii)* When and where did they happen? *(iii)* What was the macroeconomic situation and where did the pot came from? *(iv)* What was done with the money? Was public debt reduced? Was growth enhanced?

The paper is organized as follows. Section 2 proposes a definition and an identification method of tax pot episodes. Section 3 answers the question where and when, section 4 answers how and to what end. Section 5 concludes, while a data description is proposed in an appendix.

2 Definition and Identification of Tax Pot Episodes

2.1 Theoretical Definition and Discussion

We first propose a definition of a tax pot episode and then discuss on the measurement issues related to this definition.

Definition : *A tax pot episode is defined as a year N in a country I during which tax revenues happened to be surprisingly and substantially large, absent of any discretionary tax increase in year N.*

A least three words deserve comments in this definition, "surprisingly", "discretionary" and to a lesser extent "substantially". By surprisingly, we mean that the increase in tax revenues was not expected conditionally on the information available at year $N-1$. Of course, the identification of a surprise depends on the model that is used to forecast tax revenues. By non discretionary, we mean that the increase of the tax revenues in year N (relatively to the expectation formed in period $N-1$) is not the consequence of a policy decision taken in period N, like for example a change in a marginal tax rate. The increase in the tax revenues has to be the consequence of a surprise in the size of the tax base, not of a surprise in the tax schedule. What about "substantially"? Given the difficulty in identifying those surprising and non discretionary movements, we want to find a robust measurement tool for those episodes, *i.e.* a tool that select more or less the same episodes, whatever is the forecasting model that is used. Restricting ourselves to relatively large surprises is a way to achieve robustness.

Such a difficulty in bringing a definition of a relevant episode to the data is

not uncommon in economics, and we shall build upon the literature on fiscal adjustment. In the fiscal adjustment literature[1], the problem is to identify deliberated reductions of the primary deficit, net of the variations related to the action of automatic stabilizers. Different solutions have been proposed to decompose primary deficit movements into exogenous policy shifts and automatic reaction of fiscal variables to the state of the economy. The Oecd computes the fiscal impulse as the difference between the actual primary deficit and the one that would have prevail had expenditures increased as potential output. The Imf does similar adjustment to compute a so-called cyclically adjusted fiscal balance, but relates the current state of fiscal balance not to the previous one, but to a year in which the economy was "close to its potential output". A somewhat simpler and popular decomposition has been proposed by Blanchard (Blanchard [1993b]): the fiscal impulse is the difference between the primary surplus in N and the one that would have prevail had unemployment stayed at its $N-1$ level. The merit of this approach is that no potential output computation nor basis year choice is needed. Nevertheless, the measure is conditional to the choice or estimation of the elasticity of the primary surplus to unemployment changes.

In this paper, we will follow a method somewhat similar to Blanchard to identify tax pot episodes.

[1]There exists a vast literature ont that topics, that started with the work of Giavazzi and Pagano [1990] and Alesina and Perotti [1995], and was further extended by Giavazzi and Pagano [1995], Alesina and Ardagna [1998], Giavazzi, Jappelli, and Pagano [1998] and Ardagna [1999] among others.

2.2 Identification

Let us consider one country and assume that one can obtain a series of total tax revenues (in real terms) $\{T_t\}$, from which one can compute time first difference $\Delta T_t = (T_t - T_{t-1})$.

A naive approach would consist in identifying a tax pot episode as a country-year in which the ratio $\Delta T_t / Y_t$ is large, where Y stands for Gross Domestic Product. As we mentioned it before, such a measure will catch both predicted, deliberated and surprising movements in $\Delta T_t / Y_t$.

To measure the non deliberated tax surprises, we first assume that there exist a stable linear relation between tax revenues and Gdp, possibly augmented with a trend:

$$T_t = \alpha_0 + \alpha_1 \Theta_t + \alpha_2 Y_t + \varepsilon_t \tag{1}$$

where Θ is a trend over 1960-2000. In equation (1), any deliberated action taken by the tax authorities in period t is included in ε_t.

Let us assume that we can compute $E_{t-1}[Y_t]$, the conditional expectation of Gdp given information available at period $t-1$ and a model for Gdp. We can then construct a variable $T_t^\star$ that measures the expected tax revenues conditional on $t-1$:

$$T_t^\star = \alpha_0 + \alpha_1 \Theta_t + \alpha_2 E_{t-1}[Y_t] \tag{2}$$

The unexpected and non deliberated variation in tax revenues will be then given by $(T_t - T_t^\star - \varepsilon_t)$. A country-year in which $(T_t - T_t^\star - \varepsilon_t)/Y_t$ is larger than a given threshold $\overline{\tau}$ will be considered as a tax pot episode.

Note that the total variation of tax revenues can be decomposed into

three terms:

$$\Delta T_t = (T_t - T_t^\star - \varepsilon_t) + (T_t^\star - T_{t-1}) + \varepsilon_t \tag{3}$$

In equation (3), the first term into parenthesis represents the tax pot component, the second term is the expected variation in tax revenues and the unexpected variation in tax revenues that is not explained by unexpected changes in Gdp. Using the Oecd terminology, this might be interpreted as deliberated tax policy of period t. Because such an interpretation is fragile, as ε is also everything that is not explained by the simple model that we have used, we shall not pursue this interpretation any further.

The last point concerns the computation of $E_{t-1}[Y_t]$. We assume that the growth rate of output follows a stable $AR(p)$, possibly with a break in the constant term, that we estimate over the largest sample available for each country. Assume for simplicity that the order of the AR is one ($p = 1$).

$$\Delta \log Y_t = \gamma_0 + \gamma_1 \widehat{\theta}_t + \gamma_2 \Delta \log Y_{t-1} + \nu_t \tag{4}$$

where $\widehat{\theta}_t$ is a dummy for the subperiod 1974-2000. We then use equation (4) to construct a series of expected growth rates

$$E_{t-1}[\Delta \log Y_t] = \gamma_0 + \gamma_1 \widehat{\theta}_t + \gamma_2 \Delta \log Y_{t-1} \tag{5}$$

and expected Gdp is given by

$$E_{t-1}[Y_t] = Y_{t-1} \times (1 + E_{t-1}[\Delta \log Y_t]) \tag{6}$$

2.3 Robustness

As it is we think clear from the previous section, our measure is a conditional one, and it is important to judge the robustness of the episodes selection to

a change in the set of assumptions under which the selection is done. We see basically four important sets of assumptions in our framework, that concerns respectively the data availability, the Gdp forecasting model, the tax schedule and the threshold $\overline{\tau}$. We discuss in turn those four issues.

Let us consider first data availability, and let us focus on Gdp prediction (the same reasoning would also apply to the estimation of the tax schedule). Assume for exposition simplicity that the true model for Gdp is an $AR(1)$ in growth rates. In what we have done, it is assumed that the model is known by the government and by the econometrician that makes the Gdp forecast. We have therefore taken the largest possible sample to estimate that $AR(1)$. In the real life, it is likely that the model is misspecified. As a first approximation, we assume away this eventuality. It is still the case that the parameters of the model are not perfectly known by the government, and that the government is learning the model in real time. In such a case, the forecast that we make today of the 1970 Gdp conditional on the 1969 level of Gdp *given a model estimated on 1960-2000* is different from the one that was made *given a model estimated on 1960-1969*. A first robustness test would then to estimate recursively the Gdp forecasting model, and use only the available information of the time to estimate the AR equation (the same exercise could also be done for the tax schedule equation). A second problem as far as data availability is concerned is related to the revision of national accounts. In year N, the Gdp evaluation on $N-1$ is not definitive, and will be revised at least in N and $N+1$. Tackling seriously the data availability problem would require the use of real time data, which is difficult to obtain for a large panel of Oecd countries over a long period. For that

reason, we will restrict ourselves to the use of a forecasting model estimated on the largest sample available for each country.

The second set of assumption concerns the parametric form of the Gdp forecasting model. In the baseline case presented above, we use an $AR(p)$ on Gdp growth rates. Such a univariate representation might disregard important information contained in other macroeconomic variables, for example the composition of aggregate demand or the level of inflation. Therefore, in the implementation of the episodes selection, we will also consider a more general VAR model including Gdp, nominal interest rate, consumption to Gdp ratio and the Gdp deflator.

The third robustness test concerns the tax schedule, which has been assumed to be linear and including only current income. Linearity might be true only as a first approximation. For personal income tax, we know that much of the national tax systems are progressive at the individual level. But tax brackets being continuously adjusted, it is not clear that progressivity shows up at the aggregate level. It also is unclear that the linear approximation is bad for indirect taxes like VAT or for corporate income taxes. We will then test the robustness of the episode selection to a modification of the tax schedule that includes a additional term, the yearly Gdp growth, according to equation (7).

$$T_t = \alpha_0 + \alpha_1 \Theta_t + \alpha_2 Y_t + \alpha_3 \Delta Y_t + \varepsilon_t \tag{7}$$

If taxes as a whole are progressive, then α_3 will be positive and significant. In such a case, an equation that will omit the variable ΔY_t will overestimate the number of tax pot episodes. Another potential problem comes from the fact that, in some countries, some taxes are paid in period t based upon income

of period $t-1$. It might be therefore useful to include past Gdp in the tax equation and to estimated

$$T_t = \alpha_0 + \alpha_1 \Theta_t + \alpha_2 Y_t + \alpha_3 Y_{t-1} + \varepsilon_t \tag{8}$$

We will check the robustness of our results to such a specification.

Fourth, it might be likely that a country with a large level of tax revenues hit the threshold more often than a low level country, if the threshold is expressed in % of Gdp. To correct for such a potential bias, we will also consider the following definition of a tax pot: an episode in which tax revenues/Gpd surprise is above the country average tax surprise by an amount equal to κ times the country standard deviation of the tax revenues to Gdp ratio. We will refer to this case as the relative threshold definition, as opposed to the absolute threshold definition given above.

In the next section, we implement our measure of tax pot episodes on a panel of Oecd countries, and conduct various robustness checks.

3 Where and When?

3.1 Episodes Selection

First Approach : We use in this study the 1999 version of the Oecd Economic Outlook database (OCDE [1999a]) and the Oecd Revenues Statistics database (OCDE [1999b]). The sample is *a priori* 1960-2000 and 23 countries will be considered. All data are annual. The list of those countries and the acronyms we use are given in table 1. In this table, we also report for each country the largest sample for which we can obtain the Gdp and the total tax revenues series. In practice, we always stop in 1998.

For Gdp prediction, we use $AR(p)$ models in growth rates with a dummy for post 1973 years. Using LM tests, we choose one lag for the autoregressive part in all countries except for United Kingdom, Sweden and Finland where two lags were selected. We then estimate equation (1) using a Cochrane-Orcutt correction for autocorrelation of errors and compute tax revenues surprises $(T_t - T_t^\star)/Y_t$. The size of the so called French *cagnotte* in 1999 was between 50 and 80 billions Francs, *i.e.* between .7% and 1% of Gdp. We chose a threshold of three fourth of a percentage point of Gdp, $\overline{\tau} = .75\%$. Let us note that unfortunately, we do not have the data to test if our selection criterium would select the 1999 French *cagnotte*.

This gives us a first list of episodes that is given in table 3. To be as robust as possible to the choice of the forecasting model, we also perform this selection exercise using a VAR model including the growth rate of Gdp, the growth rate of the Gdp deflator, the consumption to Gdp ratio and a short run nominal interest rate. We also include a post 1973 dummy as an exogenous variable. For all the countries of the sample, we chose one lag and estimate the VAR over the longest sample available. It should be said that those sample are always smaller than in the $AR(p)$ model. Equipped with this second forecasting model, we again select tax pot episodes for a .75% threshold. The list of selected episodes is given in table 4.

We have selected 68 episodes with the AR model and 63 with the VAR one. Out of those episodes, 45 are common to the two selection device, and 4 episodes in the early 60's are chosen by the AR model while data are not available for those country-years with the VAR model. Let us temporarily choose to keep the episodes that were selected by both methods plus the

four episodes that cannot be detected by the VAR model. The list of these episodes is displayed in table 5. Figure 1 allows for a visual inspection of the selected episodes. Before going deeper in the description of those episodes, we perform some more robustness check of the selection device, and will end up with a slightly modified list.

Some more robustness check : We have seen already that the lists of episodes selected by a AR or a VAR model were mainly similar, which is a first robustness property of the episode list we have chosen up to now. We now examine the robustness of this choice to the introduction of non linearity of the tax schedule.

Fist of all, what happens to our list of tax pot episodes if we assume that the tax schedule is progressive, and given by equation (7)? We conduct use again the AR and VAR predictive models for Gdp, but now compute $T^{\star}$ estimating (7) for each country. The episodes we select are given in tables 6, 7, 8 for respectively the AR model, the VAR one and the intersection of the two, as explained previously. Figure 2 proposes again a graphical representation of these episodes in the time–country space.

Being more flexible, the progressive tax equation reduces the number of tax pot episodes selected, from 50 to 42 when the intersection of AR and VAR models are considered. Furthermore, the selections obtained with the AR and with the VAR model are even closer: out of 50 and 54 for the two models, 42 are common. The non linear specification can be seen as a refinement of the linear tax model, as it eliminates some of the tax pot episodes previously, but does not add new ones, with the exception of

Switzerland–1980. This selection is the one we keep in the rest of the paper. Note that adding past income in the tax equation changes only at the margin the results. Compared to the simple AR model, 54 episodes are selected as being tax pots (compared to 67), and 48 out of the 54 are common with the simple AR model. In the following, we keep using the tax rule that does not include past Gdp.

If we use a relative threshold definition of the tax pots, and we set κ to a level which allow for the selection of exactly 67 episodes (as in the simple AR model). This corresponds to the choice $\kappa = 1.19$. Out of those 67 episodes, 53 are common with the simple AR model. We think that the intersection is large enough to make the results relatively insensitive to the choice of a relative or absolute threshold, and we decide to keep the absolute threshold definition in what follows.

Finally, we increase the threshold to 1% and 1.5% of Gdp. In doing so, we reduce quite importantly the number of episodes. Out of 42 episodes with $\overline{\tau} = .75$, we keep only 23 with a 1% threshold (table 10) and 11 with a 1.5% one (table 11). It is also relatively large countries that disappear when the selection is tighter (United States, Japan). On the contrary, decreasing the threshold to .5% of Gdp increases to 77 the number of episode (table 9). On top of being of the size of the 1999 French *cagnotte*, we think that a .75% threshold satisfies the tradeoff we have between having enough episodes and being robust to specification errors by imposing a stringent enough criterion.

3.2 The Selected Episodes

Let us have now a closer look at the list of episodes we have eventually selected, and that is given in table 8 and figure 2. The total number of country-yeas we study was a priori 943 (23 countries times 41 years). Because of missing data, lags in models, etc..., we ended up with 726 country-years data points. Out of those 726, 42 are identified as tax pot episodes, which represents 6% of the available data points. Roughly speaking, a country is expected to experience one tax pot episode every twenty years, or one country out of the 23 under study is expected every year. Of course, these are unconditional probabilities and the point of this paper is to inspect conditional probabilities.

Let us look at the country list: 11 countries never experienced a tax pot (Austria, Belgium, Canada, France, Finland, Greece, Italy, Iceland, Netherlands, Spain and the U.K.). 4 countries out of the Big 7 are in this list, 8 out the 15 members of the European Union. 12 countries experienced at least one episode (Australia, Denmark, Germany, Ireland, Japan, Korea, Norway, New Zealand, Portugal, Sweden, Switzerland and the U.S.). Strikingly, 19 out of the 42 tax pot episodes happened in Nordic countries (Denmark (7 episodes), Norway (6 episodes) and Sweden (7 episodes)). We have no good explanation for this agglomeration in Northern Europe, but this is a fact that is robust to selection criteria. In particular, it is not an *artefact* of a higher average tax to Gdp ratio, as a relative threshold would also lead to an over representation of Nordic countries. Table 2 shows that there is no clear relation between the average tax over Gdp ratio, its variability and the selection of a country-episode. The French tax to Gdp average ratio is as large as

the Danish one (respectively 42.3% and 46.6%), the French volatility of this ratio is higher (10.3% *versus* 7.2%), but nevertheless, we find 8 country-years of tax pot in Denmark and none in France. Belgium and Japan have both a very large volatility of the tax/Gdp ratio (respectively 16.4% and 18.2%), Belgium average tax/Gdp ratio is almost twice the Japanese one (43.2% *versus* 24.6%), but no tax pot is found in Belgium, while two are observed in Japan.

The average year of a tax pot episode is 1984. We observe 4 tax pot episodes in the 60's, 12 in the 70's, 14 in the 80's and 12 in the 90's. Note that a lot of observations are missing for the 60's (see figure 2) Once this fact taken into account, it seems that episodes are more or less uniformly distributed across decades.

We now turn to the macroeconomic environment during those episodes.

3.3 Macroeconomic Environment

Table 12 compares some macroeconomic indicators for tax pot episodes and for the average episode. In this table as in the following ones, we use for each indicator the largest sample we can get for each country. Therefore, the number of episodes under consideration is not exactly the same between variables. The maximum number is 726, for example when we look at unemployment or growth; the minimum is 560 when we consider pubic debt variations. On the left hand side of the table, we use raw data (levels). Note also that a third column reports the standard deviation of the statistics under consideration, as computed on all country-years. This allow for a informal test of the "meaningfulness" of the difference between tax pot episodes and

average episodes. On the right hand side of the table, we also compute tax pots statistics in deviation from the mean of the country (*within*), to get rid of possible country specific fixed effect. Because it is not clear whether or not it is more meaningful to compute those statistics with or without the country fixed effect, we have kept both sets of statistics in those tables. In general, they both lead to the same qualitative conclusion. In the text, we comment the "level" statistics, except when some more information is provided by the "within" ones.

Tax pots occur slightly later (the average year is 1984 *versus* 1982 on average), but this might be mainly due to the fact that we cannot detect tax pots in the early 60's because of data availability reasons. The difference in Gdp growth rates is striking, growth being twice bigger during tax pots. This results comes almost by construction as we use Gdp positive surprises in the detection of tax pot episodes. But the difference is large, suggesting that a large increase in activity is necessary for tax pot to happen. Not only growth is high during those episodes, but also the economy is above its long run trend, as measured by an Hodrick-Prescott trend (with smoothing parameter 400). More over, the economy is way below trend the year before, so that those episodes looks like brusk rebounds of activity. On average, unemployment is not different during tax pot episodes, but its growth rate is of course very different: -12% during tax pot episodes *versus* 5% on average.

As far as nominal conditions are concerned, there are no clear differences between tax pots and the average, tax pots being slightly less inflationary, with long term nominal interest rates slightly lower.

The average level of the public debt to Gdp ratio is similar in both cases

(50%). The second clear difference is the evolution of this ratio: -2.4 points in tax pots and +2.8 points on average. The evolution of this ratio is of course related to the evolutions of its numerator and denominator: as we saw before, Gdp growth is higher during tax pots. But it is also the case that real debt growth is 3 points lower in tax pot episodes (roughly 9% versus 12%). Finally, the primary surplus to Gdp ratio is three times lower in tax pots, despite the unexpected increase in revenues. Note also that this ratio strongly decreasing in tax pots episodes (about -1 point).

To summarize, tax pots episodes are different from other episodes with respect to their growth (which is larger), their primary surplus (which is smaller) and the evolution of their public debt to Gdp ratio (which is negative). Let us notice one other distinctive characteristic of tax pots: the economy was the year before significantly below its trend, while it is slightly above after. To use macro analysts words, what matters is not a large growth of potential output, but a rapid filling in of Okun gaps.

We now turn to the detailed way in which public expenditures and revenues did vary during those episodes, and which action appear to have reduce public debt and/or foster growth.

4 How and To What End?

We first examine the evolutions of public expenditures and receipts during tax pot episodes, and compare them with the average country-year. We also examine the contributions of the different taxes to the tax pot. Then, given the large number of nordic countries-year episodes in the sample of tax pots,

we examine whether or not there is a Nordic idiosyncrasy in the sample. Then, we turn to the question of the efficient use of the tax pot. Two criteria are considered: public debt reduction and growth fostering. In each case, we split the tax pot sample into two set of country-years labelled "success" and "failure", and look for differences between those two subsets. Eventually, we try to relate the use of the tax pot (tax reduction, expenditures increase, debt reduction) to the initial conditions of the country-year.

4.1 Evolution of Public Finance During Tax Pot Episodes

Here we comment the results presented in tables 13 and 14. First, let us recall that the number of episodes is not constant across lines of those tables, and that the variable "total revenues" is not constructed as the sum of the taxes and transfers that come above in the tables (see the data appendix for an explanation). Therefore, one cannot get the variation of total taxes as the sum of all taxes variations.

We observe that the ratio expenditures to Gdp is decreased by .8% during tax pots while it is increased by .24% on average: during tax pots, expenditures increase less that Gdp. Surprisingly at first sight, total public revenues do not increase, while they do on average. They even decrease relatively to the country mean (see the "within" column). This indicates that tax pots are episodes in which part of the windfall tax revenues are used to deliberately decrease taxes. Tax pots are periods of positive fiscal impulse, as computed using Blanchard's methodology (Blanchard [1993b]): one observes a deliberated increase of the primary deficit to Gdp ratio (what we call fiscal impulse) of 1.29%.

As far as expenditures are concerned, government consumption to Gdp ratio is reduced substantially, transfers to Gdp ratio also decrease even though less, while other expenditures stay approximatively constant in ratio.

As of revenues, we do not observe substantial change in the personal income taxes, property taxes and taxes on goods and services to Gdp ratio in tax pot episodes, while corporate income taxes increase more than on average, and social contributions less than on average, again measured as percentage of Gdp. Behind those apparent similarities, table 14 show that surprising and non deliberated variations if taxes are indeed very different (there are by definition equal to zero on average over all episodes). The average non deliberated and surprising increase in total revenues to Gdp ratio is 1.22% for tax pot episodes, while it is by construction always greater than .75% of Gdp. During a tax pot episode, personal income and taxes on goods and services contribute the more to the surprising increase in tax revenues, followed by corporate personal income taxes. Other revenues are not very reactive as percentage of Gdp. .

To summarize, when we contrast tax pot episodes with the average country-year, we observe a decrease in the expenditure to Gdp ratio, no increase in the revenues to output ratio and a large positive fiscal impulse.

4.2 A Nordic Idiosyncrasy?

Before we study the efficiency of tax pot use to reduce debt and foster growth, let us inspect closer the fact that 19 out of 42 episodes (45%) are Nordic country-years (Denmark, Sweden and Norway). Here we split the tax pot episodes set into Nordic and non-Nordic countries to detect possible differ-

ences. The statistics relative to those two subsets are gathered in tables 15, 16 and 18.

The average year is about the same for the two subset. On average, growth is smaller in Nordic country-years of tax pot, the economy being less below trend the year before. Unemployment level and inflation are about the same, while nominal interest rate is 200 basis points higher. Public debt level and evolution are roughly similar. A difference is that nordic countries are running primary deficits during tax pots, while other countries have a primary surplus. The reduction in primary surplus to Gdp ratio is twice larger in Nordic countries.

While expenditures and fiscal impulse are similar, total revenues to Gdp ratio increases by almost 1 point in Nordic countries while it decreases by .2 points elsewhere. This is the main difference between the two sets of episodes, that is also observed using "within" statistics: there is no deliberate and/or non surprising decrease in taxes in Nordic countries at the time of a tax pot.

To summarize, the two subsets share more similarities that differences, and we treat them indistinctly in the following.

4.3 How to Reduce Public Debt?

We now study under which conditions, if any, had it been possible to reduce public debt following a tax pot episode. We start from the all set of tax pot episodes, and compute for each one the variation of the public debt over Gdp ratio between year N of the tax pot and year $N+2$. If this variation is smaller than a negative threshold, we label this episode a success, while it is considered as a failure if the variation is larger. We choose as a benchmark

a threshold of -5%, which is such as out of the 34 episodes we have (for the remaining 8, debt data are not available), 8 are successes and 26 failures. Table 18 presents the list of successes and failures. Note that Denmark five tax pots are successes, while Germany six ones are failure. Tables 19, 20 and 21 are displaying the statistics we computed for both subsets of episodes.

Successes were not periods of larger growth, but unemployment decreased more than during failures. Inflation was also smaller, but we suspect this is a time fixed effect, as successes average is 1991 while it is 1982 for failures, a period of larger inflation *ceteris paribus*. Debt was larger, but the debt to Gdp ratio started immediately to decrease sharply (-6.7%), whereas it decreased ten times less for failures. The successful countries ran primary deficits the year of the tax pot, deceasing by 190 Gdp basis points their primary surpluses. It seems that running larger primary deficits is the consequence of affecting more resources to debt reduction.

In terms of expenditures and revenues variations, let us first notice that the size of the tax to Gdp ratio growth is twice larger for successes, while the tax pot is about the same size. The fiscal impulses are roughly of similar magnitude. Consequently, expenditures decreased twice more in successful episodes.

Are those conclusions robust to a higher threshold? Tables 22, 23, 24 and 25 present results for a -2% threshold. We now get 13 successes and 21 failures. The results are preserved: not larger growth, larger tax increase, similar tax pot, same fiscal impulse, larger decrease in expenditures. Those results are in line with Alesina and Perotti [1995].

To summarize, successes differ from failures not because the tax pot was

larger, but because it was used diffently. Country-years that increased primary deficits and affected the money to debt reduction did effectively succeed in reducing debt. Another minor difference is that expenditures to Gdp ratio decreases more in successes while the revenues to Gdp one deliberately increases more.

4.4 How to Foster Growth?

Let us repeat this exercise by considering now growth fostering as the criterion. To be precise, we compute for each country and for each year N the difference between its growth rate between N and $N+2$ ($\gamma_{i,N}$) and the same growth rate of the big 7 ($\gamma_{b_7,N}$), that we denote $\widehat{\gamma}_{i,N}$:

$$\widehat{\gamma}_{i,N} = \gamma_{i,N} - \gamma_{b_7,N} \tag{9}$$

Let us denote $\mu(\widehat{\gamma}_i)$ and $\sigma(\widehat{\gamma}_i)$ the mean and standard deviation of the series of deviations $\widehat{\gamma}_{i,N}$ for a given country i. We then decide that an episode is successful in fostering growth when $\widehat{\gamma}_{i,N} \geq \mu(\widehat{\gamma}_i) + \kappa \times \sigma(\widehat{\gamma}_i)$, where κ is a positive constant that will take the values 0 and 1. In words, in the case $\kappa = 0$, a success will be an episode such that within the next two years , the country performs relatively better than on average, as compared to the big 7 growth rate. The criterion will be more strict with $\kappa = 1$.

Tables 26 to 33 present the results. Let us start with the looser criterion, *i.e.* $\kappa = 0$. We select 22 successes and 20 failures, that are evenly distributed across countries. Successes happen on average later that failures. Gdp growth is marginally larger in one subset the year of the tax pot, but in successful episodes, the country starts below its HP trend and was much below the year

before. This could be enough to explain the success given the trend reverting property of Gdp.

Even though Gdp growth is not larger, unemployment decrease is (-15.7% *versus* -4.7%), although this difference is less spectacular when we correct for country fixed effect (within). The reduction of debt to Gdp ratio is large for successes. It is also the case that primary surplus to Gdp ratio is larger for successes (1.5% primary surplus to Gdp ratio) while failures experiences primary deficits (.17%). Again, successes are episodes where the primary surplus decreases a lot, most of the money being used to decrease debt. As for debt criterion, success is synonym of expenditures to Gdp reduction, while this ratio is roughly constant for failures. Contrarily to debt criterion, total revenues to Gdp ratio is slightly decreased in successes, while it is increased in failures. Note that the size of the tax pot (non deliberated and surprising variations in total revenues over Gdp ratio) does not condition the success of an episode.

When we turn to $\kappa = 1$, we eliminate most of the episodes so that we end up with 5 successes for 37 failures. We draw basically the same lessons. As before, growth is not initially much larger, and it is still the case that the country is more below its HP trend for successes. Unemployment variations are now marginally larger for successes (within column), and we do not observe a larger reduction of the primary surplus. Tax pots are again of the same size, and again total revenues to Gdp ratio is decreased in successes, while it is increased in failures.

To summarize, it seems that growth will be high following a tax pot if the country was initially significantly below its trend, if expenditures are reduced

and if revenues are decreased, both as percentage of Gdp. The size of the tax pot is not related with the probability of success.

4.5 Understanding the Use of the Tax Pot

Let us consider three possible use of the tax pot: decreasing taxes, increasing expenditures or decreasing debt. Is it the case that high indebted countries are more likely to choose debt reduction, high taxed countries to reduce taxes and high expenditure countries not to increase taxes? To answer those questions, we extract from the tax pot episodes sample the set of high debt episodes (we also do the same for taxes and expenditures). A high debt episode is an episode in which the debt to Gdp ratio is larger than the average ratio over all tax pot episodes plus one standard deviation of the same ratio over the same sample of tax pots. We then compute average variations of taxes, debt and expenditures for the high group and for the whole sample of tax pots, and repeat this exercise for tax and expenditure to Gdp ratios. The results are gathered in table 34.

The average debt to Gdp ratio is 50.37 % for the 42 tax pot episodes, whereas it is 74.18% for the 11 episodes selected as high debt ones. When we consider deviations from the country mean (within) , we select 10 high debt episodes with an average deviation from the mean of 13.89%, whereas the deviation is 1.34% for all tax pots. The average tax revenue to Gdp ratio is 34.58 % for the 42 tax pot episodes, whereas it is 46.78% for the 21 episodes selected as high tax ones. When we consider deviations from the country mean (within) , we select 15 high tax episodes with an average deviation from the mean of 4.02%, whereas the deviation is .38% for all tax pot. The

average total expenditures to Gdp ratio is 37.01% for the 42 tax pot episodes, whereas it is 49.83% for the 11 episodes selected as high expenditures ones. When we consider deviations from the country mean (within) , we select 9 high tax episodes with an average deviation from the mean of 4.51%, whereas the deviation is .32% for all tax pots.

What do we observe? High expenditures countries are likely to choose a smaller reduction of their debt, a smaller increase of their taxes and a larger reduction of their expenditures, which seems to be the primary goal. High tax countries choose a smaller increase of taxes, and high debt countries a larger decrease of expenditures.

5 Conclusion

In this paper, we have proposed a methodology to select episodes in which tax revenues have been surprisingly and non deliberately large, and have labelled those episodes as tax pots. Using different criteria, we have ended up with 42 country-years episodes among the 23 Oecd countries and almost 40 years.

Tax pots episodes are different from other episodes with respect to their growth (which is larger), their primary surplus (which is smaller) and the evolution of their public debt to Gdp ratio (which is negative). When we contrast tax pot episodes with the average country-year, we observe a decrease in the expenditure to Gdp ratio, no increase in the revenues to output ratio and a large positive fiscal impulse. Country-years with high level of public expenditures are likely to choose a smaller reduction of their debt, a smaller increase of their taxes and a larger reduction of their expenditures,

compared to the average tax pot episode. Similarly, high tax countries choose a smaller increase of taxes,

Episodes that were followed by a significant decrease of the debt to Gdp did not receive a larger tax pot than the other country-years of tax pot. Country-years that increased more primary deficits, reduced more expenditures and increased more taxes are more likely to reduce their public debt the three years following the tax pot. Fostering growth is obtained when expenditures are reduced and if revenues are decreased, both as percentage of Gdp. The size of the tax pot is not related with the probability of success.

As in the fiscal adjustment literature, we then obtain relatively orthodox conclusions about the use of windfall tax revenues, as it is generally better for future growth and debt level to use the money to reduce expenditures and taxes.

References

Alesina, A., and S. Ardagna (1998): "Tales of fiscal adjustment?," *Economic Policy*, 47, 489–545.

Alesina, A., and R. Perotti (1995): "Fiscal expansions and fiscal adjustments in OECD countries," working paper 5214, NBER.

Ardagna, S. (1999): "Fiscal stabilizations: when do they work and why?," working paper, Boston College.

Blanchard, O. (1993a): "Consumption and the Recession of 1990-1991," *American Economic Review*, 83(2), 270–274.

——— (1993b): "Suggestions for a new set of fiscal indicators," working paper, OCDE.

Giavazzi, F., T. Jappelli, and M. Pagano (1998): "Searching for non keynesian effects of fiscal policy," working paper, Bocconi University.

Giavazzi, F., and M. Pagano (1990): "Can severe fiscal contractions be expansionary ? Tales of two small european countries," in *NBER Macroeconomics Annual*, ed. by S. Fisher. MIT Press, Cambridge, Mass.

——— (1995): "Non keynesian effects of fiscal policy changes : international evidence and swedish experience," working paper 5332, NBER.

OCDE (1999a): *OCDE Economic Outlook (64)*. Paris.

——— (1999b): *Statistiques des recettes publiques, 1965/1998*. Paris.

Appendix

A Data

All the data we use are taken from the Oecd 2000 Statistical Compendium, and more specifically from National Accounts, Main Economic Indicators, Economic Outlook and Revenue Statistics.

A.1 Definitions

As for Revenue Statistics, the Oecd decomposes total tax revenues into six main sub-categories: income and profit, social security, payroll, property, good and services and other (with respective codes 1000, 2000, 3000, 4000, 5000 and 6000. When we decompose revenues, we only study the categories that are both large enough and homogenous enough across countries. We end up with a subdivision of 1000 into **taxes on personal income** (1100) and **taxes on corporate income** (1200), **employees' social security contributions** (2100), **employers' social security contributions** (2200), **taxes on property** (4000), **taxes on good and services** (5000). We have dropped **payroll taxes** (3000) (1% of Oecd total tax revenue in 1997) and **other taxes** (6000) (3% of Oecd total tax revenue in 1997). The **total direct taxes** (*TID*) and **total indirect taxes** (*TIND*) series are taken from Economic Outlook. **Total revenues** are constructed from Economic Outlook as **direct taxes + indirect taxes + social contributions received by the government + other current transfers received by the government**. **Total transfers paid** are computed as **social benefits paid + other transfers paid by the government**, again taken from Economic Outlook.

Primary expenditures are the sum of **total transfers paid**, **government consumption**, **public investment** and **subsidies**. The **Primary balance** is then defined as **primary expenditures - total revenues**. **Primary balance** is constructed as **total transfers paid - total revenues + government consumption + government investment + subsidies - government consumption of fixed capital - net capital transfers received by the government**.

Fiscal impulse is constructed in a way similar to Blanchard [1993a] and Alesina and Perotti [1995]. Cyclically adjusted total transfers paid and total revenues (the"star variables" defined in subsection 2.2) are constructed, and allows for the computation of a cyclically adjusted primary balance. The fiscal impulse is then defined as cyclically adjusted primary balance - actual primary balance. A positive value implies that some deliberated actions has been taken whose consequences are that actual surplus is lower that what it should have been, *i.e* that there has been a positive fiscal impulse, not an adjustment.

Gdp, **unemployment**, **public debt**, **long term nominal interest rate**, **aggregate consumption** and **Gdp price deflator** are taken from Economic Outlook.

A.2 Exceptions

Because of data availability problems, there are some country-series that are computed in a different way. Those exceptions concerns the computation of total transfers paid, total revenues and primary balance. Note that the itali-

cized uppercase mnemonics are referring to the Economic Outlook database.

• **Total transfers paid :** The rule is *total transfers paid = social benefits paid + other transfers paid by the government.* Exceptions are

United Kingdom : *total transfers paid = GBRSSPG + GBRTRPG*

Denmark : *total transfers paid = DNKTSUB + DNKSSPG*

Ireland, United States, Canada: *total transfers paid = social benefits paid*

• **Total revenues :** The rule is *total revenues = direct taxes + indirect taxes + social contributions received by the government + other current transfers received by the government.* Exceptions are

Netherlands, Greece, United States : *total revenues = direct taxes + indirect taxes + social contributions received by the government*

Ireland, Australia : *total revenues = direct taxes + indirect taxes + other current transfers received by the government*

United Kingdom : *total revenues = personal income tax + corporate income tax + taxes on good and services + GBRSSRG*

Denmark : *total revenues = personal income tax + corporate income tax + taxes on good and services + DNKSSRG + DNKTRRG*

• **Primary balance :** The rule is *Primary balance = total transfers paid - total revenues + government consumption + government investment +*

subsidies - government consumption of fixed capital - net capital transfers received by the government. Exceptions are:

France, Portugal, Sweden : *Primary balance = total transfers paid - total revenues + government consumption + government investment + subsidies - net capital transfers received by the government*

Greece : *Primary balance = total transfers paid - total revenues + government consumption + government investment + subsidies*

United Kingdom : *Primary balance = total transfers paid - total revenues + government consumption + government investment + GBRTSUB - GBRKTRRG*

Denmark : *Primary balance = total transfers paid - total revenues + government consumption + government investment + DNKTSUB - DNKCFKG -DNKKTRRG*

B Tables

Table 1: List of Countries, Mnemonics and Sample Period

Australia	AU	1962-1998
Austria	AS	1966-1998
Belgium	BE	1962-1998
Canada	CA	1963-1998
Denmark	DK	1972-1996
France	FR	1965-1998
Finland	FI	1972-1998
Germany	GE	1962-1998
Greece	GR	1962-1998
Italy	IT	1962-1998
Ireland	IR	1979-1998
Iceland	IC	1983-1998
Japan	JP	1962-1998
Korea	KO	1972-1998
Netherlands	NL	1971-1998
Norway	NO	1964-1998
New Zealand	NZ	1988-1998
Portugal	PO	1962-1998
Spain	SP	1966-1998
Sweden	SW	1962-1998
Switzerland	CH	1962-1998
United Kingdom	UK	1967-1998
United States	US	1962-1998

In this table, the samples reported are the ones over which we have been able to estimate both the AR and VAR model for Gdp, and over which we have been able to compute a series of total public revenues and estimate a tax schedule.

Table 2: Level and Variability of Tax Revenues

	Average level (% of gdp)	Variability (s.d./mean × 100)
Australia	26.31	14.79
Austria	42.53	8.32
Belgium	43.27	16.44
Canada	32.41	12.63
Denmark	46.58	7.21
France	42.32	10.28
Finland	42.14	11.15
Germany	41.14	9.01
Greece	26.00	21.66
Italy	34.96	20.17
Ireland	29.98	6.17
Iceland	33.21	4.21
Japan	24.58	18.22
Korea	19.17	16.00
Netherlands	44.60	6.07
Norway	41.80	12.25
New Zealand	38.94	2.40
Portugal	26.92	30.21
Spain	29.72	25.09
Sweden	48.40	16.24
Switzerland	37.22	16.79
United Kingdom	30.47	6.58
United States	29.42	5.74

In this table, we compute for each country a measure of the size of total revenues (the mean of the ratio total tax revenues/gdp) and a measure of the volatility of this ratio (the mean of the ratio total tax revenues/gdp divided by the standard deviation of the same ratio). The definition of total revenues is given in the data appendix.

Table 3: Episodes Selection, Linear Tax Schedule, *AR* Model, .75% Threshold

Australia	1984
Austria	
Belgium	
Canada	
Denmark	1976 1979 1984 1985 1986 1994 1995 1996
France	
Finland	1972 1979 1997
Germany	1964 1968 1969 1976 1979 1990 1991
Greece	
Italy	
Ireland	1995
Iceland	1984 1986 1987 1996
Japan	1968 1978 1979 1988 1996
Korea	1973 1976 1983 1986
Netherlands	
Norway	1967 1971 1974 1976 1978 1980 1983 1984
	1985 1994 1996
New Zealand	1993 1994
Portugal	1973 1976 1987
Spain	
Sweden	1963 1964 1970 1975 1978 1979 1984 1986
	1987 1989 1994 1997 1998
Switzerland	1980
United Kingdom	
United States	1976 1978 1983 1984
Total:	67 episodes

In this table are reported the country-years in which the surprising and non deliberated variation of total revenues was measured to be larger than .75% of Gdp. An AR model is used to make Gdp forecasts, and the tax equation is linear in Gdp.

Table 4: Episodes Selection, Linear Tax Schedule, VAR Model, .75% Threshold

Australia	1984 1987 1989
Austria	
Belgium	
Canada	1984
Denmark	1976 1979 1983 1984 1985 1986 1994 1995
France	
Finland	1972 1979 1989
Germany	1964 1969 1972 1976 1979 1990 1991
Greece	
Italy	
Ireland	1995
Iceland	1986 1987 1996
Japan	1975 1988 1989 1990 1996
Korea	1986 1988
Netherlands	
Norway	1967 1976 1983 1984 1985 1994 1996
New Zealand	1993 1994 1995
Portugal	1973 1976 1977 1987
Spain	
Sweden	1964 1970 1973 1978 1979 1984 1986 1987 1994 1995
Switzerland	
United Kingdom	
United States	1966 1976 1978 1983 1984
Total:	62 episodes

In this table are reported the country-years in which the surprising and non deliberated variation of total revenues was measured to be larger than .75% of Gdp. An VAR model is used to make Gdp forecasts, and the tax equation is linear in Gdp.

Table 5: Episodes Selection, Linear Tax Schedule, Intersection, .75% Threshold

Australia	1984
Austria	
Belgium	
Canada	
Denmark	1976 1979 1984 1985 1986 1994 1995
France	
Finland	1972 1979
Germany	1964 1969 1976 1979 1990 1991
Greece	
Italy	
Ireland	1995
Iceland	1986 1987 1996
Japan	1988 1996
Korea	1973 1976 1983 1986
Netherlands	
Norway	1967 1976 1983 1984 1985 1994 1996
New Zealand	1993 1994
Portugal	1973 1976 1987
Spain	
Sweden	1964 1970 1978 1979 1984 1986 1987 1994
Switzerland	
United Kingdom	
United States	1976 1978 1983 1984
Total:	50 episodes

In this table are reported the country years in which the surprising and non deliberated variation of total revenues was measured to be larger than .75% of Gdp, using an AR model and a VAR to make Gdp forecasts when both of them are available, or only the AR model for the country-years in which it is not possible to estimate the VAR. The tax equation is linear in Gdp.

Table 6: Episodes Selection, Progressive Tax Schedule, *AR* Model, .75% Threshold

Australia	1984
Austria	
Belgium	
Canada	
Denmark	1976 1979 1984 1985 1986 1994 1995 1996
France	
Finland	1972
Germany	1964 1968 1969 1976 1979 1990 1991
Greece	
Italy	
Ireland	1995 1997
Iceland	
Japan	1988 1996
Korea	1973 1976 1983 1986
Netherlands	
Norway	1964 1967 1969 1971 1974 1976 1978 1980
	1983 1984 1985 1994 1996
New Zealand	1993 1994
Portugal	1973 1976 1987
Spain	
Sweden	1963 1964 1970 1984 1986 1987 1994
Switzerland	1980
United Kingdom	
United States	1976 1978 1984
Total:	54 episodes

In this table are reported the country-years in which the surprising and non deliberated variation of total revenues was measured to be larger than .75% of Gdp. An AR model is used to make Gdp forecasts. The tax equation is linear in Gdp and in Gdp growth.

Table 7: Episodes Selection, Progressive Tax Schedule, VAR Model, .75% Threshold

Australia	1984
Austria	
Belgium	
Canada	
Denmark	1976 1979 1983 1984 1985 1986 1994 1995
France	
Finland	
Germany	1964 1969 1972 1976 1979 1990 1991
Greece	
Italy	
Ireland	1995
Iceland	
Japan	1975 1988 1990 1996
Korea	1986 1988
Netherlands	
Norway	1967 1972 1976 1983 1984 1985 1994 1996
New Zealand	1993 1994 1995
Portugal	1973 1976 1977 1987
Spain	
Sweden	1964 1970 1979 1984 1987 1994 1995
Switzerland	1980
United Kingdom	
United States	1976 1978 1983 1984
Total:	50 episodes

In this table are reported the country-years in which the surprising and non deliberated variation of total revenues was measured to be larger than .75% of Gdp. An VAR model is used to make Gdp forecasts. The tax equation is linear in Gdp and in Gdp growth rate.

Table 8: Episodes Selection, Progressive Tax Schedule, Intersection, .75% Threshold

Australia	1984
Austria	
Belgium	
Canada	
Denmark	1976 1979 1984 1985 1986 1994 1995
France	
Finland	
Germany	1964 1969 1976 1979 1990 1991
Greece	
Italy	
Ireland	1995
Iceland	
Japan	1988 1996
Korea	1973 1976 1983 1986
Netherlands	
Norway	1967 1976 1983 1984 1985 1994 1996
New Zealand	1993 1994
Portugal	1973 1976 1987
Spain	
Sweden	1964 1970 1984 1987 1994
Switzerland	1980
United Kingdom	
United States	1976 1978 1984
Total:	42 episodes

In this table are reported the country years in which the surprising and non deliberated variation of total revenues was measured to be larger than .75% of Gdp, using an AR model and a VAR to make Gdp forecasts when both of them are available, or only the AR model for the country-years in which it is not possible to estimate the VAR. The tax equation is linear in Gdp and in Gdp growth rate.

Table 9: Episodes Selection, Progressive Tax Schedule, Intersection, .5% Threshold

Australia	1984
Austria	
Belgium	
Canada	1976 1984
Denmark	1976 1979 1984 1985 1986 1994 1995 1996
France	
Finland	1972 1979
Germany	1964 1969 1976 1979 1990 1991
Greece	
Italy	
Ireland	1995 1997 1998
Iceland	
Japan	1964 1966 1967 1975 1988 1990 1996
Korea	1973 1976 1983 1986 1987 1988
Netherlands	
Norway	1967 1969 1971 1972 1976 1980 1983 1984 1985 1994 1996
New Zealand	1988 1993 1994 1995 1997
Portugal	1973 1976 1977 1979 1987 1989
Spain	1969 1972 1987
Sweden	1964 1970 1978 1979 1984 1986 1987 1994
Switzerland	1980
United Kingdom	
United States	1962 1965 1966 1976 1977 1978 1983 1984
Total:	77 episodes

In this table are reported the country years in which the surprising and non deliberated variation of total revenues was measured to be larger than .5% of Gdp, using an AR model and a VAR to make Gdp forecasts when both of them are available, or only the AR model for the country-years in which it is not possible to estimate the VAR. The tax equation is linear in Gdp and in Gdp growth rate.

Table 10: Episodes Selection, Progressive Tax Schedule, Intersection, 1% Threshold

Australia	
Austria	
Belgium	
Canada	
Denmark	1976 1984 1985 1986 1994
France	
Finland	
Germany	1976 1990 1991
Greece	
Italy	
Ireland	
Iceland	
Japan	1988
Korea	
Netherlands	
Norway	1967 1976 1984 1994 1996
New Zealand	1993 1994
Portugal	1976
Spain	
Sweden	1964 1970 1984 1994
Switzerland	
United Kingdom	
United States	1976 1984
Total:	23 episodes

In this table are reported the country years in which the surprising and non deliberated variation of total revenues was measured to be larger than 1% of Gdp, using an AR model and a VAR to make Gdp forecasts when both of them are available, or only the AR model for the country-years in which it is not possible to estimate the VAR. The tax equation is linear in Gdp and in Gdp growth rate.

Table 11: Episodes Selection, Progressive Tax Schedule, Intersection, 1.5% Threshold

Australia	
Austria	
Belgium	
Canada	
Denmark	1976 1985 1994
France	
Finland	
Germany	1976 1991
Greece	
Italy	
Ireland	
Iceland	
Japan	
Korea	
Netherlands	
Norway	1967 1976 1984 1994
New Zealand	1993 1994
Portugal	
Spain	
Sweden	
Switzerland	
United Kingdom	
United States	
Total:	11 episodes

In this table are reported the country years in which the surprising and non deliberated variation of total revenues was measured to be larger than 1.5% of Gdp, using an AR model and a VAR to make Gdp forecasts when both of them are available, or only the AR model for the country-years in which it is not possible to estimate the VAR. The tax equation is linear in Gdp and in Gdp growth rate.

Table 12: Macroeconomic Conditions

	Levels			Within	
	Tax pot episodes	All episodes	s.d.	Tax pot episodes	s.d.
Average year	1984.09	1982.59	–	1984.09	1982.59
Δ log(Gdp)	6.92	3.28	2.70	3.27	2.51
Relative deviation from HP trend	0.45	0.02	2.85	0.45	2.85
Relative deviation from HP trend in $N-1$	-3.04	0.02	2.86	-3.05	2.86
Unemployment	3.98	4.02	2.74	0.80	2.21
Δ log(Unemployment)	-12.50	5.06	24.93	-0.49	0.63
Inflation	4.63	6.55	5.49	-1.30	4.77
Long term nominal interest rate	9.27	10.24	4.79	0.30	3.66
Debt/Gdp	50.37	50.89	27.89	1.35	19.87
Δ log(debt)	9.24	12.50	10.93	-2.18	9.88
Δ log(Debt/Gdp)	-2.37	2.83	9.75	-4.06	9.36
Primary surplus/Gdp	0.54	1.78	3.64	-0.80	3.04
Δ primary surplus/Gdp	-0.93	-0.15	1.70	-0.78	1.69

In this table, the first column displays the average of the variable considered over tax pot episodes, the second column the average over all the available country-years and the third the standard deviation of this variable over all available country-years. The fourth column uses differences from the country average data. The fourth is the standard deviation over all country-years of the differences from the country average. Note that the number of observation may differ across lines, depending on data availability.

Table 13: Expenditures and Revenues

	Levels			Within	
	Tax pot episodes	All episodes	s.d.	Tax pot episodes	s.d.
Δ Total expenditures/Gdp	-0.81	0.24	1.25	-1.04	1.23
Δ Total revenues/Gdp	0.07	0.35	1.05	-0.23	1.04
Fiscal impulse/Gdp	1.29	-0.02	0.73	1.31	0.73
Δ Gc/Gdp	-0.64	-0.04	0.52	-0.61	0.50
Δ Gi/Gdp	-0.03	-0.03	0.31	-0.03	0.30
Δ Gcw/Gdp	-0.05	0.41	0.56	-0.37	0.52
Δ Tr/Gdp	-0.20	0.30	0.71	-0.47	0.69
Δ Direct taxes/Gdp	0.04	0.13	0.74	-0.00	0.73
Δ Indirect taxes/Gdp	0.02	0.02	0.50	-0.03	0.49
Δ Personal income taxes/Gdp	0.01	0.09	0.65	-0.11	0.65
Δ Corporate income taxes/Gdp	0.16	0.05	0.42	0.14	0.41
Δ Employees social contributions/Gdp	0.01	0.07	0.21	-0.06	0.21
Δ Employers social contributions/Gdp	-0.01	0.09	0.41	-0.10	0.40
Δ Taxes on property/Gdp	-0.01	0.00	0.22	-0.01	0.22
Δ Taxes on goods and services /Gdp	0.07	0.03	0.51	0.01	0.50

In this table, the first column displays the average of the variable considered over tax pot episodes, the second column the average over all the available country-years and the third the standard deviation of this variable over all available country-years. The fourth is the standard deviation over all country-years of the differences from the country average. Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). **Gi***: Government investment,* **Gc***: Government consumption,* **Gcw***: Wage government consumption,* **Tr***: Transfers from the government.*

Table 14: Tax Pot Components

	Tax pot episodes	All episodes	s.d.
Total revenues/Gdp	1.22	-0.01	0.64
Transfers/Gdp	-0.10	0.00	0.19
Personal income taxes/Gdp	0.36	-0.00	0.22
Corporate income taxes/Gdp	0.19	-0.00	0.13
Employees social contributions/Gdp	0.06	-0.00	0.07
Employers social contributions/Gdp	0.08	-0.00	0.09
Taxes on property/Gdp	0.03	-0.00	0.07
Taxes on goods and services /Gdp	0.30	-0.01	0.25

In this table, the first column displays, for each variable and for all tax pot episodes, the average of the tax pot components, the second column the average over all the available country-years and the third the standard deviation of these tax pot components over all available country-years. Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). The definition of tax pot components is given in equation (3).

Table 15: Nordic *versus* Non Nordic Tax Pots Episodes

	Non Nordic Countries	Nordic Countries	Non Nordic Countries (within)	Non Nordic Countries s.d. (within)	Nordic Countries (within)	Nordic Countries s.d. (within)
Macroeconomic conditions						
Average year	1984.46	1982.98	1984.46	1982.70	1982.98	1981.83
Δ log(Gdp)	7.63	4.78	3.74	2.78	1.86	2.00
Relative deviation from HP trend	0.30	0.90	0.30	2.94	0.90	2.16
Relative deviation from HP trend in $N-1$	-3.64	-1.24	-3.66	2.95	-1.22	2.19
Unemployment	3.97	4.00	0.77	2.76	0.91	2.55
Δ log(Unemployment)	-13.79	-8.61	-0.52	25.29	-0.40	22.63
Inflation	4.69	4.46	-1.35	5.73	-1.14	3.48
Long term nominal interest rate	8.92	10.31	0.06	4.94	1.02	3.73
Debt/Gdp	47.02	57.06	0.01	29.22	4.02	17.17
Δ log(debt)	10.76	6.20	-2.13	10.95	-2.29	10.35
Δ log(Debt/Gdp)	-2.35	-2.41	-4.46	9.64	-3.26	10.37
Primary surplus/Gdp	1.14	-1.06	-0.96	3.51	-0.37	3.75
Δ primary surplus/Gdp	-0.61	-1.77	-0.38	1.64	-1.84	2.10

In this table, the first column displays the average of the variable considered over tax pot episodes in Denmark, Sweden and Norway, the second column the average over all other tax pot episodes. The third and fourth columns do the same thing for differences from the country average series (within). Note that the number of observation may differ across lines, depending on data availability.

Table 16: Nordic *versus* Non Nordic Tax Pots Episodes (*Continued)*

	Non Nordic Countries	Nordic Countries	Non Nordic Countries (within)	Non Nordic Countries s.d. (within)	Nordic Countries (within)	Nordic Countries s.d. (within)
Expenditures and Revenues						
Δ Total expenditures/Gdp	-0.87	-0.66	-1.09	1.22	-0.91	1.40
Δ Total revenues/Gdp	-0.22	0.92	-0.45	1.00	0.44	1.35
Fiscal impulse/Gdp	1.22	1.47	1.22	0.62	1.55	1.26
Δ Gc/Gdp	-0.70	-0.45	-0.64	0.51	-0.54	0.56
Δ Gi/Gdp	-0.04	-0.01	-0.04	0.32	-0.00	0.23
Δ Gcw/Gdp	-0.10	0.09	-0.38	0.58	-0.34	0.43
Δ Tr/Gdp	-0.26	-0.00	-0.48	0.69	-0.44	0.80
Δ Direct taxes/Gdp	-0.10	0.45	-0.13	0.68	0.39	1.07
Δ Indirect taxes/Gdp	-0.03	0.16	-0.07	0.47	0.07	0.71
Δ Personal income taxes/Gdp	-0.05	0.18	-0.17	0.60	0.05	0.91
Δ Corporate income taxes/Gdp	0.15	0.18	0.14	0.36	0.13	0.66
Δ Employees social contributions/Gdp	-0.01	0.03	-0.07	0.21	-0.03	0.22
Δ Employers social contributions/Gdp	0.01	-0.05	-0.07	0.38	-0.17	0.57
Δ Taxes on property/Gdp	-0.05	0.10	-0.04	0.21	0.09	0.30
Δ Taxes on goods and services /Gdp	0.01	0.25	-0.03	0.50	0.15	0.60

In this table, the first column displays the average of the variable considered over tax pot episodes in Denmark, Sweden and Norway, the second column the average over all other tax pot episodes. The third and fourth columns do the same thing for differences from the country average series (within). Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). **Gi***: Government investment,* **Gc***: Government consumption,* **Gcw***: Wage government consumption,* **Tr***: Transfers from the government.*

Table 17: Nordic *versus* Non Nordic Tax Pots Episodes (*Continued)*

Tax pot components	Non Nordic Countries	Nordic Countries
Total revenues/Gdp	1.17	1.38
Transfers/Gdp	-0.07	-0.16
Personal income taxes/Gdp	0.36	0.35
Corporate income taxes/Gdp	0.19	0.17
Employees social contributions/Gdp	0.07	0.02
Employers social contributions/Gdp	0.09	0.02
Taxes on property/Gdp	0.04	0.01
Taxes on goods and services /Gdp	0.28	0.37

In this table, the first column displays, for each variable and for tax pot episodes in Denmark, Sweden and Norway, the average of the tax pot components and the second column the average over all the available tax pots country-years. Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). The definition of tax pot components is given in equation (3).

Table 18: Debt Reduction Criterion, 5% Threshold

	Success	**Failure**
Australia		
Austria		
Belgium		
Canada		
Denmark	1984 1985 1986 1994 1995	
France		
Finland		
Germany		1964 1969 1976 1979 1990 1991
Greece		
Italy		
Ireland	1995	
Iceland		
Japan		1988 1996
Korea		1973 1976 1983 1986
Netherlands		
Norway	1994	1976 1983 1984 1985 1996
New Zealand		
Portugal		1973 1976 1987
Spain		
Sweden	1987	1970 1984 1994
Switzerland		
United Kingdom		
United States		1976 1978 1984
Total	**8**	**26**

In this table are given the country-years of successful or non successful tax pot episodes. Here successful means that public debt was reduced by at least 5% the third year after the episode.

Table 19: Tax Pot Episodes, Debt Reduction Criterion, 5% threshold

	levels		within	
	Success	Failure	Success	Failure
Average year	1991.20	1982.16	1991.20	1982.16
Δ log(Gdp)	5.78	6.68	2.41	2.70
Relative deviation from HP trend	0.15	1.02	0.15	1.02
Relative deviation from HP trend in $N-1$	-2.42	-2.00	-2.42	-2.00
Unemployment	5.38	3.11	1.59	0.24
Δ log(Unemployment)	-13.23	-6.94	-0.81	-0.26
Inflation	2.07	5.75	-3.85	-0.32
Long term nominal interest rate	9.48	9.52	0.08	0.37
Debt/Gdp	65.50	41.81	5.09	0.10
Δ log(debt)	1.18	11.84	-7.90	-0.31
Δ log(Debt/Gdp)	-6.67	-0.62	-7.04	-2.81
Primary surplus/Gdp	-0.13	0.81	-1.17	-0.26
Δ primary surplus/Gdp	-1.91	-0.99	-1.78	-0.87

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that public debt was reduced by at least 5% the third year after the episode. Note that the number of observation may differ across lines, depending on data availability.

Table 20: Tax Pot Episodes, Debt Reduction Criterion, 5% threshold (*Continued)*

	levels		within	
	Success	Failure	Success	Failure
Expenditures and Revenues				
Δ Total expenditures/Gdp	-0.94	-0.47	-1.20	-0.78
Δ Total revenues/Gdp	0.64	0.35	0.26	-0.01
Fiscal impulse/Gdp	1.35	1.22	1.41	1.26
Δ Gc/Gdp	-0.79	-0.55	-0.81	-0.49
Δ Gi/Gdp	-0.06	0.00	-0.04	-0.02
Δ Gcw/Gdp	-0.23	0.16	-0.62	-0.18
Δ Tr/Gdp	-0.20	-0.02	-0.53	-0.29
Δ Direct taxes/Gdp	0.33	0.14	0.24	0.04
Δ Indirect taxes/Gdp	0.17	0.12	0.11	0.04
Δ Personal income taxes/Gdp	0.14	-0.04	-0.01	-0.06
Δ Corporate income taxes/Gdp	0.00	0.15	-0.05	0.12
Δ Employees social contributions/Gdp	-0.02	0.06	-0.07	-0.02
Δ Employers social contributions/Gdp	-0.01	-0.02	-0.13	-0.13
Δ Taxes on property/Gdp	0.39	-0.03	0.39	-0.04
Δ Taxes on goods and services /Gdp	0.33	0.06	0.25	0.01

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that public debt was reduced by at least 5% the third year after the episode. Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). **Gi***: Government investment,* **Gc***: Government consumption,* **Gcw***: Wage government consumption,* **Tr***: Transfers from the government.*

Table 21: Tax Pot Episodes, Debt Reduction Criterion, 5% threshold (*Continued)*

Tax pot components	Success	Failure
Total revenues/Gdp	1.27	1.17
Transfers/Gdp	-0.07	-0.08
Personal income taxes/Gdp	0.26	0.24
Corporate income taxes/Gdp	0.14	0.16
Employees social contributions/Gdp	-0.00	0.13
Employers social contributions/Gdp	0.03	0.10
Taxes on property/Gdp	0.04	-0.00
Taxes on goods and services /Gdp	0.43	0.20

In this table, the first column displays the average of the tax pot components over successful tax pot episodes, the second column the average over non successful ones. Here successful means that public debt was reduced by at least 5% the third year after the episode. Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). The definition of tax pot components is given in equation (3).

Table 22: Debt Reduction Criterion, 2% Threshold

	Success	**Failure**
Australia		
Austria		
Belgium		
Canada		
Denmark	1984 1985 1986 1994 1995	
France		
Finland		
Germany		1964 1969 1976 1979 1990 1991
Greece		
Italy		
Ireland	1995	
Iceland		
Japan	1988	1996
Korea	1976 1986	1973 1983
Netherlands		
Norway	1994	1976 1983 1984 1985 1996
New Zealand		
Portugal		1973 1976 1987
Spain		
Sweden	1987 1994	1970 1984
Switzerland		
United Kingdom		
United States	1976	1978 1984
Total	**13**	**21**

In this table are given the country-years of successful or non successful tax pot episodes. Here successful means that public debt was reduced by at least 2% the third year after the episode.

Table 23: Tax Pot Episodes, Debt Reduction Criterion, 2% Threshold

	levels		within	
	Success	Failure	Success	Failure
Macroeconomic conditions				
Average year	1987.61	1981.95	1987.61	1981.95
Δ log(Gdp)	6.50	6.77	2.46	2.78
Relative deviation from HP trend	-0.38	1.43	-0.38	1.43
Relative deviation from HP trend in $N-1$	-3.08	-1.73	-3.08	-1.73
Unemployment	4.71	2.96	1.38	.09
Δ log(Unemployment)	-10.35	-6.89	- 61	-.26
Inflation	3.70	5.46	-2.3	- 61
Long term nominal interest rate	8.73	9.70	-.35	.55
Debt/Gdp	56.46	41.70	4.98	-0.01
Δ log(debt)	5.27	12.61	-5.31	0.46
Δ log(Debt/Gdp)	-4.93	0.16	-6.12	-2.03
Primary surplus/Gdp	1.28	0.49	-0.20	-0.58
Δ primary surplus/Gdp	-1.72	-0.77	-1.57	-0.65

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that public debt was reduced by at least 2% the third year after the episode. Note that the number of observation may differ across lines, depending on data availability.

Table 24: Tax Pot Episodes, Debt Reduction Criterion, 2% Threshold (*Continued)*

	levels		within	
	Success	Failure	Success	Failure
Expenditures and Revenues				
Δ Total expenditures/Gdp	-1.09	-0.37	-1.28	-0.68
Δ Total revenues/Gdp	0.43	0.27	0.12	-0.10
Fiscal impulse/Gdp	1.33	1.20	1.38	1.23
Δ Gc/Gdp	-0.81	-0.54	-0.72	-0.49
Δ Gi/Gdp	-0.10	0.04	-0.10	0.02
Δ Gcw/Gdp	-0.15	0.18	-0.46	-0.16
Δ Tr/Gdp	-0.21	-0.03	-0.50	-0.30
Δ Direct taxes/Gdp	0.27	0.03	0.20	-0.07
Δ Indirect taxes/Gdp	0.02	0.18	-0.03	0.10
Δ Personal income taxes/Gdp	0.09	-0.12	-0.03	-0.15
Δ Corporate income taxes/Gdp	0.13	0.09	0.10	0.06
Δ Employees social contributions/Gdp	0.00	0.05	-0.06	-0.03
Δ Employers social contributions/Gdp	-0.07	-0.00	-0.16	-0.12
Δ Taxes on property/Gdp	0.10	-0.04	0.10	-0.04
Δ Taxes on goods and services /Gdp	0.14	0.08	0.10	0.03

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that public debt was reduced by at least 2% the third year after the episode. Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). **Gi***: Government investment,* **Gc***: Government consumption,* **Gcw***: Wage government consumption,* **Tr***: Transfers from the government.*

Table 25: Tax Pot Episodes, Debt Reduction Criterion, 2% Threshold (*Continued)*

Tax pot components	Success	Failure
Total revenues/Gdp	1.20	1.16
Transfers/Gdp	-0.13	-0.08
Personal income taxes/Gdp	0.25	0.23
Corporate income taxes/Gdp	0.18	0.15
Employees social contributions/Gdp	0.02	0.13
Employers social contributions/Gdp	0.03	0.10
Taxes on property/Gdp	0.01	-0.00
Taxes on goods and services /Gdp	0.29	0.19

In this table, the first column displays the average of the tax pot components over successful tax pot episodes, the second column the average over non successful ones. Here successful means that public debt was reduced by at least 5% the third year after the episode. Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). The definition of tax pot components is given in equation (3).

Table 26: Growth Criterion, $\kappa = 0$

	Success	**Failure**
Australia	1984	
Austria		
Belgium		
Canada		
Denmark	1984 1994 1995	1976 1979 1985 1986
France		
Finland		
Germany	1969 1990	1964 1976 1979 1991
Greece		
Italy		
Ireland	1995	
Iceland		
Japan	1988	1996
Korea	1973 1976 1986	1983
Netherlands		
Norway	1983 1984 1994 1996	1967 1976 1985
New Zealand	1993 1994	
Portugal	1987	1973 1976
Spain		
Sweden	1994	1964 1970 1984 1987
Switzerland	1980	
United Kingdom		
United States	1976 1984	1978
Total	**22**	**20**

In this table are given the country-years of successful or non successful tax pot episodes. Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)).

Table 27: Tax Pot Episodes, Growth Criterion, $\kappa = 0$

	levels		within	
	Success	Failure	Success	Failure
Macroeconomic conditions				
Average year	1986.63	1980.34	1986.63	1980.34
Δ log(Gdp)	6.66	6.50	3.02	2.67
Relative deviation from HP trend	-0.76	1.94	-0.76	1.94
Relative deviation from HP trend in $N-1$	-4.11	-1.00	-4.11	-1.00
Unemployment	4.52	3.04	1.35	-0.07
Δ log(Unemployment)	-15.70	-4.71	-0.64	-0.19
Inflation	4.35	5.25	-1.58	-0.80
Long term nominal interest rate	9.76	9.20	0.79	-0.17
Debt/Gdp	55.55	43.76	6.52	-1.08
Δ log(debt)	7.32	12.47	-4.10	0.98
Δ log(Debt/Gdp)	-3.78	0.89	-5.47	-1.14
Primary surplus/Gdp	1.50	-0.17	0.16	-1.06
Δ primary surplus/Gdp	-1.13	-0.79	-0.98	-0.75

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)).

Table 28: Tax Pot Episodes, Growth Criterion, $\kappa = 0$ (*Continued)*

	levels		within	
	Success	Failure	Success	Failure
Expenditures and Revenues				
Δ Total expenditures/Gdp	-1.20	0.08	-1.43	-0.23
Δ Total revenues/Gdp	-0.15	0.63	-0.44	0.26
Fiscal impulse/Gdp	1.30	1.16	1.33	1.21
Δ Gc/Gdp	-0.78	-0.38	-0.76	-0.34
Δ Gi/Gdp	-0.05	0.08	-0.05	0.07
Δ Gcw/Gdp	-0.07	0.14	-0.38	-0.21
Δ Tr/Gdp	-0.23	0.14	-0.51	-0.18
Δ Direct taxes/Gdp	-0.04	0.20	-0.09	0.10
Δ Indirect taxes/Gdp	-0.11	0.26	-0.16	0.19
Δ Personal income taxes/Gdp	-0.02	0.07	-0.14	-0.01
Δ Corporate income taxes/Gdp	0.22	0.08	0.20	0.06
Δ Employees social contributions/Gdp	0.03	0.05	-0.03	-0.02
Δ Employers social contributions/Gdp	-0.09	0.09	-0.18	-0.01
Δ Taxes on property/Gdp	-0.04	0.04	-0.04	0.03
Δ Taxes on goods and services /Gdp	-0.08	0.31	-0.14	0.25

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)). Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). **Gi***: Government investment,* **Gc***: Government consumption,* **Gcw***: Wage government consumption,* **Tr***: Transfers from the government.*

Table 29: Tax Pot Episodes, Growth Criterion, $\kappa = 0$ (*Continued)*

Tax pot components	Success	Failure
Total revenues/Gdp	1.20	1.21
Transfers/Gdp	-0.11	-0.06
Personal income taxes/Gdp	0.37	0.25
Corporate income taxes/Gdp	0.20	0.15
Employees social contributions/Gdp	0.05	0.12
Employers social contributions/Gdp	0.07	0.09
Taxes on property/Gdp	0.03	-0.00
Taxes on goods and services /Gdp	0.29	0.29

In this table, the first column displays the average of the tax pot components over successful tax pot episodes, the second column the average over non successful ones. Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)). Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). The definition of tax pot components is given in equation (3).

Table 30: Growth Criterion, $\kappa = 1$

	Success	**Failure**
Australia		1984
Austria		
Belgium		
Canada		
Denmark	1984	1976 1979 1985 1986 1994 1995
France		
Finland		
Germany	1990	1964 1969 1976 1979 1991
Greece		
Italy		
Ireland	1995	
Iceland		
Japan		1988 1996
Korea	1986	1973 1976 1983
Netherlands		
Norway		1967 1976 1983 1984 1985 1994 1996
New Zealand	1993	1994
Portugal		1973 1976 1987
Spain		
Sweden		1964 1970 1984 1987 1994
Switzerland		1980
United Kingdom		
United States		1976 1978 1984
Total	**5**	**37**

In this table are given the country-years of successful or non successful tax pot episodes. Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)).

Table 31: Tax Pot Episodes, Growth Criterion, $\kappa = 1$

	levels		within	
	Success	Failure	Success	Failure
Macroeconomic conditions				
Average year	1989.60	1982.76	1989.60	1982.76
Δ log(Gdp)	7.22	6.67	3.27	3.13
Relative deviation from HP trend	-1.70	0.91	-1.70	0.91
Relative deviation from HP trend in $N-1$	-4.73	-2.57	-4.73	-2.57
Unemployment	5.66	3.56	1.97	0.64
Δ log(Unemployment)	-8.72	-12.58	-0.67	-0.41
Inflation	3.23	5.15	-3.45	-0.69
Long term nominal interest rate	10.04	9.43	0.21	0.53
Debt/Gdp	54.86	45.89	5.26	1.05
Δ log(debt)	7.92	10.06	-3.04	-1.43
Δ log(Debt/Gdp)	-3.28	-1.88	-3.78	-3.91
Primary surplus/Gdp	0.52	0.46	-1.44	-0.39
Δ primary surplus/Gdp	-0.55	-1.14	-0.31	-1.05

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)).

Table 32: Tax Pot Episodes, Growth Criterion, $\kappa = 1$ (*Continued)*

	levels		within	
	Success	Failure	Success	Failure
Expenditures and Revenues				
Δ Total expenditures/Gdp	-1.20	-0.79	-1.17	-1.03
Δ Total revenues/Gdp	-0.77	0.37	-0.92	0.05
Fiscal impulse/Gdp	1.29	1.35	1.29	1.37
Δ Gc/Gdp	-0.85	-0.62	-0.78	-0.61
Δ Gi/Gdp	-0.27	0.02	-0.25	0.02
Δ Gcw/Gdp	-0.28	0.01	-0.53	-0.31
Δ Tr/Gdp	-0.12	-0.17	-0.35	-0.47
Δ Direct taxes/Gdp	-0.73	0.23	-0.68	0.20
Δ Indirect taxes/Gdp	-0.26	0.09	-0.28	0.03
Δ Personal income taxes/Gdp	-0.54	0.16	-0.74	0.05
Δ Corporate income taxes/Gdp	0.22	0.19	0.21	0.17
Δ Employees social contributions/Gdp	-0.10	0.04	-0.14	-0.03
Δ Employers social contributions/Gdp	-0.05	0.01	-0.10	-0.09
Δ Taxes on property/Gdp	-0.16	0.01	-0.15	0.01
Δ Taxes on goods and services /Gdp	-0.16	0.15	-0.25	0.09

In this table, the first column displays the average of the variable considered over successful tax pot episodes, the second column the average over non successful ones. The third and fourth columns do the same thing for differences from the country average series (within). Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)). Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). **Gi***: Government investment,* **Gc***: Government consumption,* **Gcw***: Wage government consumption),* **Tr***: Transfers from the government.*

Table 33: Tax Pot Episodes, Growth Criterion, $\kappa = 1$ (*Continued)*

Tax pot components	Success	Failure
Total revenues/Gdp	1.27	1.26
Transfers/Gdp	-0.02	-0.11
Personal income taxes/Gdp	0.34	0.39
Corporate income taxes/Gdp	0.13	0.20
Employees social contributions/Gdp	0.08	0.09
Employers social contributions/Gdp	0.07	0.08
Taxes on property/Gdp	0.06	0.02
Taxes on goods and services /Gdp	0.41	0.28

In this table, the first column displays the average of the tax pot components over successful tax pot episodes, the second column the average over non successful ones. Here successful means that Gdp growth was relatively higher the two years after the tax pot. The exact meaning of "relatively higher" and κ is given in the text (see equation (9)). Note that the number of observation may differ across lines, depending on data availability. Note also that total revenues is not constructed as the sum of the revenues that are listed below in the table (see data appendix). The definition of tax pot components is given in equation (3).

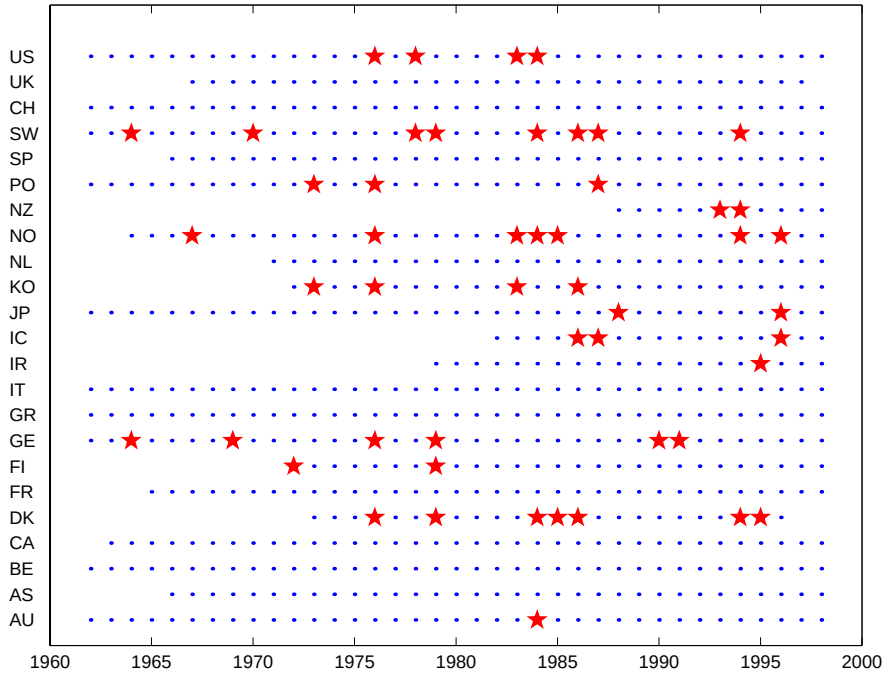
Table 34: Explaining the Use of the Tax Pot

	Levels				Within			
	All Tax Pots	High Debt	High Tax	High Exp.	All Tax Pots	High Debt	High Tax	High Exp.
Δ debt/gdp	-1.35	-2.56	-0.66	-1.77	-2.05	-2.18	-2.11	-1.71
# of episodes	34	11	19	11	34	10	14	8
Δ tax/gdp	0.50	0.61	0.47	0.17	0.21	0.52	-0.03	-0.18
# of episodes	42	11	21	11	42	10	15	9
Δ exp./gdp	-0.20	-0.72	-0.24	-0.74	-0.44	-0.27	-0.88	-1.11
# of episodes	33	7	16	11	33	8	14	9

To construct this table, we have extracted from the sample of tax pots episodes the ones with a high level of debt, taxes or expenditures at the time of the tax pot (see in the text for a precise definition of an episode with "high" debt, taxes of expenditures). Then, we have computed the variation of debt, taxes and expenditures the year of the tax pot, unconditionally and conditionally on being in a "high" episode. Those variations are taken in levels or in difference from the country average variation over the all time sample (within).

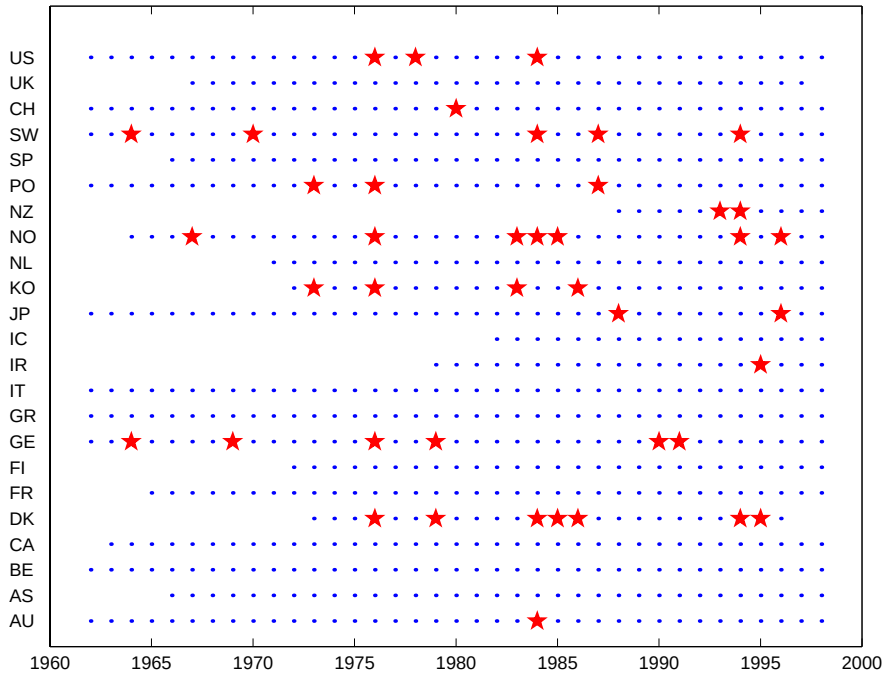
C Figures

Figure 1: Graphical Representation of the Selected Episodes, Linear Tax Schedule



On this figure are represented all the country-years episodes under consideration. A ★ stands for a tax pot episode, a • stands for a non tax pot episode and a blank for a country year in which data are not available to decide whether or not it is a tax pot episode. An episode is considered to be a tax pot if it is detected both by the AR and VAR model or if it is detected by the AR while the VAR model is not estimated for this country-year. The mnemonics correspondence is given in table 1.

Figure 2: Graphical Representation of the Selected Episodes, Progressive Tax Schedule



On this figure are represented all the country-years episodes under consideration. A ★ stands for a tax pot episode, a • stands for a non tax pot episode and a blank for a country year in which data are not available to decide whether or not it is a tax pot episode. An episode is considered to be a tax pot if it is detected both by the AR and VAR model or if it is detected by the AR while the VAR model is not estimated for this country-year. The mnemonics correspondence is given in table 1.