Long Term Debt and the Political Support for a Monetary Union*

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Abstract

This paper examines the role of long term debt for the political support of a monetary union or, more generally, an inflation-reduction policy. The central idea is that the decision about membership in the union leads to a redistribution between debtors and creditors, if they are holding long term debt with a nominally fixed interest rate, as well as tax payers. For example, if joining the union means a decrease in the inflation rate, creditors should favor joining while debtors should be against it. A government of a high inflation country might strategically try to exploit this effect by selling more long term debt denominated in its own currency at a fixed nominal rate rather than a foreign currency such as the Dollar (or, almost equivalently, as floating-rate debt or rolled-over short-term debt) to its citizens. We show that the effect on political support is unclear. While the "creditor effect" of increasing the number of agents holding domestically denominated debt helps generating support for joining the union, the "tax effect" of having to raise more taxes in order to pay for the increased real debt payments after a successful monetary union works in the opposite way. The paper then studies a number of special cases and ramifications. The case of Italy is examined more closely. The paper argues that recent debt management policy in Italy is probable to have eroded the political support for actions aimed at enhancing EMU membership chances.

1 Introduction

The date for a European monetary union appears to come closer. Satisfying the criteria set forth by the Maastricht treaty for becoming a member of the union plays an increasingly important role in the public debates in many countries. Whether or not individual countries will adopt certain measures to increase their chances at becoming members such as lowering the budget deficit will depend on the strength of the popular support for such actions.

This paper examines the role of long term debt management for generating such popular support. More precisely, we analyze how the split of a given amount of long term debt into domestically denominated debt and foreign denominated debt influences voter preferences. The paper applies in particular to the situation of monetary union in Europe, but also more broadly to any situation, in which a government seeks political support for possibly painful measures which may result in a lower inflation rate.

The central idea is that the decision about membership in the union leads to a redistribution between debtors and creditors, if they are holding long term debt with a nominally fixed interest rate, as well as tax payers. For example, if joining the union means a decrease in the inflation rate, creditors should favor joining while debtors should be against it. A government of a high inflation country might strategically try to exploit this effect by denominate more of its long term debt in its domestic currency at a fixed nominal rate rather than a foreign currency such as the Dollar (or, almost equivalently, as floating-rate debt or rolled-over short-term debt). We show that the effect on political support is unclear. While the "creditor effect" of increasing the number of agents experiencing a potential windfall gain helps in generating support for joining the union, the "tax effect" of having to raise more taxes in order to pay for the increased real debt repayments after a successful monetary union works in the opposite way. The paper then studies a number of special cases and ramifications. In the conclusion, this author voices the opinion, that issuing long term debt denominated in the domestic currency is a bad idea, if one seeks political support for membership enhancing actions.

While much has been written about the European exchange rate system and the effect of the Maastricht treaty on the conduct on monetary and fiscal policy in Europe, see e.g. Giavazzi (1988), CEPR (1991), Kenen (1995) or Giovannini (1996), or monetary policy in general, see e.g. the book treatment by Cukierman (1992), the collections of papers in Persson and Tabellini (1994a,b), or the survey by Eijffinger and de Haan (1996), little attention seems to have been paid so far to the issue of redistribution between creditors, debtors and tax payers, which is central to the analysis in this paper. The most closely related literature may be the literature on using debt policy to commit to a particular monetary or other governmental policy, starting with Stokey and Lucas (1983), also reprinted in Persson and Tabellini (1994a), volume 1, as well as Aghion and Bolton (1990) and Milesi-Ferretti (1995a). The closest of these may be the paper by Milesi-Ferretti, who analyzes how a govern-

ment can influence its reelection probabilities through the choice of issuing indexed versus non-indexed debt, provided different parties have different attitudes towards inflation[1]. The key insight in that paper is that an incumbant who is generally more positively inclined towards inflation than the median voter may issue more indexed debt as this will force the next government in power to be more careful about inflation than with nonindexed debt: this will tie the incumbants hands upon the next election, and make him look relatively more attractive to the median voter. Milesi-Ferretti focusses on a very different issue than we do, however. Furthermore, the redistributions between voters, which are key to our analysis, only play a rather indirect role in Milesi-Ferrettis paper. Debt management in light of credibility has been investigated in Missale and Blanchard (1994) and De Fontenay, Milesi-Ferretti and Pill (1995). There has also been a lot of work on the relationship between monetary policy or inflation and the issuance of foreign debt such as Bohn (1990, 1991) and, more recently, Gérard and Gilson (1996), or more generally on the issues of debt, central bank strategy and monetary union, see Cukierman, Edwards and Tabellini (1992) or Beetsma and Bovenberg (1995, 1996). It thus seems that the issue raised in this paper has not yet been addressed before.

This seems odd. Take the case of Italy, for example. While we postpone a more detailed look to section 13, some rough numbers taken from that section may indicate the magnitude of this issue. The public sector debt amounted in 1994 to 125% of GDP (see OECD, 1996), with 54% of this debt in form of medium and long-term securities. About half of that debt is in form of fixed coupon Lira-denominated debt with an average maturity of around 5 years. The nominal interest rate differential vis-à-vis Germany has been around 4 percent or more until the beginning of 1996 (for a detailed discussion of that differential, see Favero, Giavazzi and Spaventa, 1996). After a monetary union, and if Italy becomes a member, this interest rate differential would presumably almost disappear. If long term nominal interest rate differentials are driven mainly by differences in inflationary expectations, and if the inflation in a monetary union resembles more the current inflation in Germany than in Italy, nominal long term interest rates in Italy would likely drop by, say, 4% after becoming a union member, compared to the levels at the beginning of 1996. Thus, Italian debt holders will experience a windfall gain amounting to more than 1% of GDP on an annual basis until maturity of the debt issued at or before the beginning of 1996. In fact, some of that windfall has already materialized before the monetary union, since the interest differential vis-á-vis Germany has fallen dramatically, see figure 2 in section 13, and is at less than 2 percent at the beginning of 1997. Presumably, this is due to a reassessment of Italys chances at membership by the financial markets since the beginning of 1996. This is certainly not a trivial amount. It does not seem unlikely that voter preferences regarding measures aimed at increasing the chances of becoming a member of the union may be influenced by such windfall gains. Indeed,

[1]He also uses a similar device to study strategic exchange rate management, see Milesi-Ferretti, 1995b.

the average maturity of Italian debt has risen from 2.3 years in 1990 to around 5 years early in 1996, which might have been a deliberate choice by the government in order to increase popular support for such measures.

The paper focusses on the effect shifting the composition of public debt between foreign denominated debt vis-á-vis home currency denominated debt on the political support for a monetary union. A few remarks may be in order. There are other reasons which lead countries to issue particular forms of debt: some of these other reasons are discussed in the literature cited above. For example, countries such as Germany rarely offer foreign-denominated debt perhaps for credibility reasons, and it may feel itself quite restricted regarding the choices analyzed in this paper. Other countries may simply find it cheaper to issue foreign denominated debt. This paper deliberately focusses only on one of the many issues involved here and provides a possibly oversimplified analysis of a complex problem: all the other aspects remain and need to be "added on" to the considerations in this paper before reaching any judgement in practice. Some countries such as the United Kingdom, Belgium and Italy offer debt with floating rates rather than fixed rates. This can be understood within the analysis offered here, since floating rate debt essentially insulates against inflation shocks and can thus be used synonymously with foreign denominated debt throughout the paper. An interesting dimension may be the choice of maturity rather than the type of long-term debt: would it be better for countries to offer short-term debt rather than long-term debt in light of the issues described in this paper? But note that, essentially, rolled-over short term debt is nothing but long term debt at floating rates and thus essentially the same as long term debt denominated in a foreign currency as studied here. The analysis becomes quite a bit less elegant when formulated directly in this manner, but it does not change substantially. In light of this, the analysis here pertains to a fairly large and relevant class of debt management choices.

The paper is organized as follows. As a "warm-up" exercise, we consider the case of purely private debt in section 2. The main model is then introduced in section 3. The aim here was to construct a particularly simple model with debt, inflation, two periods and a simple "yes" or "no" vote on taking a particular action and we defend our model structure a bit more in section 5, extending it in particular with an additional government election stage at date zero. Despite its simplicity, the model delivers a rich set of scenarios and implications, as will be shown in the following sections. Section 4 provides a first analysis and some calculations. In particular, it is shown that there is always a unique equilibrium, given the portfolio decisions of the agents and the government. This is an interesting result all by itself due to the interdependence between the actions actually taken in equilibrium and the action preferred by the voters. To generate precise predictions, however, one needs to specify further assumptions which tie down the distribution of debt holdings and tax liabilities in the population. The next sections study several scenarios, offering a smorgasboard of possibilities. Section 6 provides a guide to these different scenarios, studied in detail in sections 7 through 12. Section 13 discusses the Italian case, using

facts about its current debt structure. Finally, section 14 concludes.

2 Private debt.

As a "warm-up" exercise for the next sections, we first consider the influence of private long-term debt, ignoring all other factors influencing the popular support for or against a monetary union. Thus, suppose there is a large population of agents, who engage in borrowing and lending, using long-term debt contracts with nominally fixed interest rates. Such long-term contracts are common in the financing of real estate such as private homes, for example. We suppose that these agents belong to high-inflation country, so that becoming a member means a fall in the average inflation rate and thus a rise in the real return on these debt contracts. Suppose the government can undertake some action which will increase the chances of the country to participate in the monetary union, but will only undertake it, if a majority of the population supports that action. We can think of that action as corresponding to a "last-minute" reduction in the budget deficit or the current inflation rate. What we are trying to capture with this increase in the chances of becoming a member is the fact, that the final membership decision is a highly politicized event, and that the Maastricht criteria will only provide a guide. Countries which really want to become a member may accomplish this by showing good citizenship or by taking some last-minute desperate measures aimed at pleasing the more skeptical among the other countries, who ultimately have to render judgement on the issue of membership.

These last-minute actions may possibly have some adverse short-term effects on the economy. On the other hand, joining the union may generate some long-term benefits to individual agents, too, like possibly improved conditions for international trade with other member countries due to using a common currency. Both, the short-run costs and the long-run benefits would surely enter the consideration of voters in deciding whether to support or to oppose the action, which the government could take to enhance the chances of becoming a member of the union. For simplicity, we completely abstract from these tradeoffs in this section of the analysis, and focus solely on the issue of redistribution between creditors and debtors. We will reintroduce these costs and benefits in the next section.

Here, we thus simply suppose that net creditors will favor the action to be taken while net debtors will oppose it. What will happen? The answer is simple. Let p be the fraction of agents who are net creditors and consequently, let $1-p$ be the fraction of agents who are net borrowers[2]. If $p > 1/2$, the action will be supported by a majority, whereas it will be opposed by a majority, if $p < 1/2$. In other words, if lots of agents borrow relatively small amounts each from a few deep-pocket lenders, a monetary union is less likely to be supported, whereas with many small-time savers

[2]This ignores agents who are neither, i.e. who have a net asset position of zero. To deal with these agents, we may either assume that their mass is negligible or that they will simply abstain from a vote about the action, since they would be indifferent.

lending to a few real estate tycoons, say, a government which works towards union membership will have popular support. This extremely simple analysis shows, that the distribution of debt and credit in the population is critical for the outcome.

3 Public debt.

We now investigate the issue of public rather than private debt. Our aim is to study the question, to what extent debt management can be used to tilt the popular support for or against a membership-chance enhancing action. More specifically, we allow the government to issue nominal debt, denominated in the home currency, where the ex post real return will be affected by whether the country becomes a member of the monetary union or not, and nominal debt denominated in some stable foreign currency, which is unaffected by the question of monetary union. Equivalently, we could assume that the government can issue debt denominated in real terms such as indexed debt.

We assume that there are I agents $i = 1, \ldots, I$, which differ in how much they want to save, s_i at some early date as well as how much income y_i they receive at a later date. We allow savings to be negative, i.e. for agents to be indebted, as well as for incomes to be negative. Furthermore, agents differ in how much they benefit from joining a monetary union and how much they are hurt by the membership enhancing action by the government. We express these "other benefits" from joining in form of a "consumption good equivalent" z_i, which can be positive or negative, and we express the harm from taking the action by γ_i, which one might want to envision to be nonnegative, but again doesn't have to. There may be many additional effects one may think of, which are all summarized by this parameter γ_i. For example, it can reflect better economic performance of the country upon joining because of greater fiscal discipline or greater trading possibilities All three variables s_i, y_i and z_i are real quantities and are taken as primitive parameters of the model. There is a government, which, among other things, will collect income taxes in order to repay its debt. We assume that the total income tax paid on income y_i is given by $\alpha\tau(y_i)$ for some a priori fixed tax schedule $\tau(\cdot)$ and some to-be-determined tax factor α, which depends on aggregate circumstances, as we shall see. Thus, total tax collection by the government at some date t is given by $\alpha\bar{\tau}$, where

$$\bar{\tau} = \sum_{i=1}^{I} \tau(y_i)$$

is the "normalized" total tax, which would be collected, if the tax factor α was set to unity. Introducing this symbol $\bar{\tau}$ helps us to economize on notation below. We note, that we have made no restrictions about the sign of $\tau(y_i)$. In other words, we allow not only for tax payers, but also for transfer receivers.

In case of joining the monetary union, the inflation rate in the country will be (normalized at) zero, but it will be $\pi > 0$, in case the country does not join. We

take π to be a primitive parameter of the model. It is chosen to be positive throughout in the analysis, because we have countries with above-average inflation in mind. However, the entire analysis applies equally well to the case $\pi < 0$: all the effects are simply exactly reversed. This case may well apply to, say, Germany as well as the Netherlands, see Zettelmayer, 1996. Finally, the case $\pi = 0$ makes the analysis of this paper empty. As for monetary union in Europe, one should note here, that the home currency will continue to exist side by side to the Euro for the years 1999 to 2002. What matters, however, is the fact, that the exchange rates will be frozen: if a country joins the monetary union, its inflation rate will be that of the union, no matter which currency is used from then on. A more problematic issue from the perspective of this analysis is the fact that there may be some last-minute exchange rate adjustment just before freezing them forever. However, it is unlikely, that these exchange rate adjustments will fully be able to completely undo the union-membership decision risk inherent in domestically denominated debt. Finally, while the assumption of zero inflation in the union simplifies our analysis, the union inflation rate itself may depend on which countries will ultimately join. In that case, one should read π as the inflation differential for joining versus not joining for the country at hand, and one would then need to endogenize π as well. We refrain from doing so as this would otherwise further complicate the analysis.

The government will be given a choice to issue its debt denominated in the home currency at some market-determined *nominal* return $\tilde{R}$ or denominated in some foreign currency at some fixed *real* return R_f. What we have in mind for foreign-currency denominated bonds is that there is a world market return for bonds issued in that currency determined outside this model. To calculate the ex post *real* return R_d on the debt denominated in the domestic currency, one needs to subtract the realized inflation rate. I.e., the ex post real return R_d will be $\tilde{R}$ if monetary union happens and $\tilde{R} - \pi$ if monetary union does not happen.

We assume the following sequence of events:

1. **The debt issuance date:** The government issues (medium to long term) debt [3],

$$b = \sum_{i=1}^{I} s_i,$$

splitting it into nominal debt b_d denoted in the domestic currency and nominal debt b_f denoted in a foreign currency,

$$b = b_d + b_f,$$

Let $\lambda = b_d/b$ denote the fraction of debt which was issued in the domestic currency, and assume, that this fraction is not degenerate, i.e. that $0 < \lambda < 1$.

[3] One can interpret our assumption about $b = \sum_i s_i$ as a definition about b to be that part of the debt of a country which it sells to domestic savers as well as s_i to be that part of the savings of private agents, which they use to buy government debt, ignoring all other credit markets. In particular, we ignore sales of assets to foreigners for now. We get back to this in section 11.

The debt is sold to domestic savers with

$$b_d = \sum_{i=1}^{I} s_{i,d}$$

and

$$b_f = \sum_{i=1}^{I} s_{i,f}$$

showing the market clearing conditions for bonds of each individual type, where $(s_{i,d}, s_{i,f})$ is the portfolio in the two types of government bonds of saver i: $s_i = s_{i,d} + s_{i,f}$.

2. **The voting date:** The government can take some action which will enhance the chances of the country to become a member of the monetary union. It will take the action $(a = 1)$, if it is supported by a strict majority[4] of the population, otherwise it doesn't $(a = 0)$. For notation, let $p = p_1$ denote the probability of membership, if the action is taken, and $p = p_0 < p_1$ denote the probability of membership, if the action is not taken.

3. **The realization date:** The country becomes a member with probability p_a and stays out of the union otherwise.

4. **The repayment date:** Taking the tax schedule $\tau(y)$ as given, the government retires the debt by calculating the tax factor α so that

$$\alpha\bar{\tau} = R_d b_d + R_f b_f$$

We assume that the utility of an agent who has a portfolio $(s_{i,d}, s_{i,f})$ and income y_i is given by the total consumption

$$u_i = E[c_i] - \gamma_i 1_{\{a=1\}}$$

where the consumption is given by

$$c_i = \begin{cases} c_{i,m} = \tilde{R} s_{i,d} + R_f s_{i,f} + y_i - \alpha_m \tau(y_i) + z_i, & \text{if membership} \\ c_{i,n} = (\tilde{R} - \pi) s_{i,d} + R_f s_{i,f} + y_i - \alpha_n \tau(y_i), & \text{if no membership} \end{cases}$$

and where $1_{\{a=1\}}$ is an indicator function for whether the action has been taken or not.

The agent is assumed to choose the partition of his portfolio $(s_{i,d}, s_{i,f})$ so as to maximize utility u_i. He rationally foresees the outcome of the decision about the action at the voting date. Hence, the expected real return on domestically denominated debt must equal the real return on debt denominated in the foreign currency,

$$R_f = p\tilde{R} + (1 - p_a)(\tilde{R} - \pi),$$

[4]There is nothing special about choosing the strict majority rule in this paper. One might equally well do the entire analysis requiring, say, some given fraction ϕ of the agents supporting the action to enact it.

or

$$\tilde{R} = R_f + (1 - p_a)\pi \tag{1}$$

where $p_a = p_1$ or $p_a = p_0$, depending on whether the government takes the membership-encouraging action ($a = 1$) or not ($a = 0$) in equilibrium. Equation (1) suggests that one can interpret changes the interest differential between, say, Italian bonds vis-à-vis German bonds, as either due to changes in market expectations about Italys future inflation rate π, in case it does not join the European monetary union, or as due to changes in market judgements regarding the probability of Italy joining the union: for this paper, we concentrate on the latter. In interpreting such interest differential, one needs to be careful about the differential tax treatment of interest payments across countries as discussed in detail in Eijffinger, Huizinga and Lemmen (1996), and about default risk as discussed by Favero, Giavazzi and Spaventa (1996). However, these issues are tangential to the analysis here.

We have assumed that agents are risk neutral throughout most of the paper to keep the analysis simple. It turns out that risk neutrality delivers more than just simplicity: it actually delivers existence of an equilibrium easily, see section 4, whereas risk aversion requires additional careful thought, see section 12.

In forming an opinion about whether to support or to oppose the action by the government to increase the chances of membership, each agent evaluates his utility, i.e. his expected consumption, given that a particular action is taken and given the fixed nominal return on domestically denominated bonds. I.e., the agent supports the action to be taken, if

$$u_{i,\tilde{R},1} = E\left[c_i|\text{action taken, } \tilde{R}\right] - \gamma_i > u_{i,\tilde{R},0} = E\left[c_i|\text{action not taken, } \tilde{R}\right].$$

Note that since the choices here are particularly simple, and since there are no strategic considerations, agents vote "sincerely" by simply voting their preferences. An agent would not want to change his vote, even when conditioning on being pivotal.

An equilibrium is a nominal return $\tilde{R}$, a split of individual portfolios $(s_{i,d}, s_{i,f})_{i=1}^{I}$ and the choice of whether to take the action ($a = 1$) or not ($a = 0$) so that,

1. Given a or, equivalently, the participation probability p_a, as well as the nominal return $\tilde{R}$, each agent i maximizes his utility u_i at the portfolio choice $(s_{i,d}, s_{i,f})$.

2. Given the portfolio choices $(s_{i,d}, s_{i,f})$ and the nominal return $\tilde{R}$, a majority of agents favors the governments decision a, whether or not to take the action (with the majority being strict, if $a = 1$).

The first equilibrium condition implies the no arbitrage condition (1) and essentially not much else. Note that there is an inherent fixed point problem here: given a, calculate $\tilde{R}$ with (1) and given $\tilde{R}$, find a from the second equilibrium condition.

4 Existence of an equilibrium.

It is useful to do some general calculations which will help in the further analysis.

To talk about actions off the equilibrium path, it proves to be convenient to attach a subscript a referring to the equilibrium action to the nominal return in equation (1),

$$\tilde{R}_a = R_f + (1 - p_a)\,\pi.$$

With $\tilde{R}_a$, one can calculate the ex post real return on domestically denominated bonds and thus the tax factor α. It is simply given by

$$\alpha_x = \left((\tilde{R}_a - 1_{\{x=n\}}\pi)\lambda + R_f\,(1-\lambda)\right)\frac{b}{\bar{\tau}}$$

where $x \in \{m, n\}$ is a subscript and where $1_{\{x=m\}}$ is an indicator function for whether $(x = m)$ or not $(x = n)$ monetary union takes place. The tax factor is a random variable, which depends on the realization of this event. Note that along the equilibrium path,

$$E\left[\alpha\right] = R_f \frac{b}{\bar{\tau}}$$

regardless of whether the action is undertaken or not. Likewise, the expected return on savings is given by R_f along the equilibrium path. When agents form an opinion, however, whether or not they should favor the action to be taken, they are considering "unexpected" deviations, taking the nominal return $\tilde{R}$ as given. Given a nominal return $\tilde{R} = \tilde{R}_a$ for the on-the-equilibrium-path decision a, the expected utility $u_{i,\tilde{R}_a,\hat{a}}$ for agent i from proceeding with decision $\hat{a}$ about the action is[5]

$$\begin{aligned} u_{i,\tilde{R}_a,\hat{a}} &= (p_{\hat{a}} - p_a)\,\pi\left(s_{i,d} - \lambda\frac{b}{\bar{\tau}}\tau\left(y_i\right)\right) \\ &\quad + R_f\left(s_i - \frac{b}{\bar{\tau}}\tau\left(y_i\right)\right) + p_{\hat{a}} z_i - \gamma_i 1_{\{\hat{a}=1\}} \end{aligned}$$

Thus, the difference

$$\Delta_i = u_{i,\tilde{R}_a,1} - u_{i,\tilde{R}_a,0}$$

in utility terms between proceeding with the action $(\hat{a} = 1)$ rather than without it $(\hat{a} = 0)$, given the on-the-equilibrium-path decision a, is given by

$$\Delta_i = (p_1 - p_0)\left(\pi\left(s_{i,d} - \lambda\frac{b}{\bar{\tau}}\tau\left(y_i\right)\right) + z_i\right) - \gamma_i \tag{2}$$

In particular, we see that the preference of the agent for or against taking the action is independent of the realized choice on the equilibrium path and independent of the

[5] To derive this, use $p_{\hat{a}}\,(1 - p_a) - (1 - p_{\hat{a}})\,p_a = p_{\hat{a}} - p_a$.

return R_f on foreign bonds. This "breaks" the fixed point circle which is inherent in the definition of the equilibrium, and thus allows us to prove existence of an equilibrium, see the theorem below. Risk neutrality is crucial here: without it, the issue can become quite a bit more tricky, see section 12.

We further note, that every agent is indifferent between any possible portfolio choice by virtue of our utility function. Thus, take any portfolio distribution $(s_{i,d}, s_{i,f})_{i=1}^{I}$ across agents. With equation (2), one can now uniquely determine the fraction of agents in favor of the action, and thus determine, which action will be taken on the equilibrium path. We formulate this insight in form of a theorem:

Theorem 1 *Given any portfolio distribution $(s_{i,d}, s_{i,f})_{i=1}^{I}$ across agents and given the fraction λ of bonds denominated in the local currency, there is a unique equilibrium. In that equilibrium, the action enhancing the chances of membership in the monetary union will be taken, if $\Delta_i > 0$ for a strict majority of the population, where Δ_i is given by equation (2).*

It is worth emphasizing once more, that the equilibrium is unique *given* the portfolio distribution and given λ, but that this distribution is not pinned down at all by the structure of the model.

5 Why would a government do what it is supposed to do? A defense of the model.

Why would a government want to follow the voter sentiment in deciding whether or not to take the action as we have assumed? And why would a government want to strategically manipulate the debt structure to enhance the popular support for such a measure? These are important questions regarding the interpretation of the model at hand.

To start with the first question of why a government should follow the public opinion, one can tell a simple story. While governments usually do not take popular votes on a single issue such as taking some particular membership-chances enhancing action, they nonetheless seem to care quite a lot about opinion polls, reflecting how voters feel about governmental policy choices. This makes sense: the chances at reelection in real life democracies depend on a multitude of issues, and incumbants choose wisely when accumulating good will at each decision they have to make.

A similar reasoning applies to the first question. The government in power in this paper can be thought of as having been elected for a multitude of reasons, and monetary unification is just one of them. The "ideal" government which follows the majority opinion on every single issue often does not seem to be one of the choices available in real life, and elections can turn into choosing between the lesser of two evils. Thus, it is not illogical to assume that a government views the issue of monetary unification differently than the public does and hence wants to "manipulate" it into

becoming more supportive of the governments view. Alternatively, the governments views may precisely coincide with the public views ex ante: in that case, the analysis of this paper can be seen as pointing out how a government can choose precisely the right debt structure so that the incentives generated by the opinion poll are in line with the original mandate of the government.

Admittedly, there is a tension here between the governments a voting public would elect and the political manipulation of these same voters by the elected government. The initial election of the government has not been modelled so far, since we do not view it to be at the heart of the issue that we are interested in here. However, it is remarkably easily done.

Imagine there is an additional government election date at date zero preceeding all other dates, in which voters choose the government they prefer for the remainder of the game. The election focusses on the single issue of the choice of λ. More precisely, voters choose the preferred value for $\lambda \in [0;1]$ by comparing them pairwise with indifferences decided by some tie-breaking rule (this is the usual framework for the median voter theorem). The government is then committed to implement the chosen value of λ, and the game proceeds further as above. Assume, that the portfolio decisions of the agents are functions of λ, $s_{i,d} = S_{i,d}(\lambda)$ and $s_{i,f} = S(i,f)(\lambda)$. With this, determine the unique implied decision about the action $a = A(\lambda)$ as a function of λ. Let $\Lambda_0 = \{\lambda \mid A(\lambda) = 0\}$ and $\Lambda_1 = \lambda \mid A(\lambda) = 1\}$ be the sets of all λ resulting in not taking the action respectively taking the action. Furthermore, let $\zeta_i = (p_1 - p_0)z_i - \gamma_i$ be the expected other net benefits from taking the action for agent i. Assume finally that agents do not participate in a vote on a pairwise comparison of two values of λ, if they are indifferent, and otherwise vote for their preferred choice. We get the following perhaps somewhat surprising result.

Theorem 2 *With the additional stage 0 of choosing λ by pairwise voting, a value $\lambda \in \Lambda_0$ will be chosen if the majority of the agents has negative net benefits from taking the action, $\zeta_i < 0$, and a value $\lambda \in \Lambda_1$ will be chosen if the majority of the agents has positive net benefits from taking the action, $\zeta_i > 0$. Within these sets, the actual value of λ chosen will be determined by the tie-breaking rule since all agents are indifferent between all values belonging to Λ_i, $i = 0, 1$.*

Proof: *Calculating expected utility and exploiting the relationships derived in section 4, one gets*

$$u_i(\lambda) = R_f \left(s_i - \frac{b}{\bar{\tau}} \tau(y_i) \right) + p_{A(\lambda)} z_i - 1_{\{A(\lambda)=1\}} \gamma_i$$

Hence, at stage zero, the difference in utility between two choices for λ, λ_a and λ_b, say, is

$$u_i(\lambda_a) - u_i(\lambda_b) = \begin{cases} \zeta_i & \text{if } \lambda_a \in A_1, \lambda_b \in A_0 \\ -\zeta_i & \text{if } \lambda_a \in A_0, \lambda_b \in A_1 \\ 0 & \text{else.} \end{cases}$$

Figure 1: **Insert figure 1 approximately here.**

This delivers the theorem. •

What drives the result is that the ex-ante real return on savings is fixed by the world return R_f, regardless of the split into domestically denominated bonds or foreign denominated bonds. Hence, the real tax burden is fixed as well. It is only *after* agents actually have split their portfolios, that the redistributional issues between savers and tax payers start to matter for the political support for a monetary union.

In light of this theorem, we now feel comfortable progressing to the analysis of the game described in section 3 above without the stage at date zero. In the analysis below, further assumptions in particular about the portfolio functions $S_{i,d}(\lambda)$ and $S_{i,f}(\lambda)$ will be made, delivering predictive bite. One can then read the results obtained below as either an examination for the choices available to a possibly manipulative government, or as the construction of the sets Λ_0 and Λ_1, which is of relevance for the agents who need to choose between different λ values at the voting stage of date zero.

6 A guide to the scenarios.

The question that we are asking is this: can the government influence the degree of support for the action by altering the choice of the split into domestically denominated versus foreign denominated debt, i.e. by changing λ? And if so, how? We now aim at answering this question in the following sections.

It should already be clear, that specific results are only to be obtained when imposing further restrictions, and we shall do so below. The idea is to offer a range of possibilities rather than fix the conclusions with a particular choice of restrictive assumptions beforehand. An overview of the particular scenarios studied here and the results obtained can be glanced from figure 1.

The natural starting point is to first abstract from other costs and benefits of a monetary union, i.e. to impose $z_i = 0$ and $\gamma_i = 0$ for all agents i. This will be done in sections 7 to 9. Further restrictions are needed regarding the distribution of savings and liabilities as well as regarding the portfolio decision of agents, since we cannot pin down portfolio choices due to the otherwise convenient assumption of risk neutrality. Section 7 considers the extreme case of bond holders versus tax payers, whereas sections 8 and sections 9 apply more broadly. The difference between these two sections is the assumption regarding the portfolios: while the same portfolio split ("perfect diversification") is assumed in section 8, agents are assumed not to diversify at all in section 9.

Next, we reconsider the issue of other benefits and burdens in a monetary union 10

as described in the current setup of the model, before considering extensions. It is fairly straightforward to allow for foreigners trading in debt as well: we study the effects of this in sections 11 and 12. The latter section 12 also introduces risk-averse as opposed to risk neutral utility functions, which offers the advantage of being able to tie down the portfolio decisions endogenously. While one can get rather striking results in case the country at hand is considered open and small with respect to world risk, returning to the closed economy case shows, that the assumption of risk neutrality above is more than just convenient: it actually ensures easily the existence of an equilibrium, as demonstrated in proposition 1.

Let us proceed into the details of the analysis.

7 Bond holders versus tax payers, and $z_i \equiv 0, \gamma_i \equiv 0$.

We first study an extreme case, in which agents are either only savers or only tax payers, and where the redistribution between bond holders and tax payers is the only issue that matters for voting. One obviously gets the following result.

Proposition 1 *Suppose that agents are either pure savers, i.e.* $s_i > 0$ *and* $\tau(y_i) = 0$ *or tax payers,* $s_i = s_{i,d} = s_{i,f} = 0$ *and* $\tau(y_i) > 0$. *Assume that each saver holds strictly positive amounts of debt denominated in the domestic currency. Let* θ *be the fraction of savers and* $1 - \theta$ *be the fraction of pure tax payers. Then, the action enhancing the chance at union membership will be undertaken, if and only if* $\theta > 1/2$, *regardless of* λ. *In particular, debt management has no effect on the popular support for actions enhancing the chances at union membership.*

Proof: *Just check that indeed* $\Delta_i > 0$ *for savers and* $\Delta_i < 0$ *for pure tax payers.* •

One might want to give this result some interpretation. Evidence from the United States suggests, that savings are highly skewed, with a large fraction of the population holding very little savings and a small fraction holding a lot. On the other hand, most citizens do have to pay taxes. This "arm-chair" evidence suggests, that in the absence of any other motives, there should be an opposing majority to undertaking effort towards becoming a member of a monetary union.

However, one might want to study this issue perhaps a bit more carefully, since in particular, the distinction between those who save and those who pay taxes is in practice unlikely to be as strict as assumed in the proposition above.

8 Perfect diversification and $z_i \equiv 0, \gamma_i \equiv 0$.

We thus now consider situations, in which agents are both savers and tax payers simultaneously. The model above admits many equilibria with respect to the portfolio

choices of agents: taking the outcome of the vote at the voting date as given, agents are completely indifferent between any of the possible choices of splitting their savings s_i between the various bonds. This is due to the assumed linear form of the utility function and the no arbitrage condition (1). It thus may be natural to first focus on symmetric equilibria, in which agents fully diversify, i.e. in which each agents splits his portfolio in exactly the same proportions as the government. Furthermore we start by analyzing the case, in which the redistributional issue between debtors and creditors is the only issue which matters to voters when forming their opinion about the monetary union, i.e. we assume that $z_i \equiv 0$. We obtain the following benchmark indifference result.

Proposition 2 *Suppose that all agents split their savings portfolio in the same way between the two types of bonds, i.e. that* $s_{i,d} = \lambda s_i$ *and* $s_{i,f} = (1-\lambda)\, s_i$*, and suppose that agents do not have any other gains or losses from monetary union, i.e.* $z_i = 0, i = 1, \ldots, I$*. Then the fraction of agents supporting the action is independent of* λ *as well as* π*. In other words, in this case, government debt policy as well as monetary policy (in the sense of altering the non-membership inflation rate) are neutral with respect to the popular support for the action, which enhances the chance at union membership.*

Proof: *In that case,*

$$\Delta_i = (p_1 - p_0)\, \pi\lambda \left(s_i - \frac{b}{\bar{\tau}} \tau\left(y_i\right) \right)$$

The sign of Δ_i *does not depend on* π *or* λ*. Note that we have assumed from the start, that* $\pi > 0$ *and* $\lambda > 0$*.* •

In light of the intuition given in the introduction, this theorem may be a bit surprising. A shift into longer-term debt should make agents with higher savings more appreciative of the monetary union because of the potential windfall gains from redistribution towards creditors, whereas agents with higher income should be more resistant to a monetary union as they have to pay for these windfalls with their taxes. The proof shows, however, that no agent changes his attitude towards monetary union, regardless of his savings or income level. Essentially, each agent calculates his "net" gain from monetary union by comparing his gains from savings against his losses from paying his share of the total additional taxes. Changing the composition of the debt changes the scale of these individual net gains, but does not change their signs. In some sense, with symmetric diversification, the intuition gained above from the extreme case of tax payers versus savers still seems to go through.

9 No diversification and $z_i \equiv 0, \gamma_i \equiv 0$.

As pointed out above, however, agents need not necessarily end up holding a diversified portfolio. Thus, in this section, we assume the other extreme: agents hold only one type of debt[6]. One motivation for this behavior is that government bonds might be traded in large "chunks", and that diversification requires the services of a costly intermediary such as a mutual fund or a bank. Since agents are indifferent between holding only debt denominated in the local currency or only holding debt denominated in the foreign currency or holding some mixture of both in the absence of a cost to diversification, a small cost for holding a mixture will lead agents to only choose one of the two extremes.

By assumption then, a fraction λ of the savers will only hold bonds denominated in the home currency, $s_{i,d} = s_i$ and a fraction $(1-\lambda)$ will only hold bonds denominated in the foreign currency, $s_{i,d} = 0$. For simplicity of notation, let

$$x_i = s_{i,d} - \lambda \frac{b}{\bar{\tau}} \tau (y_i)$$

be the net gain for agent i per unit increase in the return. This normalized net gain is positive, if the long term savings exceed the agents share in the long term tax burden, and negative otherwise.

One can identify three groups of agents. We concentrate their description on the case, where savings and tax payments are nonnegative in order to economize on space:

1. Agents, who only hold domestically denominated bonds and whose savings exceeds their share of the tax burden, $x_i > 0$. These agents will favor the action to be taken by the government.

2. Agents, who only hold domestically denominated bonds and whose savings fall short of their share of the tax burden, $x_i < 0$. These agents will be against the action to be taken by the government.

3. Agents, who only hold foreign currency denominated bonds. These agents will always be against the action to be taken by the government.

Raising the average maturity of the debt λ now has two effects:

1. **The creditor effect**: A raise in λ makes some agents move from the third to the first group, because one needs more agents holding the debt denominated in the domestic currency. This raises the support for the membership enhancing action.

[6]In fact, this is not even the most extreme possibility. Since short sales have not been ruled out in this economy, agents could hold negative amounts of some type of debt.

2. **The tax effect:** A raise in λ makes some agents move from the first to the second group, because the overall tax burden rises with rising λ. This lowers the support for the membership enhancing action. This lowers the support for the membership enhancing action.

3. **A decomposition effect:** A raise in λ makes some agents move from the third to the second group, because one needs more agents holding the debt denominated in the domestic currency. This has no effect on the popular support for the membership enhancing action.

The overall result depends on which one of the first two effect dominates. Some examples might help to illustrate this.

9.1 The case of a representative agent.

Suppose that agents are representative in the sense of all receiving the same income $y_i \equiv y$ and all agents wanting to save the same amount $s_i \equiv s$. The only difference between agents is which type of debt they acquire, which we might think of being determined by a lottery. For an agent acquiring the debt denominated in the domestic currency, we have

$$x_i = s - \lambda \frac{b}{\bar{\tau}} y = (1 - \lambda) s > 0$$

and hence, there are no agents in the second group. The tax effect is completely absent. Thus, in this case, raising λ raises the popular support for the membership enhancing action because of the creditor effect.

9.2 The case of bond holders versus tax payers.

Suppose as considered further above already, that agents are either savers, $s_i > 0$ and $\tau(y_i) = 0$, or tax payers, $s_i = 0$ and $\tau(y_i) > 0$. Again, the tax effect is completely absent, because savers are completely unconcerned about the rising tax burden: no agent can move from the first into the second group. Thus again, raising λ raises the popular support for the membership enhancing action because of the creditor effect. This insight seems to contradict somewhat the result obtained above, that λ has no effect, if there are only savers or tax payers. Above, however, we have assumed that all savers save strictly positive amounts in the bonds denominated in the domestic currency. The case considered here is at the boundary considered of the situation above.

9.3 The case of indifferent voters.

Suppose finally, that there is a positive fraction of agents who hold debt denoted in the domestic currency and who receive as much as they have to pay at some $\bar{\lambda}$, i.e.

for which

$$s_i = \bar{\lambda}\frac{b}{\bar{\tau}}\tau\left(y_i\right) > 0.$$

Then, moving from some $\lambda = \bar{\lambda} - \epsilon$ just below $\bar{\lambda}$ to some $\lambda = \bar{\lambda} + \epsilon$ just above $\bar{\lambda}$ will make these agents switch from group one to group two, i.e. from supporters of the action to opposers, no matter how small the movement 2ϵ of the share parameter λ is. While some fraction of the agents will also switch from group 3 to group 1 because of the increase in debt denominated in the home currency, that fraction is bounded above by 2ϵ and can thus be made arbitrarily small. In other words, as $\epsilon \to 0$, one obtains a pure tax effect, eroding the support for the membership enhancing action.

10 Other benefits and burdens of a monetary union: $z_i \neq 0, \gamma_i \neq 0$.

Examining the results above, one notices that the absence of other benefits and burdens of a monetary union was crucial. For example for the intuition of our benchmark result 2 of no effect of λ on the popular support for the membership enhancing action, we have argued that size of the net gain or net loss may change with λ, but not its sign. If there are other benefits and burdens of the monetary union and of taken the action, however, the size of the redistributional effect matters too, since it will be compared to z_i and γ_i by voters.

A perhaps particularly plausible case is examined in the next proposition. To formulate that proposition, we define the *exogenous net gain* from taking the membership enhancing action to be

$$\zeta_i = (p_1 - p_0)z_i - \gamma_i$$

Note, that equation (2) can be rewritten as

$$\Delta_i = (p_1 - p_0)\left(\pi\left(s_{i,d} - \lambda\frac{b}{\bar{\tau}}\tau\left(y_i\right)\right)\right) + \zeta_i \tag{3}$$

We observe, that there is no formal difference between the gain z_i from joining the union, weighted with the probability increase resulting from the action $(p_1 - p_0)$, and the negative of the pain of taking that action, $-\gamma_i$.

Proposition 3 *Suppose that the exogenous net gains are strictly positive for every member of the population, $\zeta_i > 0$. Suppose, that everybody splits his bond portfolio exactly in the same way, $s_{i,d} = \lambda s_i$. Then, as λ moves from 0 to 1, support for the membership enhancing action falls monotonically.*

In words, if you seek political support for actions enhancing your chances at membership in the monetary union, if voters are otherwise positively inclined towards it,

and if voters hold balanced portfolios, then do not issue long-term bonds denominated in the home currency.

Proof: *Let $\Delta_{i,\lambda}$ be the value for Δ_i at a particular value for λ. At $\lambda = 0$, the vote is purely influenced by the other benefit $\zeta_i > 0$, see equation (3). Hence, the entire population will favor a monetary union at $\lambda = 0$. Furthermore, since $s_{i,d} = \lambda s_i$, equation (3) shows, that each $\Delta_{i,\lambda}$ is an affine linear function of lambda. $\Delta_{i,\lambda}$ rises with lambda, if*

$$s_i - \frac{b}{\bar{\tau}}\tau(y_i) > 0$$

and it falls, if one has "i" instead. If $\Delta_{i,\lambda}$ rises with λ, the voter will not change his or her attitude towards the action. This will be the case, for example, if the voter is a pure saver $s_i > 0, \tau(y_i) = 0$ or a transfer receiver, $\tau(y_i) < 0$. However, if $\Delta_{i,\lambda}$ falls with λ, then the voter might change his mind. Thus, as λ increases from 0 to 1, the fraction of agents who would rather oppose the action, can only increase. •

11 Debt sales to foreigners.

Of course, countries sell their debt not only to their own citizens, but also to foreigners, i.e. agents who cannot participate in the vote by law. Should the government try to sell domestically-denominated debt or should it try to sell foreign-denominated debt to foreigners? This question is easy to answer. Proceeding through the analysis in section 4, one can see that the case of bond sales to risk-neutral foreigners can easily be included by interpreting b to be the total amount of debt issued, not just the debt issued to its own citizens, and interpret λ to be fraction of the total debt which is denominated in the home currency, regardless of whether it is sold to domestic agents or not. As a result, the market clearing condition for debt will change: write it as

$$b = b_d + b_f + b^*$$

with the additional term b^* denoting debt sales to foreigners, and b_d , b_f having the same interpretation as before, i.e. domestically denominated debt and foreign denominated debt, sold to domestic citizens. However, this change in the market clearing condition does not change the analysis in section 4. In particular, we still obtain equation (2), determining Δ_i, and thus the preferences for or against the membership-enhancing action. Note now, that λ can be changed ceteris paribus, i.e. leaving $s_{i,d}$ constant, by simply changing the decomposition of debt sold to foreigners.

We get the following result.

Proposition 4 *Suppose, that all agents have to pay nonnegative taxes, $\tau(y_i)$, and suppose that the total long-term debt is positive, $b > 0$. Then, holding the decomposition of domestically sold debt constant, the political support for the membership*

enhancing action will be the lower, the more of the debt sold to foreigners is denominated in the domestic currency, i.e. the higher λ is chosen.

Proof: *This is a trivial consequence of (2): the more of the debt sold to foreigners is denominated in the foreign currency, the smaller is λ, leaving everything else constant, and thus, the larger the support.* •

So, a country which wants to enhance its chances at membership should try to avoid selling domestically denominated debt to foreigners. In fact, if possible, the country might want to go *short* on domestically denominated debt sold to foreigners, essentially buying insurance against the event of monetary unification from foreigners.

12 Risk aversion

So far, we have only considered risk-neutral agents. How do the results change, if risk-aversion is assumed? Thus, suppose, that agents receive utility $v_i(c)$ from consuming c, where $v_i(\cdot)$ is twice differentiable, strictly concave, and defined on the whole real line[7]. The agent supports the membership enhancing action, if

$$u_{i,\tilde{R},1} = E\left[v_i(c_i)|\text{action taken, } \tilde{R}\right] - \gamma_i > u_{i,\tilde{R},0} = E\left[v_i(c_i)|\text{action not taken, } \tilde{R}\right].$$

In specifying this utility function, one should pause for a moment and think, which terms one should include in the utility function $v(\cdot)$ and which ones one shouldn't. Two alternative specifications come to mind. The first is, that c_i should also *include* $-\gamma_i$, the costs from taking the membership enhancing action. It turns out, that the further analysis goes through just the same, when this is done. The second possibility is, not to include the other benefits from monetary union z_i. As it turns out, this does make a difference, and we get back to that below.

Note that with debt of both types (and certainty about the action a), there are complete markets. There are two contingencies, joining or not joining, and the ratio of marginal utilities in these two contingencies will be equalized across all agents. Consumption conditional on either contingency can be assigned a state-contingent price.

There are two "extreme" possibilities to consider. The first possibility is one of an open economy, in which world financial markets are large compared to the country at hand. The second possibility is that of a closed economy, in which there is no asset trade with foreigners. We analyze both cases in turn.

[7]If the utility function is only defined for positive consumption, we need to make additional assumptions about s_i, y_i and $\tau(y_i)$, which make sure that agents cannot go bankrupt, or introduce additional features to deal with bankruptcy. Since these seem to be unnecessary complications for the purpose of the analysis at hand, we have made the simpler assumption, that the utility function is defined everywhere

12.1 Open financial markets.

A reasonable assumption to make may be to imbed the country in an open world of financial markets, i.e. that

$$b = b_d + b_f + b^*$$

with the additional term b^* denoting debt sales to foreigners. Furthermore, it may be reasonable to assume that the consequences of these contingencies are "small", compared to world financial markets, i.e. that foreigners are effectively risk neutral with respect to the risk of joining or not joining. In that case, the state-contingent prices are equal and foreigners will provide domestic agents with monetary unification insurance, if necessary. Furthermore, domestic agents will choose their portfolios so as to equalize consumption in both states,

$$c_{i,m} = c_{i,n}$$

We get the following proposition, which is, however, a bit less trivial than it may seem.

Proposition 5 *With risk neutral foreigners and open financial markets, and with strictly positive costs of taken the action, $\gamma_i > 0$, all agents will always oppose the membership enhancing action, regardless of the split of debt by its government.*

Proof: *This proposition may look trivial, because after all the consumption will be equalized across the two states, i.e. because $v_i(c_i)$ will be the same, regardless of whether the action will be taken or not, and taking the action costs additional disutility $-\gamma_i$.*

But one may want to do this argument a bit more carefully. What is crucial here is that the ex post realized real returns on the bond denominated in the domestic currency as well as the tax payments only depend on the on-the-equilibrium path action taken as well as the realization or absence thereof of monetary unification. These returns do not change, if the voters suddenly have a change of heart, given some market nominal return, and decide to take some other, "surprising" action instead. To understand this clearly, it is helpful to go follow again the "counterfactual" analysis of section 4, possibly modified for the case at hand. Given the on-the-equilibrium action a, find the nominal return on debt denominated in the domestic currency $\tilde{R}_a$ as before. Calculate the tax factor $\alpha = \alpha_x$, where $x \in \{m, n\}$ denotes whether the country will join the monetary union or not. Given these, determine the asset holdings $s_{i,d}$ and $s_{i,f}$ of all agents. They are now uniquely determined due to the strict concavity of $u(\cdot)$, or, put differently, because consumption is equalized in both states. Given *these asset holdings, the to-be-realized returns R_x, and the tax factors α_x, $x \in \{m, n\}$, consumption $c_{i,x}$ in the two contingencies is now determined, regardless of whether the action is finally taken or not. By construction, $c_{i,m} = c_{i,n}$ and hence, given all the on-the-equilibrium path data, the agent will get the same utility of consumption $v(c)$, regardless of whether the action is finally taken or not and regardless*

of whether monetary unification happens or not. Thus, the agent will always favor, not to take it. •

One may also think that this proposition is obvious, since the debt position of domestic agents is independent of the debt management of its government: any discrepancy is taken up by the foreigners. However, this is just one side of the story: if the government issues more domestically denominated debt, it will increase the tax burden on its citizens in case of a monetary union. The key element is now, that the *risk* in this tax is insured away by domestic agents.

What is perhaps surprising about this proposition, that the agents may end up opposing the membership enhancing action, even if the benefits from joining the monetary union z_i are hugely positive. The reason for this result is, that the agent effectively "sells" his claim to the additional unification consumption z_i on foreign markets. After that sale, the agent is simply indifferent as to whether monetary unification will take place or not, and all he sees now are the costs of taking the action.

The result does rest on specifying the benefits z_i of joining the union to be part of consumption. An alternative specification is to specify consumption without z_i, i.e. to be

$$c_i = \begin{cases} c_{i,m} = \tilde{R}s_{i,d} + R_f s_{i,f} + y_i - \alpha_m \tau(y_i), & \text{if membership} \\ c_{i,n} = (\tilde{R} - \pi)s_{i,d} + R_f s_{i,f} + y_i - \alpha_n \tau(y_i), & \text{if no membership} \end{cases}$$

and then to have the agent support the membership enhancing action, if

$$u_{i,\tilde{R},1} = E\left[v_i(c_i) + z_i | \text{action taken}, \tilde{R}\right] - \gamma_i > u_{i,\tilde{R},0} = E\left[v_i(c_i) + z_i | \text{action not taken}, \tilde{R}\right].$$

To state the next proposition, recall

$$\zeta_i = (p_1 - p_0)z_i - \gamma_i$$

Proposition 6 *With risk neutral foreigners and open financial markets, agent i will always oppose the membership enhancing action, if $\zeta_i < 0$ and always favor it, if $\zeta_i > 0$, independent of the government debt split.*

Proof: *The proof proceeds exactly as above, except that now the consumption c_i is equalized across the two states of joining or not joining, and that now the difference between $u_{i,\tilde{R},1}$ and $u_{i,\tilde{R},0}$ is given by ζ_i, not $-\gamma_i$.* •

12.2 Closed financial markets.

We finally consider the case, where the country is closed, i.e. where all the government debt is held by its own citizens, and where there is no access to insurance from foreigners, but where the government sells foreign-denominated debt (or indexed debt) to its own citizens. Despite the fact that financial markets work quite well across borders in practice, it is still true that citizens seem to prefer national assets. This is the well-known Feldstein-Horioka (1980) puzzle: see Feldstein and Bacchetta (1991) for a modern update. So the case we are considering here may be considered to be fairly reasonable, too.

To simplify the analysis somewhat, we restrict ourselves to the case where everybody earns the same income $y_i \equiv y$, the same savings $s_i \equiv s$ and has the same strictly concave utility in consumption, $v(\cdot)$. Also, we assume the second utility specification above, i.e.

$$u_{i,\tilde{R},a} = E\left[v(c_i) + z_i | a, \tilde{R}\right] - \gamma_i 1_{\{a=1\}},$$

where

$$c_i = \begin{cases} c_{i,m} = \tilde{R}s_{i,d} + R_f s_{i,f} + y - \alpha_m \tau(y), & \text{if membership} \\ c_{i,n} = (\tilde{R} - \pi)s_{i,d} + R_f s_{i,f} + y - \alpha_n \tau(y), & \text{if no membership} \end{cases}$$

Since agents are all alike in their consumption c_i, they will all hold the same portfolio. Since we have assumed a closed economy, we must thus have $s_{i,d} = \lambda s$ and $s_{i,f} = (1-\lambda)s$. While consumption $c_i \equiv c$ will be the same for all agents, it will generally be different, depending on whether the country joins the monetary union or not. Suppose, one were told the equilibrium values $c_{m,a,\lambda}$ and $c_{n,a,\lambda}$ for these two cases, where we have noted the possible dependencies on whether the action is taken $a \in \{0;1\}$ and the split λ as well. The standard Lucas asset pricing relationship delivers

$$\left(p_a v'(c_{m,a,\lambda}) + (1-p_a)v'(c_{n,a,\lambda})\right) R_f = p_a v'(c_{m,a,\lambda})\tilde{R}_{a,\lambda} + (1-p_a)v'(c_{n,a,\lambda})(\tilde{R}_{a,\lambda} - \pi)$$

or, written differently,

$$R_f = \hat{p}_{a,\lambda}\tilde{R}_{a,\lambda} + (1 - \hat{p}_{a,\lambda})(\tilde{R}_{a,\lambda} - \pi) \tag{4}$$

where

$$\hat{p}_{a,\lambda} = \frac{p_a v'(c_{m,a,\lambda})}{p_a v'(c_{m,a,\lambda}) + (1-p_a)v'(c_{n,a,\lambda})} \tag{5}$$

is the equivalent riskneutral probability known from the finance literature, see e.g. Duffie (1992). That probability will certainly depend also on λ in general: we have thus noted that dependency.

Similar to section 4, the nominal return thus satisfies $\tilde{R}_{a,\lambda} = R_f + (1 - \hat{p}_{a,\lambda})\pi$. Depending on whether or not the action is taken in equilibrium ($a \in \{0;1\}$) and whether or not monetary union takes place or not ($x \in \{m;n\}$), one obtains the ex

post realized real returns on domestically denominated debt $\tilde{R}_{a,\lambda} - 1_{\{x=m\}}\pi$ and thus the tax factor

$$\alpha_x = \alpha_{a,x,\lambda} = ((\tilde{R}_{a,\lambda} - 1_{\{x=m\}}\pi)\lambda + R_f(1-\lambda))\frac{b}{\bar{\tau}}.$$

Plugging all this back into the equations above for the consumptions $c_{i,m} \equiv c_{m,a,\lambda}$ and $c_{n,a,\lambda}$, one thus obtains a fixed point problem in all these quantities, given λ and a. One can reduce this all to a one-dimensional fixed point problem in the nominal return $\tilde{R}_{a,\lambda}$: if $\tilde{R}_{a,\lambda}$ is known, one can easily see from the equations above, that all other quantities can be determined as well. One needs to check existence and uniqueness of this fixed point.

Given a fixed point, calculate the expected utility

$$u_{i,\tilde{R}_{a,\lambda},\hat{a}} = p_{\hat{a}}\left(v(c_{m,a,\lambda}) + z_i\right) + (1-p_{\hat{a}})v(c_{n,a,\lambda}) + \gamma_i 1_{\{\hat{a}=1\}}$$

from taking action $\hat{a}$ at that point, and calculate the difference between the expected utility from taking action 1 versus taking action 0,

$$\begin{aligned}\Delta_{i,a,\lambda} &= u_{i,\tilde{R}_{a,\lambda},1} - u_{i,\tilde{R}_{a,\lambda},0} \\ &= (p_1 - p_0)\left(v(c_{m,a,\lambda}) - v(c_{n,a,\lambda}) + z_i\right) - \gamma_i\end{aligned}$$

In contrast to the situation of risk-neutrality, however, this difference now depends on the action a taken in equilibrium. A general existence result like theorem 1 and statements about the effect of changes in λ seems hard to come by, and we leave matters at this point.

13 Some facts.

Let us examine the consequences of the theory for the case of Italy at the beginning of 1996, providing a particularly interesting example. At the beginning of 1996, it was still unclear, whether Italy will join the monetary union or not, despite the apparent impossibility of being able to satisfy the Maastricht criteria. The Italian government made repeated efforts to prove that they should be allowed in, and some of these efforts looked quite painful in terms of their short-term consequences for part of the Italian public. Given the frequent elections in Italy, public support for such measures must have been essential.

What are the features of Italian debt up to that point in time[8]? First, the yield differential between medium-to-long term Italian versus German debt should be examined, see figure 2. As one can see, the differential never fell below three percent before the beginning of 1996, and stood at five percent at the beginning of 1996.

[8]Again, I would like to express my sincere gratitude to Luigi Spaventa, who provided me with most of the data used in this section

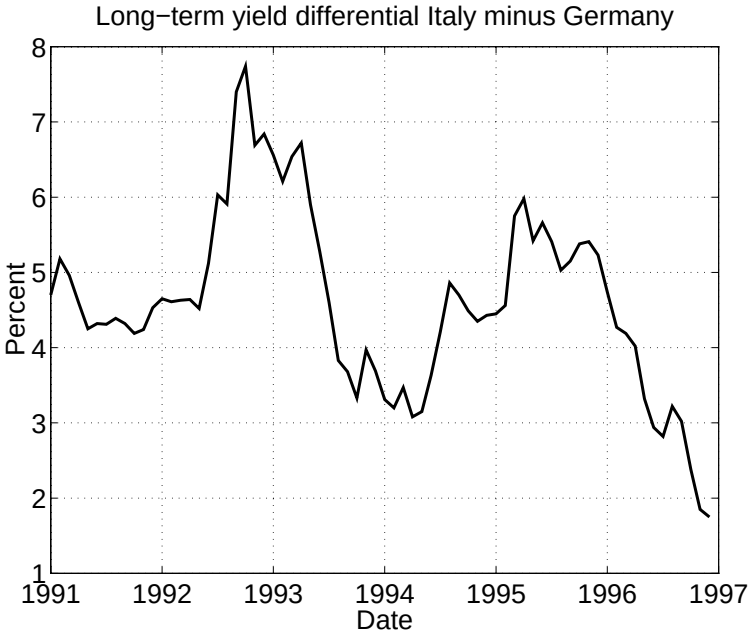

Figure 2: *Yield differential between Italian and German medium- to long-term government bonds. Source: DataStream, series ITLNGYLD and BDLNGYLD.*

The differential fell drastically in 1996 to less than two percent. It is plausible that this fall was caused by a rather dramatic reassessment of Italys chances to join the monetary union by the financial markets, see our equation 1. Other factors may have played a role like e.g. a reassessment of the default risk or a general change in the long term monetary policy in Italy even in the absence of monetary union. Disentangling these issues requires a much deeper analysis than we want to pursue for the purpose of the discussion here: the reader is instead advised to consult the paper by Favero, Giavazzi and Spaventa (1996). For our purposes here, it shall suffice that we can think of the major part of the yield differential as a differential which will be erased upon monetary union.

The decomposition of Italys public debt is shown in table 1 as well as figure 3. As can be seen, there has been a slight upward trend in the medium-to-long term debt, which becomes even stronger, once focussing on the fixed rate part of that debt.

To check the average residual life of the fixed rate medium to long term debt, check the last line of table 1 as well as tables 2 and figures 4 and 5. As one can see, fixed rate debt still had on average five years to maturity at the beginning of 1996. If monetary union happens on schedule at the first of January 1999, this debt will still have two years to maturity on average. As one can see from figure 5, this average residual life has been generally trending upwards since the beginning of the decade.

Finally, we are interested in the ownership structure of the Italian debt. They can be learned from figure 6 for essentially long-term debt as well as from figure 7 for all Italian debt. Interestingly, the ownership of long-term fixed rate Italian debt by

Year	1989	1990	1991	1992	1993	1994	1995
Medium to long Term	46.0	47.0	49.3	48.2	51.5	54.1	54.8
In foreign currency	3.0	3.7	3.7	3.9	4.6	4.7	5.4
All other	51.0	49.3	47.0	47.9	43.9	41.2	39.8
Total	100	100	100	100	100	100	100
Decomposing medium to long term:					1993	1994	1995
Fixed coupon (BTP)					22.9	28.1	31.2
+ Floating rate (CCT), indexed to BOT (T-Bills)					28.6	26.0	23.6
= Total medium term:					51.5	54.1	54.8
Data: Centro Eur. Rich.	Date:	3/90		5/92	5/93	3/94	12/95
Fixed coupon (BTP)		22.0		29.0	29.0	35.0	38.0
(Av. life to maturity:)		(2.31)		(4.44)	(4.08)	(5.13)	(4.4)

Table 1: *This table shows the decomposition of Italian public debt in percent of the total as well as the decomposition of medium to long term debt into fixed coupon debt and floating rate debt, Source: Bank of Italy, Italian Treasury. Data is taken at the end of the year. Figure 3 contains a graphical representation of these numbers. Additionally, the fraction of long term fixed rate (BTP) debt according to the Centro Europa Richerche is shown together with the average life to maturity. The differences to the Treasury numbers come about due to differences in the definition of public debt.*

Type of debt Date	BOT (T-Bills)	CCT (Floating)	BTP (Fixed)	Total Average
Dec. 93	0.42	3.35	5.00	3.26
Mar. 94	0.44	3.28	5.46	3.47
June 94	0.41	3.13	5.49	3.44
Sep. 94	0.41	3.03	5.59	3.38
Dec. 94	0.42	2.96	5.47	4.69
Mar. 95	0.43	3.07	5.35	4.72
June 95	0.40	3.18	5.10	4.62
Sep. 95	0.40	3.27	4.87	4.57
Dec. 95	0.40	3.42	4.69	4.53
Mar. 96	0.42	3.51	4.96	4.63

Table 2: *This table shows the average residual life of various debt instruments in years. For the analysis here, the average residual life of BTP, i.e. medium-to-long term fixed coupon debt, is of particular interest. Source: The Italian Treasury. Figure 4 contains a graphical representation of these numbers.*

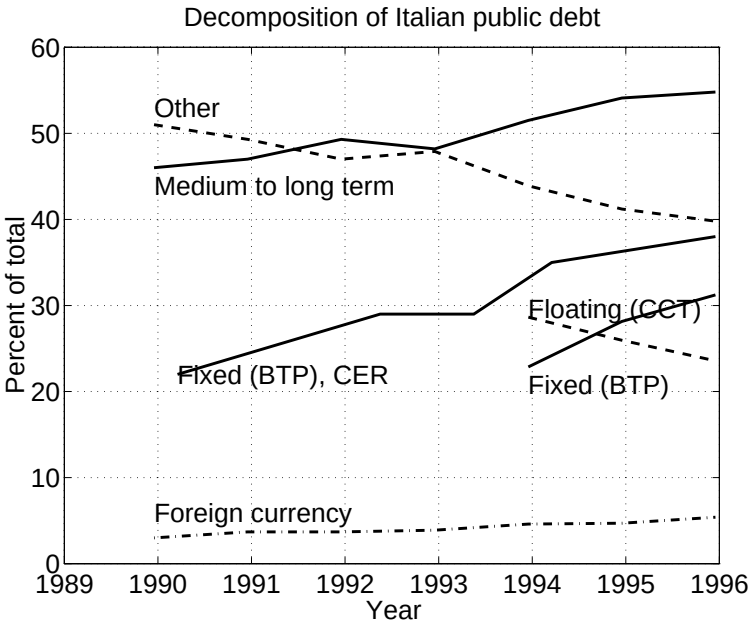

Figure 3: *Decomposition of public debt. For 1993 to 1995, the medium-to-long term debt is further split into fixed coupon debt (BTP) versus floating rate debt (CCT). In the figure, the lines denoted "medium to long term", "foreign currency," and "other" sum to 100 percent. The lines denoted "floating (CCT)" and "Fixed (BTP)" sum to the value of "medium to long term". Additionally, the line "Fixed (BTP), CER" has been drawn, which shows the fraction of debt in form of medium to long term fixed rate debt, as calculated by the Centro Europa Richerche, which, in principle, is the same as the line called "Fixed (BTP)", but the calculations are done differently. The end of the year (mid December) dates have been chosen for the purpose of plotting. See also table 1.*

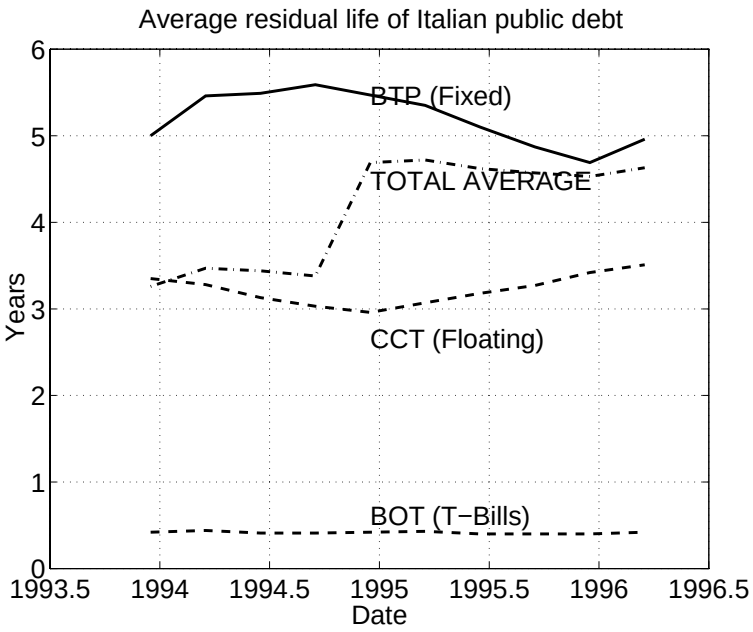

Figure 4: *Average residual life of various debt instruments, see also table 2.*

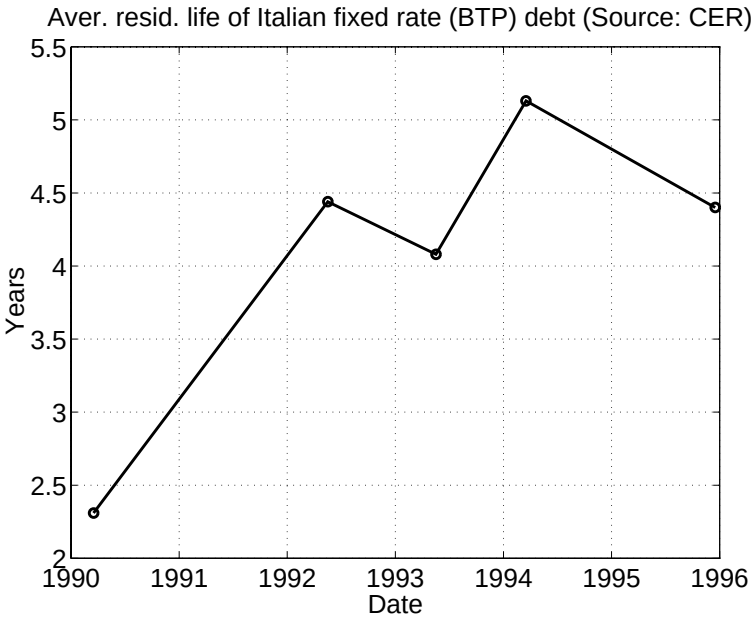

Figure 5: *Average residual life of fixed rate medium to long term debt (BTP) according to the Centro Europa Richerche, see also table 1.*

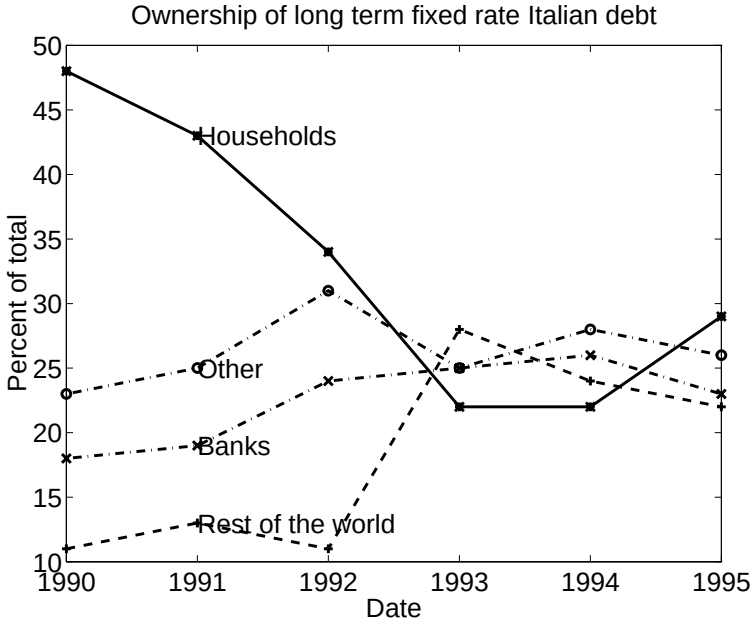

Figure 6: *Ownership structure for Italian debt, excluding BOT (T-bills) and CCT (floating rate). The remainder is mainly long-term fixed rate debt (data for strictly long-term fixed rate debt was unfortunately not available). Note the drastic decline in ownership by private households. The years are to be interpreted as "points" in this figure. Source: Centro Europa Richerche.*

households has declined dramatically in the last decade. At the beginning of 1996, it is actually fairly evenly distributed across the four groups shown in these figures.

Thus, for 1996, one may summarize these observations in light of the theory as follows. There has been a shift towards long term fixed rate debt in the financing of the government. The shift has been twofold: a higher fraction of the debt has been financed this way, and its maturity has increased. However, the majority of this debt is not hold by Italian households: in fact, currently about a quarter of this debt is held by foreigners. This makes it likely that we are in the situation of proposition 4: the Italian debt policy may have actually contributed towards eroding the popular support for a monetary union.

14 Discussion and conclusion.

We have investigated, whether a country can use its debt management strategically in order to influence voter preferences regarding an action, which enhance the chances of lower future inflation. A particularly relevant case of this situation is the current situation in Europe as it is inching closer to monetary union. The point of this analysis is, that domestically denominated debt presents holders of that debt with a

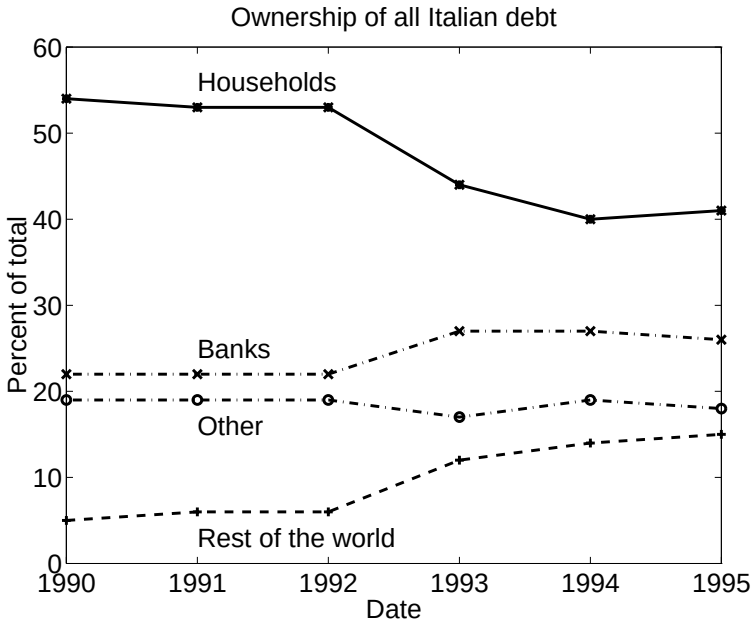

Figure 7: *Ownership structure for all Italian debt. Note the decline in ownership by private households is not nearly as drastic as for just the long-term debt in figure 6, indicating a shift in household ownership from long-term to short-term or floating rate securities. The years are to be interpreted as "points" in this figure. Source: Centro Europa Richerche.*

windfall gain in case of a lower inflation, making them tend to favor the action, but which needs to be paid for by tax payers, which will thus tend to oppose the action.

The rather simple structure leads to a wealth of results, depending on the particular specifications chosen. So, what should one make out of all of that? The key lesson that may be learned here, is that the issue of windfall gains to debt holders from a monetary union, and the corresponding, additional tax burden imposed on the tax payers should attract sufficient attention, and does require careful thinking.

The favorite result of the author are the results emerging from propositions 3 and 4 as well as from the facts about the Italian case shown in section 13: if politicians seek to exploit the effects stated in this paper in order to gain political support for measures enhancing their countries chances at joining the monetary union, then it is a bad idea to issue long term debt denominated in the home currency as opposed to issuing long term debt denominated in a foreign currency such as the Dollar. Thus, recent Italian debt management policy may have actually contributed towards eroding the popular support for a monetary union.

As a caveat, one should keep in mind that there are other results to the contrary in this paper. Perhaps, the main conclusion that should emerge is that the issue of redistribution due from tax payers to holders of long term bonds in the case of a reduction of inflation as induced by, say, a monetary union, is something that is not trivial in magnitude and requires careful attention with respect to measuring the incidence of the inflation tax and the bond holder windfall gains.

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