Budgetary Balances and Restrictions in the European Monetary Union

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Abstract

JASON C. JONES: Budgetary Balances and Restrictions in the European Monetary Union. (Under the direction of Stanley W. Black.)

Government budgetary positions are an important issue for members of the EMU and those who are awaiting entrance. Under the Maastricht treaty in the run up to the creation of the EMU and under the Stability and Growth Pact (SGP) since its formation, countries are required to keep their budget deficit to GDP ratio under three percent. The majority of current EMU members had to reduce their deficits in order to join the EMU. Maintaining these deficit levels under the SGP has proven difficult for a number of EMU countries. The first chapter of this dissertation looks at legislated fiscal actions of five EMU members. By classifying these actions into structural, temporary, or mixed, I conclude that deficit rules have played an important role in inducing structural changes to budgetary positions. However, the numerical nature of these restrictions has led to temporary changes that detract from needed structural change. In the second chapter I empirically test why budgetary positions worsened soon after the formation of the EMU and find fiscal fatigue to be an important explanation. As the current members of the EMU wrestle with the deficit question, the new member states are watching the influence that the EU's rules have on the current members' budgetary positions. In the final chapter I construct a dynamic general equilibrium model of a new member state, the Czech Republic, in the process of catching-up to Western Europe. The catching-up process leads to budget surpluses and inflation. I simulate and compare welfare outcomes of fiscal responses to inflation under the direction of the EU. I also simulate and compare welfare outcomes of the fiscal authority responding to political pressure to reduce accumulated government surpluses.

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Chapter 1

The Reaction to Deficit Restrictions among EMU Members

1.1 Introduction

The process by which the Euro has been introduced provides a blueprint for further unification across Europe, as well as other areas in the world. This study highlights one important feature of European monetary unification, the effect of budgetary restrictions on the evolution of budgets. Government budgets are of particular interest because of the threat large deficits pose to the stability of a monetary union. The majority of European countries have a tradition of deficit biases indicative of structural problems in the budget or its process. The tendency toward deficits amplifies concerns in a monetary union because of the potential moral hazard. Being a member of a monetary union increases the chances that fellow members will bail out a country that has accumulated unsustainable levels of debt, thus encouraging risky budgeting behavior. In order to prevent this and to encourage structural improvements to overcome deficit biases, deficit restrictions have been put in place (Alesina & Perotti, 2004). Under the Maastricht treaty signed in 1991, potential member countries were required to bring their public deficit to GDP ratio under 3 percent before entry into the EMU. This restriction was carried over after the formation of the union in the Stability and Growth Pact (SGP).

The extent to which these deficit restrictions have been successful in inducing structural changes is explored here by documenting the budgetary evolution of five member states, France, Germany, Italy, Ireland, and Spain, in the run-up to joining the EMU and beyond. These five countries have varied budgetary histories and illustrate different responses to budgetary restrictions. France and Germany did not have deficits large enough to warrant concern before the Maastricht treaty was signed, yet between Maastricht and the formation of the EMU they struggled to meet the criteria. They both succeeded in bringing deficits within the threshold in time for the creation of the EMU but shortly after joining, deficits grew large enough to violate the SGP. Italy had high deficits before Maastricht was signed, but was able to meet the criteria just before becoming a member of the EMU. Like France and Germany, Italy was unable to maintain acceptable deficit levels after joining the EMU and it too has violated the SGP. Ireland and Spain are similar to Italy in that they had high deficits before Maastricht but were able to meet the criteria and gain entrance into the EMU. Similar to the other countries in the study, Ireland experienced a worsening of budgetary positions soon after joining the EMU, but not enough to violate the SGP. Spain, on the other hand, is the only country not to experience a worsening of budgetary positions since joining the EMU, in fact budgetary positions have continued to improve.

For each of these countries the timing and nature of budgetary actions through the steps of monetary integration are documented. These actions are classified as structural, temporary, or mixed. These case studies illustrate how budgetary restrictions have played an important role in inducing structural changes to the budgets of these EMU members. The numerical nature of the restrictions, however, has been at best a blunt instrument in insuring these structural changes and has often led to unsustainable temporary adjustments that detract from the structural changes that need to be made.

Section 1.2 provides a brief history of the monetary integration in Europe and documents trends in budgetary balances. Section 1.3 defines the types of changes that will be identified in these case studies. Section 1.4 includes case studies for France, Germany, Italy, Ireland, and Spain. The last section presents the conclusions and policy suggestions.

1.2 A Brief History

The initial steps toward European integration that ultimately led to the creation of the monetary union started soon after World War II. After centuries of fighting amongst themselves, there was a desire to integrate, in part to try and prevent further conflict (Wyplosz, 2006). Integration began by reducing barriers to trade.¹ In 1951, Italy, Belgium, France, West Germany, Luxembourg, and the Netherlands created the European Coal and Steel Community which removed all tariffs on coal, steel, and iron. The same countries formed the European Economic Community (EEC) in 1957 and plans for further integration and an eventual monetary union were laid out. Trade barriers continued to fall through the 1960's. This period was important for the establishment of the goal of an eventual monetary union with the Werner Plan of 1970.

With the creation of the European Monetary System (EMS) in 1979, the goal of an eventual monetary union became explicit. The EMS was designed to reduce exchange rate fluctuations among the now expanded EEC. This step in integration provided the first nominal convergence criterion. Each country in the EMS was required to join the European Exchange Rate Mechanism (ERM) which fixed members exchange rate within a fluctuation band of 2.25 percent. This was the first restriction on the policies carried out by the members of the EEC, but only indirectly for fiscal authorities.

After the obvious obstacle to forming a monetary union, widely fluctuating exchange rates, was addressed in the ERM the focus turned to other convergence criteria. These were designed to insure the stability of the future monetary union. The Maastricht treaty was signed in 1992 expanding the nominal convergence criteria by including inflation, deficit, debt, and interest rate limits. These criteria had to be met before a country could join the monetary union and greatly influenced the conduct of policy in Europe. In the spring of 1994, as members moved into Stage Two of the EMU, the first report of the excessive deficit procedure under the Maastricht Treaty was released by the European Commission. The commission decided

 $^{^{1}}$ The timeline and information for treaties is from the EU web site "Uniting Europe step-by-step, the treaties" http://europa.eu/scadplus/leg/en/s9001.htm

that all but Luxembourg and Ireland had excessive deficits, and that deficit positions would be reevaluated before countries could move into Stage III of the EMU, the final stage. By 1998, the commission declared all but Greece had brought their deficits under sufficient control. Greece was eventually cleared and joined in 2001.

The formation of the European Monetary Union (EMU) was quick to follow and on midnight January 1st, 1999 all member countries' currencies ceased to exist independently.² The Maastricht treaty had accomplished its role and also become obsolete for these countries. There was no longer a need for exchange rate or inflation restrictions, but the possible moral hazard in fiscal balances remained and the 3 percent deficit rule from Maastricht was retained under the SGP.

Under the Maastricht treaty, deficit violations would keep a country out of the union. Punishment for violating the SGP, on the other hand, comes in the form of fines. These fines are imposed by fellow members who have little incentive to strap their already strapped neighbors with further financial obligations. In such a way, governments have less incentive to meet the somewhat arbitrary deficit rules, especially when there are economic strains at home. The weak enforcement mechanism and the existence of large countries with strong influences in the union allow for easier violation of the rule without fear of reprisal (Busemeyer, 2004).

Figure 1.1 illustrates the budgetary positions of the member states considered in this study (SourceOECD, 2007). Each country experienced a worsening of deficit positions in the late 1970's and 1980's. In the early 1990's budgetary positions are varied, but from 1994 to 2001 there is a noticeable improvement in each country's deficit position. Within two years of joining the EMU each country, excluding Spain, experienced a worsening of budgetary positions. By 2003, France, Germany, and Italy had all violated the SGP (European Commission, 2006). In fact, the inability of ECOFIN to enforce the SGP³ and pressure from the violators has led to changes in the rules. The new Stability and Growth Pact was passed on June 27th,

 $^{^{2}}$ Individual currencies were not officially phased out until 2001, but the EMU was operating under the Euro and the ECB was in charge of monetary policy starting in 1999

 $^{^{3}}$ For a summary of the SGP action (or better yet inaction) in response to growing deficits see de Haan, Berger, Helge, & Jansen (2003)

Figure 1.1: Budgetary balances



Deficit to GDP Ratio 1970-2006

2005. The new rule emphasizes medium term objectives and allows a member to exceed the 3 percent deficit limit if it is inline with those medium term objectives, taking into account cyclical conditions (Buiter, 2007).

1.3 Types of Changes

The types of budgetary adjustments made in Europe can be classified in three ways; structural, temporary or non-structural, and mixed. Each played an important role in the evolution of budgetary positions in Europe over the last three decades.

1.3.1 Structural Changes

Structural budgetary changes are legislated actions whose purpose is to permanently change the nature of spending obligations, tax collection, or its process. None of these changes are permanent in that they are irrevocable, any legislated action can be reversed, but if the action intends to change the structure of the budget or its process it is classified as structural. These actions may or may not lead to immediate substantial improvement of deficit positions.

Countries across the EMU face similar challenges in the structure of their budgets. On the revenue side, most EMU members have a narrow tax base with very steep marginal tax rates. Significant portions of the population do not even pay taxes and those that do pay do so at high marginal rates. Many EMU members have sought to broaden the tax base as well and lower the marginal and average tax rates in hopes of generating higher revenue and improving incentives to work. Such changes, along with actions which improve the efficiency of tax collection, are classified as structural changes. Often these changes lead to an immediate worsening of budgetary positions, but as working and producing habits change it is hoped that revenues will increase.

The strong welfare state across the majority of EMU members is placing particular pressure on government budgets (Pestieau, 2006 p.3). The aging population, along with the low birth rate, is straining generous social security and pension systems. The rising cost of healthcare is also putting pressure on the liberal social healthcare systems and draining budgets. The structure of these budgetary problems can be changed by permanently changing contribution rates, benefits paid, or the criteria for qualification for these benefits. Such changes will be recorded as structural changes.

The relatively high level of structural unemployment is further pulling money out of governments' coffers through unemployment insurance and other entitlement payments. In order to reduce its obligation, many EMU member states have legislated actions to bring down the high rates of structural unemployment. Changes to the duration of benefits, mobility in the labor market, minimum wage, education and training, wage rigidities, and employee protection are just some of the actions undertaken that are designed to affect the level of structural unemployment and are classified as structural changes.

The process by which budgets are created and carried out also plays an important role in the structure of budgets across Europe. In some cases, a lack of coordination between the local and the central government in carrying out a budget has contributed to worsening budgetary positions. Many EMU countries have recently legislated improvements in the communication with and reporting by regional governments to overcome this problem. Some have even crafted their own stability and growth pact with the regions with varying success. These changes are also categorized as structural.

In addition, the budget making process is subject to the common pool problem, where the benefits of public spending are often centered on a particular group while revenues used for those projects a drawn from a common tax pool. Thus politicians have a tendency to spend to address their local constituents or particular area of responsibility with less consideration for revenue building. Both pluralistic and proportional political systems provide unique difficulties in overcoming the common pool problem. If the common pool problem is not properly overcome, budgets will be constructed according to "fiefdom" where each individual minister or party representing a particular region, interest, or ethnicity makes budgeting decisions benefiting their own "fiefdom" and don't take into account the effects on the budget as a whole (Hallerberg & von Hagen, 1999, p. 209-232).

Hallerberg (2004)⁴ has studied the common pool problem and institutional reforms in Europe aimed at overcoming it. He demonstrates that the common pool problem can be most effectively overcome in a pluralistic electoral system when one person, usually the finance minister, is given the primary role to conduct fiscal policy and control the budget (delegation). Budgetary rules may not be as useful for delegation systems as decisions by the one in power are based on domestic situations with the budgetary position in mind. This complete control may make them less committed to an external rule. In countries with a more proportional electoral system, concentrating budgetary power is less practical. Yet, if parties can negotiate "fiscal contracts" to which they can commit, then the common pool problem can be overcome (commitment). External rules could be very useful for a commitment system, as they could align the differing parties under a common external goal that they all must work on together to attain. Any changes designed to overcome the common pool problem in the budgetary process are classified as structural changes.

⁴Definitions in this paragraph come from p. 28-36

1.3.2 Temporary Changes or Non-structural Changes

A temporary or non-structural change is any action which temporarily changes revenues or spending without changing the structure of the government's revenue, obligations, or budget making process. Such budgetary moves provide quick and temporary sources of revenue or immediate but temporary relief from obligations. One such devise is using accounting tricks to move obligations off budget or adjust the timing or classification of revenues to relieve budgetary pressure. There are also a number of one-off measures that can be used to provide immediate, yet fleeting sources of revenue (Koen & van der Noord, 2005). Other types of temporary changes that have been used by EMU members include spending and wage freezes, temporary taxes, and delayed wage negotiations with social partners and public employees.

1.3.3 Mixed Changes

Some budgetary reduction techniques fall in the middle and provide both permanent changes to the budget position as well as substantial one-off improvements. These action are often undertaken in order to gain immediate budgetary relief, but the permanence of the outcome will continually effect budgetary positions.

The best example is privatization. The tradition of a heavy public involvement in production is inherited from reconstruction after World War II, when many companies were nationalized. This left the governments of Europe with a large cache of assets, but also large liabilities. Many of the state owned companies have lost their competitiveness and are dependent on subsidies to stay viable. In addition, ownership of such a large number of firms results in a large public workforce with all the associated wage, pension, and healthcare costs. Many European countries sold large portions of their public companies in the run-up to the monetary union. These sales provided immediate revenue which provided temporary budgetary relief. They also affected the structure of budgets by reducing subsidies (in the case of underperforming firms) and wage bills. The hope is that greater competition, as a result of privatization, will lead to more profitable firms, in which case the newly privatized firms become a source of tax revenue. On the other, any revenue that the formally public firm generated is now lost. Another budgetary device that can have temporary as well as structural effects is a tax amnesty. Successful amnesties provide an immediate source of revenue for the government from the original payment of back taxes, but it also increases the number of payees and thus the structure of the revenue side of the budget.

The remainder of this paper will look at the budgetary experience of France, Germany, Italy, Ireland, and Spain. The nature and timing of the changes and reforms will be addressed in the context of their motivation and related specifically to the influence of deficit rules in their implementation.

1.4 Country Case Studies

1.4.1 France

Figure C.1 illustrates the deficit position of France. France has not been overly concerned with deficit restrictions when drafting budgets and budgetary reforms and contributed to the worsening of deficit positions during the Maastricht period and beyond. Structural deficiencies were first addressed in 1983 under Economics and Finance Minister Jacques Delors. Major reforms began in earnest in 1986 when Jacques Chirac was elected Prime Minister and continued on and off until his term as President ended in May 2007. The newly elected president, Nicolas Sarkozy has continued to push forward with reforms. Though these reforms were undertaken within sight of the signing of the Maastricht treaty, the timing of the changes suggest that they would have been done anyway. This is best illustrated by the continued tax reform designed to broaden the base while lowering tax rates. These reforms involved many tax cuts and loss of revenue, yet were largely enacted in the critical few years before the advent of the EMU. Partially because of this, France was included in the group of countries censured by the European Commission in 1994 for having an excessive deficit. France did have to resort to a few temporary fixes and accounting tricks to insure entrance into the EMU. The only time these temporary changes were employed in any large measure was when the deficit rules appeared to be binding.

Structural changes have continued amidst strong opposition. This may reflect the mature

nature of the structural changes in France, as all the easy reforms have been completed. Continued structural reforms help explain their current violation of the SGP, as they continue to move forward with little regard of the numerical restrictions of the SGP. This rule is seen as a nuisance to their overreaching plans of addressing structural budget deficiencies.

The existence of deficit rules could still be linked to the improvements in the structure of France's budget. Many of the major structural reforms were met by violent protests by the citizenry. The external pressure of restrictions on deficits provides a political excuse to undertake structural reforms. In this way, restrictions have played an important role in the government's ability to push reforms against such social pressure, but less so since the formation of the EMU.

Structural Reform

Form of Fiscal Governance:

Even though there are a number of parties and cleavages in French politics, the election procedure results in two tight coalition factions and thus a pluralistic political process. Budget making and execution are the prime minister's job, and he receives recommendations from the Minister for the Economy, Finance, and Industry. The French National Assembly had virtually no power over the budget until 2001, when they were given some control over where the spending was going, but they still cannot change the total amount in the budget. Thus France has a strong delegation form of fiscal governance. With the pluralistic election system there has been little need for change. In fact, their indifference to the deficit rules is consistent with Hallerberg's conclusions about external rules under delegation (Hallerberg, 2004, p. 102-109).

Tax Reform:

France had, and to some extent still has, a very narrow tax base with high tax rates on those who do pay. By the 1990's only about 50 percent of households in France even paid income taxes and the rate on the highest income earners was around 58 percent (OECD, 2000a, p. 16). In 1991 the Finance Act was introduced which was designed to lowered rates, broaden the tax base, and limit the tax wedge on labor (OECD, 1991a, p.50). In 1994 the tax system was simplified and personal taxes were reduced (OECD, 1995, p.31). The first major reform came in 1997 which introduced a five year gradual reduction a tax rates. It also increased the number of people who did not pay income taxes by 1.5 million. The bill did broaden the tax base by eliminating some tax rebates for professionals. A freeze was placed on spending to finance these tax reductions, but this freeze only lasted one year (OECD, 1997a, p. 50). The attempt to broaden the base and make the structure less steep continued under the SGP with tax reform bills passed in 1999 and 2000. These reforms cut taxes and were designed to make the system more efficient (OECD, 1999a, p. 53; OECD, 2000a, p. 57). Changes to the tax system were again implemented in 2005 designed to reduce labor distortions (OECD, 2005a, p. 57). This continued tax reform included many tax reductions and was costly and contributed to the deficits experienced over this time period. The cuts were mostly funded with spending restraints, increases in indirect taxes and VAT, as well as funds from privatization. These sources were insufficient to keep France within the Maastricht deficit limit and temporary measures were used in the run up to joining the union, but as France entered the union tax restructuring continued with less use of temporary measures and has contributed to the violation of the SGP.

Pension Reform:

After years of building up liberal pension laws for both the private and public sector, two major pension reforms have been passed in France. The first was in 1993 and the second was in 2003 (OECD, 2005a, p. 47). The original timing of these reforms could be tied to the deficit rules, as these reforms helped not only the long term structure of budgets, but they also improved the short run budget position. The political establishment also recognized the threat that the growing pension liabilities had to the budget and enacted these changes under intense opposition. The 2003 revisions were passed amidst riots across France (OECD, 1999a, p. 170). Finding ways to fund pensions has been a continued concern. Proceeds from the sale of mobile phone licenses in the early 2000s were earmarked for the pension reserve fund. This specific allocation was different than in much of the rest of Europe, where the proceeds were used for general one-off deficit reduction.

The 1993 reform was directed toward the private sector while the 2003 reform affected both private and public employees. The reforms increased the duration under which a person must work to receive full benefits as well as the age of mandatory retirement to 65. Retirement benefits were also reduced for those not contributing the full rate, but some concessions were made as the retirement age was lowered and payments were indexed (OECD, 2005, p. 46). These reforms begin to address the pension problem in France, but are far from providing any solution to the upcoming crisis.

Healthcare Reform:

French legislators began to address the rising cost of healthcare in the early 1990s. Early and often in the process toward joining the EMU, actions were taken to bring social security into balance in order to meet the Maastricht criteria. Early reforms were designed to curb spending (OECD, 1992, p. 50). In 1991 a "spending envelope" for healthcare professionals was instituted and in 1993 guidelines designed to reduce unnecessary procedures were introduced (OECD, 1994, p. 77-78). Once again changes to the funding of social security system such as these were often met with strong resistance from the public.

The original healthcare program had little oversight and few repercussions for overspending. This was changed in the Jupp reform in 1996. This reform gave parliament greater oversight, organized the three major insurers, and aligned their operations with the budgetary goals set by Parliament. Better organization allowed the government to introduce electronic personal medical files which improved the quality and decreased the cost of providing care (OECD, 2005, p. 76). A major reform was introduced in 2002 which changed the capped budget system under which public hospitals ran. The capped system led to inefficient care and these reforms were designed to provide better and more cost efficient care (OECD, 2005, p. 78). The timing of healthcare reform provides some evidence of a Maastricht effect and has contributed to improved budgetary balances.

Labor Reform:

The unemployment rate in France has been above 8 percent since the mid 1980s and peaked around 12 percent in the mid 1990s⁵. Legislated actions designed to address structural unemployment have been mixed and many of the suggested reforms have been met with popular

⁵see Figure C.1 for series on unemployment

resistance. These reforms have not been as successful as others and the structural unemployment rate has remained high and continues to affect the budget through social services and unemployment insurance. Actions taken to reduce structural unemployment include abolishing required authorization to lay off workers, increasing government sponsored worker training programs, subsidizing and providing tax incentives for firms that hire workers (particularly younger workers), and reducing the work week while cutting back on allowable overtime. At the same time the minimum wage has been raised twice since 1995 and unemployment insurance has been expanded (OECD, 1987a, p. 37; OECD, 1994a, p. 45; OECD, 1995a, p. 64-67; OECD, 2000a, p. 101-102; OECD, 2005a, p. 58). Attempted reform to the ability to hire and fire workers in 2006 was defeated after riots erupted in Paris. None of these reforms can be tied to Maastricht or the SGP, but the high unemployment rate is still a concern for maintaining balanced budgets.

Nonstructural/Temporary Changes

When the Maastricht treaty was signed in 1991 France was within the 3 percent deficit criterion, but by 1995 their deficit had increased to 5.5 percent and France was censured for having excessive debt. As France was in the middle of a number of structural changes and social discontent was growing over those changes, it was necessary to make some temporary adjustments in order to meet the deficit criterion by 1998. One popular measure used was to treat capital injections into money losing public enterprises below the line, accounting for 0.19 percentage points of GDP from 1994 to 1999. Questionable accounting was also used in the treatment of accrued coupons on fungible treasury bonds and export credit insurance in 1996 totaling 0.3 percentage points of GDP. Treating capital injections below the line and accounting tricks amounted to 0.12 percentage points of GDP in 2000, but since that time there use has tapered off. Koen and van der Noord estimate that such tricks accounted for less than 1 percent of GDP in 2001, 2002, and 2003.⁶

A number of temporary measures were used directly around the time that deficits were

⁶Numerical estimations for this paragraph come for Koen and van der Noord (2005) Table A1.

to be evaluated. In 1997 Eurostat allowed the government to receive a transfer of money from France Telecom in exchange for the government's assumption of the company's pension liabilities (OECD, 1997a, p. 51). This cash flow amounted to 0.5 percent of GDP and helped push France just within the 3 percent deficit to GDP threshold (Hallerberg, 2004, p. 108). Similar to the Eurotax in Italy, in 1997 France imposed a temporary 15 percent tax hike on corporations, and temporarily increased the tax on long-term capital gains (OECD, 1999a, p. 170). This coupled with a spending freeze in 1997 (which was lifted in 1998) and a freeze on the wage scales of public employees in 1996 (OECD, 1997a, p. 50), helped insure that France met the deficit requirement when evaluated at the end of 1997, even with the extensive and costly reform to the tax system. It is not surprising that France was unable to maintain its deficit levels under the SGP, with the size of the temporary movements at the EMU juncture and the continued structural reform to the tax system. Taxes were again lowered in 1999 according the structural realignment scheme. The social security system remained a source of fiscal slippage and in 1999 FF 10 billion in appropriations was frozen to finance the social security deficit, yet benefits increased in 2002 (OECD, 2000a, p. 162). The indifference to the numerical deficit threshold remains evident as France continues with structural reforms, but has reduced its reliance on temporary fixes to insure compliance with the SGP.

Mixed

In the early 1980s President Francis Mitterrand dramatically expanded public participation in production and nationalized many companies in an attempt to overcome a recession. When Jacques Chirac was elected Prime Minister in 1986, there was a change of philosophy. Prime Minister Chirac identified the large public involvement in production as a drag on the efficiency of the economy and on public finances (OECD, 1987a, p. 7). Privatization efforts provided a source of funding to allow structural changes to the tax structure as well as relieve the government of heavy subsidies that many of these firms began to demand. Since 1982 France has privatized 2000 firms (equivalent to 1.35 million employees). Privatization will continue to remain a source of temporary funding as there are still 1500 companies in which the government has ownership, where 97 are directly owned (OECD, 2003a, p. 86-90). Yet France did not use privatization to supplement its budget as much as other European countries, in fact privatization slowed down when temporary funds would have been most helpful around 1997.

The large share of government owned firms, and the fact that privatization was included in Prime Minister Chirac's original plans to change the economy, indicates that the process of privatization would have most likely continued without the deficit requirement. In addition, the motivation for privatization as being anything more than an attempt to improve efficiency is doubtful.

1.4.2 Germany

Germany earned the reputation of a fiscal hawk through years of strong fiscal positions.⁷ The German constitution even includes provisions designed to insure strong public finances.⁸ They were one of the few in Europe who raised VAT around the oil crises to keep the budget in check. When the budget position weakened in the early 1980's Helmut Kohl was elected to office and made deficit reduction a priority (OECD, 1983a, p. 24) and for the most part was successful. The German public has also grown to expect fiscal austerity even when it is painful. In 1998, Chancellor Kohl actually lost his leadership position in part because of the public's perception of mismanagement of the public budgets (Hallerberg, 2004, p. 98). Germany was instrumental in crafting the deficit rules in Masstricht and SGP. They had little reason to believe that they would have trouble meeting the deficit threshold, but Germany's fiscal austerity was weakened by the reunification of East and West Germany in 1991. The size of the effect of reunification surprised most observers and Germany found itself struggling to meet the criteria they were instrumental in constructing (Hallerberg, 2004, p. 97).

Germany had a tradition of fiscal austerity and wanted to impose this on those who would be joining them in the EMU, so the Maastricht treaty and the SGP had little effect on changing the structure of the way the government thought about deficits in general. The difficulties of reunification and the long process of overcoming it under Maastricht and the SGP though did

⁷See Figure C.2 for deficit, inflation, and unemployment data for Germany. Data from SourceOECD (2007) ⁸Article 110, point 1 of Germand Constitution. Accessed at www.psr.keele.ac.ul/german.htm

lead Germany to have to employ temporary fixes as in other European countries.

During the 1980s, Germany avoided the large deficit problems that other European countries were dealing with. They consistently met tax cuts in one area with spending decreases or increased taxes in another. They undertook some structural changes in the 1980s, but these were mainly tax reform. Reunification was a leading cause of the worsening deficit position and Germany being censured by the European Commission in 1994. Structural reforms to the healthcare system, pensions, and labor market continued to be introduced with Chancellor Schroeder's revealing of the ambitious "Agenda 2010" in 2003. The structural changes introduced with this plan cut into the welfare state and were met with opposition, but most of the proposals have been implemented. In implementing these reforms the Germans, as the French did, allowed the deficit limits of the SGP to be violated.

Germany was able to meet the Maastricht deficit threshold, but did so with a number of temporary changes. They were able to maintain a deficit level under 3 percent of GDP the first two years of the SGP with the help of much larger than expected revenues on the mobile phone licensing sale in 2001 (OECD, 2001a, p. 48). From 2001 to 2006 the deficit worsened and eventually violated the SGP. Structural changes since the advent of the EMU do point to the possibility that a general deficit rule has been helpful in motivating structural change, even if they choose to ignore the numerical threshold under the toothless SGP. The austere tradition of the Germans has recently returned and through increases in VAT the deficit was only 1.9 percent of GDP in 2006 and less than 1 percent of GDP in 2007, exceeding expectations (International Business Times, 2007). This was the first time it has been below the 3 percent threshold since 2001. As we will see, the temporary adjustments needed under Maastricht have not been employed to meet SGP, instead structural reforms have accelerated.

Structural Reform

Form of Fiscal Governance:

Germany's election system is a mix of pluralistic and proportional representation, but most often the different parties align themselves into two opposing factions and politics tend to follow a pluralist form. The Finance Minister takes a very strong role in the budgeting process and thus Germany has a delegation form of fiscal governance. The great concern German leaders and Finance Ministers have shown for austere public finances, as well as public expectations of such, have made Germany fiscally stable for the majority of recent history. The Finance Minister's position is constrained more so than in France. When parliament is divided or the Finance Minister does not have the support of the Prime Minister, the fiscal situation has worsened. Unlike France, all budget bills must be passed by the upper house of parliament, and vote buying to appease coalition members has and can occur under the current set up. The current structure, therefore, could potentially be detrimental to budget positions.⁹

Germany is one of four federalist countries in the EMU (OECD, 2003b, p. 80). Because the deficit criteria were based on the general government deficit level, independent state spending could offset federal budget austerity. The constitutions of the federation and each of the German states contain a provision to prevent deficits from exceeding investment spending, but these rules have been largely ignored (or bypassed with creative definitions of investment spending), resulting in large deficits by the regions (OECD, 2006a, p. 55-57). In 2003 the federal government and the individual states crafted the Domestic Stability Pact. This plan shared the burden of any fines that would be imposed on Germany for excessive deficits with the states. This was designed to increase awareness at the state level to maintain deficit positions (OECD, 2004, p. 49). The deficit restrictions in the SGP were instrumental in the formation of this pact, but it is only effectual in as much as the SGP is in inducing changes.

Tax System Reform:

Germany has traditionally had a high income and business tax rate and Chancellor Kohl set out to simplify and reduce these tax burdens. Tax reform in Germany was most often met with spending cuts or increases in other taxes such as VAT, which were lower than average (OECD, 1990, p. 49; OECD, 1993a, p. 84; OECD, 2006a, p. 54). In fact through the 1980's while these reforms were ongoing, Germany's deficit hovered around one percent of GDP. Kohl's first tax relief measure went into effect in 1986 (OECD, 1987b, p. 17). It added deductions for children, raised the lower limit for taxable income, and reduced the marginal tax rate (OECD, 1989a,

⁹Facts from Hallerberg, 2004, p. 84-91

p. 85). Reforms continued, designed to make a simpler, fairer, and less distorting tax system through 1991. These reforms came at a time of weak economic performance but the cuts were funded by spending cuts in pensions and health care and the budget remained stable.

Reunification did slow down tax reform and temporary taxes were introduced to meet the deficit criterion, but in 1994 a business tax reform was implemented (OECD, 1994b, p. 59). This reform was designed to be simpler and cut down on abuse; it also lowered taxes on businesses. In 1997 another tax reform law came into force. This round of tax reforms abolished the wealth tax, restructured the inheritance tax, gave tax breaks to those firms that hire, and increased the child allowance. It also raised real estate taxes to compensate for the tax reductions (OECD, 1997b, p. 158). The new government of Chancellor Schroeder pushed forward with tax restructuring. The 1999 tax relief law broadened the tax base and cut personal taxes which were compensated for with a higher business tax through a series of steps through 2002 (OECD, 2001a, p. 183; OECD, 1999b, p. 60-61). Those increases were short lived though as in 2001 business taxes were reformed and businesses received a windfall to promote development (OECD, 2003b, p. 58). There was no earmark to pay for these reductions and the deficit increased after 2001, indicating early indifference for the numerical restrictions of the SGP. Slowly indirect taxes and VAT have been raised and this along with a tax amnesty in 2005 (OECD, 2003b, p. 59; OECD, 2006a, p. 54) has helped the deficit position improve. By 2006 Germany was no longer in violation of the SGP.

Pension Reform:

Chancellor Kohl's major changes came in tax cuts and privatization while welfare and social security were adjusted here and there to help balance the budget. The retirement age was increased in 1988 (OECD, 1989a, p. 97) and contribution rates increased in 1996 and 1997 (OECD, 1997b, p. 158), but little else was done structurally until 2002. After pushing off reform for years, a new pension reform bill was passed which cut back public pensions and introduced private personal pension accounts (OECD, 2001a, p. 58-60). The effects of the reform are still not fully understood, but it has played a role in reducing the government's role in pensions and thus some of the pressure it will put on the budget (Bonin, 2001). In addition, as part of "Agenda 2010" annual pension adjustments will be linked to the number

of contribution payers and pension recipients, to try and overcome demographic changes in Germany (OECD, 2004, p. 57).

Healthcare Reform:

Spending cuts in healthcare were used by Chancellor Kohl early to fund his tax cuts¹⁰, but he also worked to rein in the increasing cost of the social healthcare system. The Healthcare Restructuring Act in 1992 was designed to improve hospital efficiency (OECD, 1993a, p. 127). In 1997 consumers were given more rights to move between health funds and these funds were subjected to greater fiscal discipline from the government (OECD, 1997b, p. 85). The cost reduction reform bill, "Gesundheit 2000", has been the most ambitious of the healthcare reform bills and concentrates on cost reduction (OECD, 2000b, p. 61). Reform has continued and in 2004 another bill was passed to reduce the costs and improve the efficiency of the German healthcare system (OECD, 2004, p. 64).

Labor Reform:

Labor reform in Germany has been slower than other structural reforms. Traditionally, most labor issues were discussed among the government and unions, states, and firms resulting in non-binding agreements (OECD, 1987b, p. 37-38). Structural unemployment could not be ignored, especially with the high rate of unemployment in the former East Germany. It was hoped that all of the funds for infrastructure improvements funneled into the Eastern German economy would lead to competitive firms and good opportunities for employment,¹¹ yet in 2002 the unemployment rate was 19.1 percent in the East compared to 8.3 percent in the West (OECD, 1993a, p. 40).

In 2002 the position of Minister of Economics and Minister of Labor were combined to form the new Minister of Economics and Labor. This post was given the directive to stimulate the economy and reduce unemployment (OECD, 2004a). The first major labor legislation was introduced in the Job-AQTIVE-Act in 2002. This act was designed to help the labor market work more efficiently. It set out a plan for the Labor office to work more efficiently in helping

¹⁰For example, contribution rates were increased in 1993 (OECD, 1997b, p. 85)

 $^{^{11}{\}rm Though}$ little of the money set as ide for East Germany was actually used on structural improvements (OECD, 1993 a, p. 78)

the unemployed find work. It also provided incentives for businesses to hire temporary workers, set up temporary work agencies, and other efficiency promoting laws. More directly associated with the government's deficit position, the qualification and payment of unemployment benefits were tightened (OECD, 2003b, p. 105). Employment protection for new and small firms was eased, reducing the cost of hiring and firing. In addition, unemployment benefits were reduced and eligibility tightened in 2005 (OECD, 2006a, p. 100) in hopes of reducing the structural unemployment rate and reliving its pressure on the budget. These costly structural reforms did not occur until after the formation of the EMU, and contributed to the worsening of budgetary positions.

Temporary Changes

The combination of reunification and tax reform put Germany's finances in a bind. As was described previously, the costs of unification were much higher than originally planned and soon after unification a solidarity tax on income of 7.5 percent was imposed (OECD, 1992b, p. 102). This set precedents on how Germany would confront immediate deficit problems when it came closer to Stage III of the EMU. Few accounting tricks or privatization funds were used to meet the deficit threshold. In fact the only accounting trick Koen and van der Noord identify is a reclassification of public hospitals and a reimbursement of Airbus subsidies in 1997 totaling only 0.24 percentage points of GDP (Koen & van der Noord, 2005). In fact, an attempt by the Finance Minister Waigel to revalue Bundesbank's gold reserve and use the profit to adjust the budget in 1997 was heavily criticized as creative accounting by the public. The revaluation did go through in 1998 after entrance into Stage III of the EMU, but the attempt in 1997 did tarnish Chancellor Kohl's reputation and was a factor in Schroeder's election (Hallerberg, 2004, p. 98).

Most adjustments were in the form of temporary taxes and spending restraints. In 1995 a second temporary solidarity tax was introduced though its expiration was postponed until 1998 (OECD, 1997b, p. 49). In addition a 25 percent increase in the fuel, energy, and tobacco tax was approved (OECD, 1995b, p. 161). Spending was frozen in all German ministries and spending cuts were made in 18 of the 26 spending areas for the 1996 budget. When deficit projections were worse than expected, spending cuts were expanded mid-year. The budget also included a 2 percent reduction in personnel in the federal government. In the end the Finance Minister decreed that any large spending decisions needed his personal approval (OECD, 1997b, p. 44-45). These measures made it possible to meet the Maastricht criteria and the temporary measures continued to improve the budget situation immediately after entrance into the EMU. The gold reevaluation in 1999 was much larger than expected (OECD, 1997b, 160) and one-time revenues from the sale of mobile phone licenses in 2000 along with р. a relatively strong economic performance across Europe at the start of the EMU allowed Germany's deficit position to remain comfortably below the SGP threshold. But as these temporary effects wore off, the lingering effects of reunification, other structural deficiencies (such as social security), as well as the ongoing tax and pension reform led to a worsening of the budget condition. Other than a temporary corporate tax increase in 2003 and a postponed tax reform (OECD, 2002, p. 199), Germany did not return to temporary taxes or spending cuts to insure compliance with the SGP. They continued structural change with less regard for the deficit level until recently, when fiscal austerity has been restored.

Mixed

Chancellor Kohl recognized that state ownership of enterprises was an obstacle to efficiency and started the privatization process early in his leadership. In 1985 the newly elected government committed to privatization. Germany would be selling shares in Volkswagen, German Telecom, Lufthansa, and the railroad in stages over the next 20 to 30 years (OECD, 1986a, p. 27). Privatization has gone on as planned with little change. The planned sale of 25 percent of Telecom was accelerated and completed in 1997 (OECD, 1997b, p. 160). This is the only major case in which the deficit criterion played a significant role in privatization. Privatization was seen from the beginning to be a method of increasing the efficiency and competitiveness of nationalized firms and thus the German economy.

1.4.3 Italy

The fiscal situation in Italy has been one of the worst in Europe, with deficit to GDP ratios in the double digits throughout the 1980s and a debt level over 120 percent of GDP.¹² The size and persistence of deficits indicate structural deficiencies that need to be addressed. Three events occurred in the early 1990s which played a role in motivating real changes to the deficit structure. First, Italy was hit by the currency crisis in 1992, which forced them to withdraw from the ERM. The attack on Italy's currency came in part because of the large budget deficit and investors' belief that Italy would therefore be unable to remain within the fixed exchange rate bands of the ERM. Second, there was a crack down on political corruption in the 1992 Clean Hands campaign, bringing in an unprecedented number of new faces to the parliament with a directive to bring about change and making parties responsible for their budgetary actions (Hallerberg, 2004, p. 188). Finally, the Maastricht treaty was signed with its deficit restrictions in 1992 which carried the threat of exclusion from the EMU.

Italy began to address some of its structural problems, though it is difficult to say whether it was the currency crisis or the threat of not being a part of the first wave of the EMU that instigated these reforms. In either case, integration played an important role. One indication that being an original member of the EMU was one of the main reasons for some of the changes is the personal role of Romano Prodi, the Prime Minister directly before admittance to Stage III of the EMU. He has been a strong advocate of a united Europe and after his dismissal as Prime Minister he became the first president of the European Commission of the newly formed EMU.

Structural changes though were not fully in place or implemented by the time Italy entered Stage II of the EMU and thus were too late to have an effect on the deficit. In order to meet the numerical deficit threshold Italy has had to rely on temporary adjustments much more than other European countries. Under the SGP, Italy has hovered around the 3 percent threshold for a few years, but since 2003 deficits have exceeded the deficit threshold, reaching 4.5 percent of GDP by 2006. The severity of the contractions to meet the Maastricht criteria along with

¹²See Figure C.3 for data on deficits, unempolyment, growth, and inflation using SoureOECD (2007) data.

the delay of promised prosperity in the EMU, has lead to fiscal fatigue. Silvio Berlusconi won the premiership in 2001, partially as a backlash to Prodi's austere fiscal stance and the absence of many of the promised gains of joining the EMU. Structural changes to the budget and budgetary process that have been introduced since entrance into the EMU have been politically safe. The only way Italy has remained under the deficit limit is through continued use of temporary measures, specifically privatization and tax amnesties, though accounting tricks were still extensively used until the loopholes were covered by the Eurostat. The ability of the SGP to induce continued structural changes in Italy is yet to be seen, as budgets continue to worsen.

Structural Reform

Form of Fiscal Governance:

Hallerberg (2004) points to the political process of budget making in Italy as one of the main reasons for the poor fiscal position, and identifies Italy's form of fiscal governance as a fiefdom up until 1995. During this time period deficits in Italy exploded. Before 1994, parliament was filled using two-tier proportional representation. This made it difficult for any one party to win a majority of seats, and thus led to coalitions that easily broke down. As a result, the premiership was continually revolving. From the end of World War II to 2001 there was only one coalition that lasted at least four years, but most were much shorter.¹³ The continual upheaval made it almost impossible to organize commitments across parties to stick to any budget that was formed.

A major reform in 1994 moved Italy away from a proportional electoral system to a more pluralistic system. Seventy-five percent of the seats in parliament were to be based on plurality. These changes make a delegation form of fiscal governance the most effective. After the election of Prime Minister Prodi in 1996, all of the ministries involved in the budget process, except the Ministry of Finance, were consolidated into the Ministry of Treasury, and the executive side of budget making was strengthened. The Ministry of Finance was added in 2001 to

¹³Derived from the political history provided on PBS Commanding Heights http://www.pbs.org/wgbh/commandingheights/lo/countries/index.html under Italy/Politics

form the Ministry of the Economy, and Italy's form of fiscal governance became delegation (facts up to this point come from Hallerberg, 2004, p. 183-192). In 2006, Prime Minister Berlusconi reversed the reforms introduced by Prodi and the electoral system has returned to a proportional system (OECD, 2007a, p. 39). These changes renew fear of a return to a fiefdom form of fiscal governance if commitment cannot be institutionalized. The existence of the SGP should theoretically provide the needed external pressure for commitment, but it is too early to determine what will occur.

Part of Italy's budgetary problems came from its regional governments. The regional governments' reliance on the federal government for funding with little oversight and unclear accounting between the two has resulted in fiscal leakages (OECD, 1996a, p. 95). Localities have steadily been given greater fiscal autonomy and responsibility for their own budgets,¹⁴ relieving the federal government of the subsidies sent to them. Italy also passed its own Internal Stability Pact (ISP) with the formation of the EMU. Local governments are responsible for setting budget targets in line with the central government's goals of meeting the SGP deficit criterion. The local governments have abided by their ISP projections, yet deficits have continued to deteriorate (OECD, 2007a, p. 131-132). This indicates weaknesses in the ISP in reflecting the SGP as well as central government budgetary slippage. Overall, greater coordination with local governments along with changes to the electoral system have greatly improved Italy's ability to control budgets if it so chooses.

Tax Reform:

Italy's revenue system, like the rest of Europe was steep and had a narrow base, but it also suffered from inefficiencies in collection (OECD, 1996a, p. 86). There were some minor changes in the 1990's, but it wasn't until 1997 that a major tax reform was undertaken to broaden the base and simplify the tax code in an effort to overcome tax avoidance and strengthen the structural makeup of the tax system. The reform hurt revenues in the short run. These steps were justified by the prospect of strong growth as a result of joining the union and by structural changes to the tax system which would increase tax revenue without increases in

 $^{^{14}\}mathrm{From}$ legislation in 1992, 1995, 1997, 1996, and a constitutional amendment in 2001 (OECD, 2005b, p. 98-99

taxes (OECD, 1999c, p. 69-70). Tax reform was addressed again by Prime Minister Berlusconi and in 2003 there was a major tax restructuring which substantially reduced tax burdens and attempted to widen the base (OECD, 2003d, p. 141). This tax reform was not met with spending decreases to insure compliance with the SGP and has played a role in Italy's weak deficit position since joining the EMU.

Pension Reform:

Social payments in Italy cultivated in the 1960s and 1970s were the major cause of spending increases across the 1970s, 1980s, and early 1990s, accounting for 75 percent of the growth of primary spending (OECD, 1997d, p78). This spending increase was concentrated mainly on one area, pensions. Public health spending and transfers to households remained below the OECD average, making the social safety net in Italy weak (OECD, 1997d, p. 80). Pension spending on the other hand, has been well above OECD averages and even well above European averages (OECD, 1997d, p. 82). This has been driven in part by poor demographics, but also by increases in real benefits in the 1970's and the fact that payments were indexed on prices. Italy had an inflation rate in the double digits from 1974 to 1985, hitting its peak over 20 percent in the early 1980's.¹⁵ In addition, the number of pensioners is higher than the rest of Europe, a result of a low retirement age (60 for men and 55 for women in the private sector) and easy access to early retirement through seniority pensions (eligible only after 20 years of work). The lack of other strong social safety nets pushed many to the pension system for welfare.

The restructuring of the pension system started with Prime Minister Amato in 1992 (OECD, 1997d, p. 83) and was carried on by later governments. Major changes came with the Dini reform in 1995. This reform harmonized the retirement age (raising it for some sectors), calculated pensions based on contributions versus earnings, and increased the contribution rate and the required years of contribution before eligibility. These changes were meant to discourage early "retirement" into the pension system and make the system more solvent (OECD, 1996a, p. 50-51). In 2004 and 2005 the pension system was again addressed and retirement

¹⁵See Figure C.3

age was increased in some sectors and eligibility was tightened (OECD, 2005b, p. 67). Though important steps have been made, the system still remains a heavy burden on Italy's budgets.

Healthcare Reform:

Italy has done relatively little to address the rising costs of healthcare.

Labor Reform:

Structural unemployment received little attention under Maastricht, as it did not have a direct influence on entrance and reforms would only have had very long run effects on the deficit position. In fact in 1994 the government increased the unemployment allowance and extended benefits paid (OECD, 1995d, p. 138). This was designed to soften some of the blow that would result from fiscal consolidation and the ever present high unemployment rate. Only under the SGP have there been some attempts to address high structural unemployment. In 1999, the government increased expenditures to train unemployed or under employed workers (OECD, 2000c, p. 197). In April of 2000 the government approved reductions in social contributions for employers who hire an unemployed person (OECD, 2001c, p. 165). Both of these attempts have negative immediate effects on the budget position and were undertaken after entrance into the EMU was assured, and demonstrate some disregard for the numerical restrictions of the SGP.

Nonstructural/Temporary

Though there were important changes to the structure of the deficit they were implemented with very little time left before the start of the EMU. Italy found itself constrained by the deficit limit to the very end and it seemed very possible that Italy would join Greece and delay entrance into EMU. A number of temporary or non-structural changes can be identified in the run up to the accession date that prevented this from happening. Some of these nonstructural temporary adjustments have continued under the SGP temporarily helping Italy remain around the 3 percent deficit boundary. A certain amount of fiscal fatigue has also revealed itself in Italy since becoming a member of the EMU, as budgetary positions have worsened. The promised returns from joining the EMU have not been completely realized and the painful fiscal consolidation leading up to admittance has played a role in politically driven
increases in spending with little regard for the deficit.

Controlling public employment and wages through temporary freezes was a popular method to meet deficit aims. When the 1991 budget overshot and pressure began to mount against the currency, a freeze on government employment was introduced temporarily to get a hold on spending (OECD, 1992c, p. 123). This was again employed in the run up to the European Commission deficit review in 1998, as a freeze was placed on hiring in the public sector. This time a temporary freeze was also placed on raises for public employees, along with a deferred indexation of pension benefits. In addition, major wage contract renegotiations with public transportation, postal services, education, and metal-workers were postponed until after the induction into the EMU (OECD, 1997d, p. 64-65).

Major investment projects were also put on hold. Each successive budget in the run up to the EMU cut or postponed public investment programs (OECD, 1997d, p. 77). This trend was reversed in 2001 with Berlusconi's "100 day package" to promote growth which revived public works projects (OECD, 2001c, p. 34). This package reveals a measure of fiscal fatigue in Italy as tax cuts were introduced and benefits increased for lower income groups. This reflected the discontent among the population after fiscal restraints. Italy used a number of taxes that were intended to be temporary and were usually introduced once the proposed budget was overrun. For example during the budget overrun of 1992 the emergency budget called for increases in stamp duties as well as a one-off tax on real estate (OECD, 1992c, p. 123). Taxes, though not the main source of deficit improvement, were not reduced and even increased in the run up to joining the EMU (OECD, 1997d, p. 145-147). Most of the increases in taxes were mitigated soon after the advent of the EMU. In 2000 the government reduced the personal income tax rate for those in the second bracket, and also introduced a temporary (that did not stay as temporary as promised) reduction on the excise tax on oil (OECD, 2001c, p. 34).

The easiest example of a temporary measure is the Eurotax introduced in 1997 accounting for 0.6 percentage points of GDP. This was a tax which was to be refunded after the country entered the EMU. Koen and van der Noord point out that Italy was also actively employing a number of accounting tricks in the run up to the EMU which from 1993 to 1997 accounted for over 2 percentage points of GDP improvement to deficit positions. Almost 1 full percentage point of GDP of improvements in 1997 can be attributed to accounting (numerical estimations come from Koen & van der Noord, 2005). These sorts of accounting tricks have continued and Italy used temporary and one-off measures again in 2005, accounting for about 0.5 percentage points of GDP, to remain just within the SGP limit (OECD, 2001c, p. 165). The medium term plan on 2005 reduces the one-off sources of revenue by half with them completely phased out the following year (OECD, 2005b, p. 54). These temporary changes were successful in helping Italy meet its deficit requirement, but detract from what the SGP and Maastricht treaty were designed to do.

One accounting device that Italy used extensively until the loophole was covered by Eurostat was securitization. This consisted of transferring ownership of some future asset of income flow to a special-purpose vehicle which finances itself through the issuance, on its own account, of asset-backed bonds (Koen & van der Noord, 2005). Italy did this with proceeds from the state lottery and the sale of public real estate as well as overdue social security contributions (OECD, 2003d, p. 55).

Mixed

Italy's public stake in companies was high even by European standards at the start of the 1990s (OECD, 1994d, p. 53). Most of these companies were inefficient and noncompetitive without government subsidies. They also provided an immediate opportunity of revenue once they were sold. The first privatization steps were taken by Giuliano Amato and Carlo Ciampi the prime ministers in 1992 and 1993 respectively (OECD, 1994d, p. 67 and 75). In January 1992, Law 35 was passed which provided a legal basis for turning publicly run companies into join-stock corporations (OECD, 1994d, p. 149). This set a course for massive privatization which continues today. These sales played an important role in meeting the Maasticht and SGP rules. The fact that the push began in the 1990s provides evidence of a rule effect. In addition, the 2000 budget was greatly strengthened by the sale of mobile phone licenses (SourceOECD, 2007).

A technique used more so by the Italians than by any other European country as a temporary source of funds as well as a way to improve tax collection was tax amnesties. Corruption has been a continual problem, and taxes for mainly the self employed and well connected groups were never collected (OECD, 1996a, p. 90). As the events of the early 1990's revealed the need to improve the country's fiscal condition, some of the focus turned toward trying to collect taxes that were already in place. Italy introduced the first amnesty in 1994 on illegal buildings (OECD, 1994d, p. 139) and in 1995 on social security contributions and car taxes (OECD, 1995d, p. 47). In 1996 another amnesty was given on settlements followed in 1997 with an amnesty on VAT payments. Joining the union has not deterred the use of this tool and in 2001 and 2003 amnesty was again declared (Koen & van der Noord, 2005). Tax amnesties have reached a point where returns are limited and less are expected in the future (OECD, 2005b, p. 64-65).

1.4.4 Ireland

Much like Italy, Ireland has a history of substantial deficits and debt. Deficit positions began to improve in the 1980's. So much so that upon entrance to the EMU Ireland had a budget surplus and a debt to GDP ratio under 50 percent. Since joining the union, surpluses have fallen but the budgetary position remains strong.¹⁶

Ireland's budgetary problems began in the mid-1970s, during a period of strong growth. Leaders pursued an aggressive government spending program to create jobs, increase growth, and strengthen the social security system (OECD, 1975, p. 21; OECD, 1976, p. 26; OECD, 1978a, p. 19). Government consumption increased substantially, pay raises in the public sector exceeded pay raises in the private sector, and welfare payments increased 200 percent from 1972 to 1976 (OECD, 1976, p. 27). These moves took the deficit to GDP ratio from 4 percent to over 10 percent within three years. Just as the effects of these deficit positions and resultant debt began to weigh on the country the first oil shock hit in the late 1970's. The government was aggressive in its use of fiscal policy to combat the worsening economic conditions and by 1982 the deficit to GDP ratio was 13.3 percent and the debt to GDP ratio had grown to 123 percent.

¹⁶See Figure C.4 for data on budgetary positions, unemployment, and inflation from SourceOECD (2007).

This fiscal expansion, however, had little effect on the economy, as unemployment remained high and international investors began to be wary of the debt that Ireland was accruing (OECD, 1981, p. 21). Debt service payments became a major component of government spending, further aggravating the problem. By 1981, expansionary policy was officially abandoned as politicians recognized the damage the debt was having on the economy (OECD, 1982, p. 26). Though budget plans called for deficit-reducing measures, the deficit continued to worsen as there was serious overspending and insufficient tax collection (OECD, 1982, p. 29).

It wasn't until 1983 with the election of a new coalition government of the Fine Gael and Labor Party that the deficit trend was reversed. This government introduced a budget with dramatic increases in income and consumption taxes. The OECD estimated that these increases reduced the average Irish worker's disposable income by 6 percent (OECD, 1983b, p. 30). Budgets improved under this oppressive tax system for the next few years, but major strides were not made until spending could be controlled. Spending restraint began in 1987 (OECD, 1988a, p. 10) with the election of a new government and the beginning of a more stable form of fiscal governance. There was also strong political will and public support for deficit reduction and the 1987 and 1988 budget contained significant cuts in expenditure (OECD, 1989b, p. 18-19). 1987 also ushered in a period of amazing growth. Through this period growth rates hovered around 10 percent, three times the European average (OECD, 1997c, p. 11). Such rapid and unexpected growth led to repeated undershooting of budgets. Budget positions improved with modification of the tax code and favorable interest rates as a result of being a part of ERM. By the early 1990's Ireland was running a primary budget surplus. Ireland was only one of two potential members of the EMU not censured for excessive deficits by ECOFIN in 1994. By the time they joined the monetary union in 1999 their deficit to GDP ratio was 2.6 percent of GDP and the debt to GDP ratio had fallen to under 60 percent of GDP.

Joining the monetary union in 1999 provided an even greater boon to Irish growth. The initial euro exchange rate versus the dollar was favorable and was especially helpful in the export oriented Irish economy (OECD, 2001b, p. 9). In addition, fears of inflation had kept the interest rate relatively high in the run up to joining the union, but it had to fall in order to gain parity to the EMU rate. These lower interest rates further fed growth and budget surpluses. Once again, budget projections underestimated revenue and Ireland enjoyed both primary and absolute budgetary surpluses. In addition, improved tax laws and increased expenditure on education helped bring unemployment rates down from a high of 15.6 percent in 1993 to 4 percent by 2001.

In 2001, Ireland experienced its first significant worsening budgetary position since the early 1980's. A global slowdown, driven mainly by the burst of the information and technology bubble, in which Ireland was heavily invested, slowed growth to a "modest" 5 percent (OECD, 2003c, p. 9). This occurred just as policy makers began to take on heavy obligations to improve the neglected infrastructure and address wage inequality between the public and private sector. The 2001 and 2002 budget did not reflect the slow down in growth (OECD, 2003c, p. 11). As a result, revenues did not meet expectations and spending overshot, including unexpected increases in the budget for infrastructure improvement from 5.9 to 15.8 billion Euros (OECD, 2003c, p. 76). From the year 2000 to 2005 government expenditure increased 70 percent, or 31 percent in real per capita terms (OECD, 2006b, p. 140). The 2004 budget called for a slight deficit, the first planned deficit since joining the EMU, even though stronger than expected revenues led to a slight surplus.

Ireland provides an interesting case study on the effects of budgetary restrictions. The structural changes and budgetary improvement that began to take shape in the late 1980's had little to do with EMU membership but more with the unsustainable position in which they found themselves. Unlike the other countries discussed in this study, Ireland was not constrained by the deficit to GDP criterion in the run-up to the formation of the union. The Irish did, however, make a conscious effort to meet the debt to GDP threshold, and used their favorable budgetary balances to influence growth and pay down debt (OECD, 1993b, p. 45). What was sacrificed as a result of this decision was infrastructure improvements and sufficient wage increases for public employees. It was not until the National Development Plan (NDP) in 1999, the year Maastricht lapsed and the SGP came into effect, that major infrastructure improvements were undertaken and wage differentials were addressed (OECD, 2001b, p. 54). These costs have contributed to the worsening budgetary balances observed since the formation

of the union, and reflect the important effect of budgetary restrictions.

Structural Reform

Form of Fiscal Governance:

According to Hallerberg (2004),¹⁷ instability in Ireland's party systems resulted in its inability to control deficits in the 1970's and 1980's. From 1977 to 1989 the government vacillated between majority coalitions, one party majorities, minority coalitions, and minority. The budgetary process is controlled almost exclusively by members of the cabinet with a weak finance minister. Minority governments work better under a delegation form of fiscal governance, while coalition governments would do better under commitment. Yet commitment will only work in a coalition government if there is political competition and a viable exit option to keep the parties to their agreement. This was lacking during the coalitions that existed in the Irish parliament during this time. In addition, the frequent change in the party system made it impossible to institutionalize an appropriate form of fiscal governance. The result was a fiefdom form of fiscal governance and the predictable overspending and large deficits.

In 1989, newly elected Prime Minister Haughey formed a minority coalition and was able to push through important spending restrictions. Since that time all successive governments have been coalitions, which are most effectively serviced by a commitment form of government. In order for this form of fiscal governance to be effective, detailed agreements on the budgetary process must be in place. Adding program managers to the budgetary process has provided stability in making agreements. Each party in the coalition provides a program manager, who monitors budgetary agreements and is assigned to smooth out any disagreements before the budget is presented to the cabinet. Though coalition governments continue to rise and fall, the role of budgetary program managers have remained the same, bringing vast improvement to the monitoring and implementation of budgets.

These changes start pre-Maastricht and were driven by the dire deficit position that Ireland found herself in, as well as electoral pressure. Yet the deficit rules in place under Maastricht

 $^{^{17}\}mathrm{Facts}$ for the next two paragraphs come from pages 197-204

and the SGP make it much easier for coalition governments to operate by providing an external deficit rule.

Tax Reform:

In order to address the worsening debt crisis, the 1983 budget contained substantial income and consumption tax increases, with little change in expenditure. In 1983, tax revenue was 43 percent of GNP, and was disproportionately born by the Irish worker. Marginal tax rates for the average industrial worker rose to 63.5 percent for single persons and 43.5 percent for married persons with two kids. Average tax rates rose 7 percentage points from 1979 to 1983. Social insurance charges rose from 7.5 percent to 11.5 percent over the same period. Indirect taxes rose enough to increase the price level by 13 percent (OECD, 1983b, p. 30). Yet corporate taxes remained one of the lowest in Europe and property tax remained zero. This tax structure made Ireland very attractive to foreign investors and was instrumental in the boom that was to come. The tax increase did stop the continual worsening of deficit positions, but it was very narrow and the high marginal rates along with a generous unemployment plan adversely affected incentives to work. Even with the boom in the 1980's and 1990's unemployment remained one of the highest in Europe.

After years of strong growth and healthy revenue collection along with a commitment to rein in expenditure starting in 1987, Ireland began to reform the tax system.¹⁸ Tax changes were packaged in Ireland's social consensus model of wage setting. Starting in 1987, the government negotiated with labor leaders to insure moderate wage increases in exchange for tax reductions (OECD, 2001b, p. 50). These agreements helped the government decrease taxes with less inflation. They also led to an improvement in the tax system. Even as tax rates fell, revenues continued to increase. The 1986-87 income tax cuts were enough to reduce revenue by 439.25 million Irish pounds, yet in 1988 tax revenue as a whole was much greater than originally estimated and the deficit positions improved immensely (OECD, 1988a, p. 71). Tax reform continued through the 1990s, though the focus turned from reducing marginal tax rates to reducing average tax rates and using the tax code to increase incentives to work. By 1994,

¹⁸See Figure C.4 for trends in receipts and disbursements for Ireland

after almost 10 years of strong growth, the unemployment rate was still one of the highest among OECD countries (OECD, 1994c, p. 42). Changes in the tax code in the 1990's were also designed to broaden the tax base, by reducing some exemptions and raising non-income taxes. Unemployment finally began to fall in the 1990's and by the time Ireland joined the EMU it was under 5 percent.

The process of income tax reduction and restructuring of the tax code proceeded as Ireland was preparing to join the EMU. The budgets of 1997 and 1998 had tax cuts worth 0.9 billion Irish pounds, but deficits still fell as a result of tax revenues being 1 billion Irish pounds more than expected for each of those two years (OECD, 1999c, p. 84-85). The social partnership agreement for 2000 to 2003 continued to promise income tax reductions, but by 2003 tax cuts began to slow (OECD, 2003c, p. 42).

The massive tax overhaul taken from 1986 to the present has little to do with Maastricht or the SGP. The government began the process as early as 1980. Improvements to the tax structure have widened the base and discouraged tax evasion. This along with strong economic growth led to improved budgetary positions through the process of tax reductions. The SGP may begin to play a bigger role as budgetary positions worsen.

Pension Reform:

Ireland has favorable demographics compared to the rest of Europe. A mini baby boom in the 1970's has delayed the social security crisis in relation to other European countries (OECD, 1999c, p. 120). A 2003 projection suggested that under current policies the aging population alone would bring the deficit to GDP ratio to 3 percent by 2050 (OECD, 2003c, p. 44). Though this is a much better projection than most European countries, action was taken in 1999 and 2000 to increase contributions and create the equivalent of an IRA account (OECD, 2001b, p. 14). Little else has been done to address this issue, and the SGP has played little or no role in any changes that have been made.

Healthcare Reform:

The rising cost of healthcare has been less of a drag on Irish budgets compared to the rest of Europe, as it is a mixed private and public system (OECD, 1997c, p. 150). Most reforms have focused on improving the efficiency of the public health system (OECD, 1999c, p. 122), but reform in this area is less than most other countries in Europe.

Labor Reform:

Ireland has had some of the highest unemployment rates among OECD countries. From 1974 to 1997 it was above 8 percent and got as high as 16.8 percent in 1985. Unemployment remained above 10 percent through the early 1990's even with growth above the OECD average (SourceOECD, 2007). Irish policy makers used tax laws and spending on education to influence the structural level of unemployment. The tax changes explained above were effective in increasing the incentive to work and thus increase labor force participation rates and bringing down structural unemployment. Ireland now enjoys below European average unemployment.

Increased expenditure on education and training has also played a key role. Irish educational attainment does not match the high skilled labor needed in Ireland (OECD, 1995c, p. 54). Using recommendations from the commissioned National Education Convention in 1993, spending was allocated to improve the quality of schools, increase participation, and focus on training (OECD, 1995c, p. 91). The 1993 budget provided money for apprenticeships, vocational training, and employment training schemes. From 1993 to 1999, measures were passed to increase secondary school completion and third-level school enrollment, as well as making it easier to get vocational and on the job training (OECD, 1997c, p. 95). Almost every subsequent budget has provided something to enhance the competitiveness of its work force (OECD, 1999c, p. 123; OECD, 2001b, p. 74).

Nonstructural/Temporary Changes

Ireland did not have to scramble to meet the deficit requirements of the Maastricht treaty. They did, however, have a high debt to GDP ratio which in 1994 was still 90 percent. Beginning in 1993, each budget plan issued by the government cited meeting the Maastricht debt criteria as its goal (OECD, 1993, 1995, 1997, 1999). Though Ireland did use spending/hiring freezes as well as a temporary tax in 1983 and 1993 to stop the deficit bleeding (OECD, 1983b, p. 38), none of these techniques were used in the run up to joining the union nor were they needed. In fact, one major one-off measure cited by Koen and van den Noord (2005) undertaken in 1999 actually worsened short-run budgetary positions for a favorable position down the road.

Once Ireland was in the union with a sustainable debt and strong budgetary position, cracks began to appear after years of neglect. One of the first expenditures cut when the government started to fight deficits in the early 1980's was capital and infrastructure improvement. The 1987 budget significantly reduced capital expenditure (OECD, 1989b, p. 18-19). Infrastructure improvement and capital expenditure did not receive attention again (except for allotments in 1994 to maintain infrastructure and a 1995 budget item for capital spending (OECD, 1995c, p. 119)) until the National Development Plan (NDP) in 2000. The plan included funding for housing, national roads, public transportation, water and waste treatment, as well as health facilities (OECD, 2001b, p. 54). The cost of this plan continues to rise from an initial estimated cost of 5.9 billion euros when it was first formed to 24.1 billion euros by 2005 (OECD, 2003c, p. 76; OECD, 2006b, p. 92).

Years of thrift have also led to a loss of competitiveness in public sector wages. Wages have not increased in comparison with private sector wages, leaving vacancies and difficulty in retaining employees (OECD, 2001b, p. 68). It wasn't until after joining the union that significant funds started being put into wages for public employees. These delayed infrastructure projects and wage equalization have contributed to the worsening balance since the formation of the union. They can be contributed in some part to decisions made in an attempt to use surpluses to pay down the debt to meet the Maastricht criteria.

Mixed

Public ownership in Ireland has been and remains high. Ireland has maintained its presence in energy, steel, transport, communications, banks, and insurance. These publicly owned businesses performed well enough in times of prosperity that subsidies and business debt fell (OECD, 1993b, p. 90). This, along with strong budgetary positions, has limited the call for any privatization. Government officials have, on the other hand, tried to improve the performance of these businesses through deregulation and state sanctioned competition. For example, the national telephone service is regulated only in the price that it charges. In an attempt to improve prices and customer service in air transportation, the government licensed a second carrier to compete with the original air service (OECD, 1993b, p. 95). The fact that Ireland did not privatize provides evidence that binding Maastricht and SGP rules have contributed to the privatization seen in other countries.

With its steep marginal tax rates and high average tax rates on income in the late 1980s, tax evasion was an issue. Along with the restructuring of the tax system which starting in 1987, the government issued a tax amnesty. This tax amnesty was more successful than expected and contributed greatly to the improved budgetary position in 1988 (OECD, 1989b, p. 18). Tax amnesties have been used on and off since 1984, the most recent in 2002 (Koen and van der Noord, 2005). Maastricht seems to have played no role in the tax amnesty, as it was part of the tax reform package introduced in order to create a more effective tax system, but it has been useful in improving deficit positions.

1.4.5 Spain

When General Francisco Franco died in 1975 after 35 years of dictatorial power, the share of government to GDP was comparatively small, only 25 percent (Hallerberg, 2004). After General Franco's death in 1975, Spain transitioned to a parliamentary democracy. The restructuring of the political system came at turbulent time in the world economy. Oil shocks and the resultant worldwide recession hit Spain hard. Spanish protected sectors' weaknesses were revealed and the political restructuring slowed the response by political leaders (OECD, 1979, p. 5). Unemployment became a major issue rising from 4 percent in 1976 to a peak of 17.8 percent in 1985 and 19.1 percent in 1994. The rate remained above 10 percent until 2005, including periods of strong economic growth. Strong wage and labor rigidities inherited from General Franco's policies reinforced this high level of structural unemployment (OECD, 1994c, p. 53). Inflation also spiraled out of control, reaching 23 percent in 1977.¹⁹

The post-Franco government significantly expanded the welfare state, increasing the government's share of GDP to 44 percent by 1990 (Hallerberg, 2004, p. 212). Leaders did attempt to raise revenues enough to meet the increased spending, but budgetary slippage and periods

¹⁹See Figure C.5 for data on budgetary positions, unemployment, inflation, and growth from SourceOECD, 2007

of slow growth caused a worsening of deficit and debt positions. Fiscal policy was expansionary in the early 1980s in an effort to combat high unemployment, but proved to be ineffective and deficits grew to 6 percent of GDP in 1982. The Socialist Party won power in 1982 and maintained a majority through 1993. Key to their economic plan was controlling the deficit and inflation. Spain entered a period of strong economic growth and their efforts, along with tight monetary policy, did bring inflation down from its high in 1977 to less than 5 percent by 1993. The government, however, was unable to control deficit positions as well as they had hoped. Stronger economic conditions in the 1980's led to improved deficits, but budgetary goals were unmet as each budget had significant overspending. By 1993, economic downturn, overspending in social security and by the regional authorities, as well as fiscal slippage due to overruns in preparation for the 1992 Barcelona Olympics and the Seville World Expo pushed the deficit to GDP ratio up to 7.3 percent (OECD, 1991b, p. 35).

1993 marked the low point in Spain's fiscal balances. Since then budgetary positions have improved to the point at which Spain now has a budget surplus. The turn around was influenced greatly by the deficit restriction included in the Maastricht treaty. The Socialist party lost its majority in the 1993 elections, but retained the premiership in a minority government. With a public mandate, they passed the Convergence Program for 1992-1996 with a clear goal of reaching the deficit criteria by 1996. Slowly structural reforms were introduced and the deficit improved to 1.43 percent of GDP in 1999 when Spain joined the EMU.

The dramatic improvement in the deficit was also aided by a period of strong economic growth and favorable debt servicing conditions. In addition, there is evidence that a number of temporary adjustments and changes were used to insure that the deficit to GDP criterion was met. However, unlike all the other members of the EMU, Spain has not experienced a worsening of deficit positions since joining. In fact budgetary positions have continued to improve. The Maastricht treaty has played an important role in the improvement of the structural budgetary position in Spain. The reforms which began in an attempt to meet the Maastricht deficit threshold will make it easier for Spain to remain within the SGP deficit limits while it addresses future budgetary problems.

Structural reform

Form of Fiscal Governance:

Hallerberg (2004)²⁰ classifies Spain as a fiefdom from 1977 to 1993. The Socialist party held the premiership and a majority government from 1982 to 1993. This type of government is best suited for a delegation form of fiscal governance. The Spanish Constitution, written in 1978, instituted a delegation form of fiscal governance by giving formal budgeting power to the Minister of the Economy and Budget. In practice, however, this minister wields very little power over the budget. Without clear oversight, budgets continually suffered from fiscal slippage.

In 1993 the Socialist Party lost its majority, but maintained a minority government. Prime Minister Gonzalez turned his focus toward meeting the Maastricht criteria and the Minister of Economy and Budget was given increased power and support to influence the budget. In the 1996 elections the Popular Party won the right to lead as a minority government. The new leadership institutionalized the Minister of Economy and Budget's power when Rodrigo Rato Figaredo was appointed vice-prime minister and given power to negotiate budgets more fully. Parliament's ability to overrule him was also greatly reduced. Thus the delegation form of fiscal governance came in a time of minority governments when consensuses would have theoretically worked better. Nonetheless, budgets improved as expenditure was reined in and revenues increased. Since the 2000 election the government has been run by the majority, first by the Popular Party and then by the Spanish Socialists' Workers Party. This particular type of government makes the institutionalized delegation form of fiscal governance more effectual.

Spain's budgetary position was also greatly improved by another important change in the budgetary process. Regional government overspending contributed to the worsening deficit position, as their deficits were financed by the central government (OECD, 1993c, p. 74). Through the 1980s and 1990s regional governments were given an increasing larger role in administering welfare, education, healthcare, etc. As part of the Convergence Program for 1992-1996, regions agreed to deficit reductions and co-ordination between the central and

²⁰Facts for the next two paragraphs come from pages 212-214

regional authorities was improved (OECD, 1993c, p. 75; OECD, 2005c, p. 75). In addition, regions were granted greater control over revenue collection in their particular region. Regions followed through with their promises and budgetary positions improved by freezing hiring, curtailing investment, and keeping wage increases low, though there was still some slippage.

The decentralization was enhanced in 2002 when regions were given even more control over spending and tax collection and Spain became the most decentralized country in the OECD (OECD, 2003e, p. 11). To help control regional spending and maintain the advances made in budgetary positions, the Fiscal Stability Law was drafted in 2001 to be implemented in 2003. This was in essence a stability and growth pact for the regions as well as the central government. The law imposed balanced budgets at all levels of government. Plans must be presented before any budget can pass and Parliament sets expenditure growth limits before the budget is formulated (OECD, 2001d, p. 53). This law was amended in 2003 to take into account cyclical positions, but has continued to play an important role in Spain's strong budgetary position (OECD, 2007b, p. 107).

Changes in fiscal governance and the relationship between central and regional authorities had been greatly influenced by the Maastricht and SGP deficit restrictions. These changes have had a positive impact on budgetary positions, specifically by controlling overspending at the regional and general level. It promotes surplus building in times of strong growth to avoid bumping up against the SGP deficit restriction in unexpected downturns. It also promotes public saving and could lead to stronger incentives to address structural changes to potential budgetary problems in the future, such as the aging population.

Tax Reform:

The tax system in Spain has been subject to continual revisions since 1975. The massive increase in spending which occurred in the building of the welfare state post-Franco required a large increase in revenue. At the end of General Franco's reign there was very little income tax and spending was funded mainly by regressive indirect taxes and social security contributions (OECD, 1978b, p. 35). In 1977, major tax reform introduced personal income taxes as a main source of taxation (OECD, 1979, p. 37). Measures to implement a VAT were introduced in 1980 and by 1985 it was instituted, increasing indirect tax collection (OECD, 1986b, p. 16).

These changes were needed to keep up with the increases in expenditure, but they also shifted a strong burden on those who paid taxes, specifically the Spanish working class (OECD, 1988b, p. 67).

Focus shifted towards creating a simpler and broader based tax system in the early 1990's. A major tax reform in 1991 broadened the tax base and cut high marginal rates (OECD, 2000d, p. 103). In light of the improved budget positions after 1993 and high structural unemployment, tax reforms since late 1990's have focused on improving the efficiency of the tax laws, overcoming perverse incentives, and encourage labor force participation. Simplicity has also been a goal in order to reduce tax evasion (OECD, 2000d, p. 95-110). Reforms in 1998, 2003, and 2007 have all reduced tax burdens and simplified the tax system (OECD, 2000d, p. 103; OECD, 2003e, p. 192; OECD, 2007b, p. 113).

Deficit restrictions have had a limited role in influencing the timing of these tax reforms. Early reforms were necessary to keep up with expanding expenditure and were instituted before restrictions existed. The later reforms were designed to adjust incentives and bring down structural unemployment. Tax reductions have not adversely affected the budgetary positions, as the implied elasticity of tax revenues has been above one (OECD, 2007b, p. 67). Tax cuts have increased revenue as compliance has increased and non-indexation of brackets has allowed natural increase in revenue. Major tax reductions were reserved until after admittance to the EMU had been insured. The existence of the Fiscal Stability Law has insured that these tax cuts are covered by spending reductions.

Pension Reform:

Starting in 1977 social security benefits (of which pension payments are the largest component) grew 28 percent a year until 1983 and the ratio of recipients to contributors grew from 37 percent to 46 percent (OECD, 1984, p. 41). The increase was slowed with reforms in 1984 and 1985, but remained very generous. Spain has the second highest replacement ratio of all Europe at almost 100 percent of income from the pensioners last 8 working years (the average for the EU is 65 percent calculated over lifetime earnings (OECD, 1989c, p. 55)). The retirement age has been traditionally low and in 1996, the average age of a new pensioner was 62. Spain has a fairly favorable demographic, which had delayed the budgetary pressure that comes from an aging population, as well as the urgency in reforming the pension system (OECD, 2001d, p. 100). Yet pensions did receive attention in the 1995 Toledo Pact. This law which went into effect in 1997 attempted to address some of the potential pension problems, but was vague and mainly identified pension reform as necessary (OECD, 2001d, p. 107). Piecemeal change has occurred in the last few years. The minimum eligibility age has been raised to 61, incentives to work beyond 65 have increased, and the system has improved oversight (OECD, 2007b, p. 56). The government is also taking advantage of its strong budgetary position and accumulating a surplus in the social security balance. Deficit restrictions have not played a role in pension reform to this point, but the stringent fiscal stability law will force policy makers to address the issue before they bump up to the SGP threshold.

Healthcare Reform:

Spain's expenditure on healthcare is similar to other OECD countries, and health outcomes are strong (OECD, 1996b, p. 95). Significant changes in public healthcare came in 1986, when coverage was expanded to cover all low income groups (OECD, 1986b, p. 57). This is financed by both social security taxes and state transfers. The rising costs of healthcare as well as expanded healthcare coverage had contributed to regional deficits. Part of the solution has been greater decentralization. By 2002 all healthcare service management was transferred to the regions as well as greater autonomy in raising funds (OECD, 2003e, p. 11). Balanced budget laws have forced regions to address deficits by increasing revenue and experimenting with healthcare alternatives. In Cataluna public hospitals link pay to productivity, Andalucia has experimented with increased public hospital competition, while the Basque region has experimented in reducing prescription drug prices (OECD, 1998, p. 77). Deficit restrictions did play a role in the central government turning over management of healthcare to the regions.

Labor Reform:

Over the last 30 years, unemployment has been one of the highest in the OECD. In 1975, the unemployment rate was only 3.7 percent, but by the mid to late 1980s it was well over 10 percent. Three important features contributed to the persistently high levels of unemployment. First, the majority of wage negotiations are done at the regional level by lawyers who are more interested in legal issues than adjusting to economic conditions. Second, a system of very protective measures for permanent workers has been inherited from General Franco's system which compensated for low wages. Firms therefore have very low incentive to hire permanent workers; in 2003 30 percent of all employees were temporary. Third, the unemployment insurance system is very generous, reducing the incentive to find work (OECD, 1994e, p. 68-78).

The high level of unemployment causes a large fiscal drag. Just prior to reforms in 1992, transfer payments for unemployment benefits and sick leave pay grew 21 percent (OECD, 1994e, p. 79). Reform of the labor market was one of the first challenges addressed with the commitment to meet the Maastricht treaty, and in 1992 the first major reform was introduced. Eligibility was tightened, while benefits were lowered and subject to taxation. Measures were passed to ease work hour limits, make it easier to change working conditions and layoffs of a small number of workers. In 1997 the labor market reform was extended (OECD, 1998, p. 64) and Spain began to experience a gradual reduction of unemployment. The 1997 reform was extended in 2001 and focused on reducing the costs of firing permanent employees and discouraging the hiring of temporary workers (OECD, 2001d, p. 165). Unemployment insurance was also further adjusted to reduce the disincentives to work. Tax changes in this period were also designed to encourage labor force participation. The 1997 reform also included measures to enhance the flexibility of wages and labor cost by decentralizing wage bargaining. Reforms continued in 2006, where successive uses of temporary contracts were restricted (OECD, 2007b, p. 54). Unemployment finally fell below 10 percent in 2005 and continues to improve.

Deficit restrictions played an important role in inducing labor reform. The drag which the unemployment rate had on the budgetary balances made overcoming it a priority once Spain committed to meeting the Maastricht criteria. The results have been promising, as structural unemployment has fallen and the labor market has improved.

Nonstructural/Temporary Changes

From 1993 to 1999 the deficit fell 5.77 percentage points of GDP. Structural reforms, strong growth, and a falling rate on debt servicing played a significant role in the improvement of

budgets over this time period, but the 3 percent deficit to GDP threshold was not obtained without temporary adjustments.

The 1994 budget slashed government discretionary spending a whole percentage point of GDP (OECD, 1996b, p. 23). This action included reductions in capital spending as well as a freeze on all public sector wage increases (OECD, 1994e, p33). Massive privatization was also undertaken in 1995, the revenue of which was projected to finance 6 percent of the deficit (OECD, 1996b, p. 28). From 1995 to 1997, 1.5 percentage points of the reduction of the deficit to GDP ratio came from restrictions on government consumption, while 0.75 percentage points came from improved interest rate and cyclical positions (OECD, 1998, po. 46).

The 1997 budget again contained deep cuts in discretionary spending. Public wages were frozen and only one in every four public employment vacancies were replaced. In addition, from 1995 to 1997 public investment fell 1.2 percentage points of GDP (OECD, 1998, p. 49). Part of this reduction was due to the way investment projects were financed. From 1997 to 1998 the government shifted payment on all investment projects to when they were completed. Approximately 160 billion pasetas worth of projects were signed in 1997 under this delayed payment agreement (OECD, 1998, p. 50). Several accounting techniques were also employed in the 1997 budget. All current and capital transfers to public enterprises were financed off-budget by privatization receipts and profits of the few solvent public firms. The OECD estimates that moving transfers off budget and delaying payment of projects accounted for 0.75 percentage points of GDP (OECD, 1998, p. 50). Koen and van der Noord (2005) show how one-offs, creative accounting, and classification errors accounted for a 1.2 percentage point improvement in the deficit to GDP ratio from 1995 to 1997.

Spain's temporary adjustments, unlike other EMU members, have not led to worsening budgetary balance upon entrance to the EMU. The 1999 and 2000 budget did increase public expenditure in investment projects including steep increases for research and development (OECD, 2000d, p. 43). The 2004 budget had a spending overrun partially due to the reincorporating capital transfers to public enterprizes (OECD, 2005c, p. 71). The returns from the structural reforms undertaken and a strong economy have overcome the problems associated with temporary adjustments. In addition, the Finance Stability Law has imposed discipline on budgetary planners. The lack of significant temporary adjustments since joining the EMU to meet the self-imposed stringent deficit rule reflects stronger structural positions.

Mixed

The size of the public sector (as far as ownership of firms) is modest in European terms but its share in the "mixed economy" (including transfers and subsidies to firms) was second only to Italy until the 1990's (OECD, 1988b). Subsidies, transfers, and mounting losses in public firms contributed to worsening budgetary positions. By 1983 losses of public non-financial enterprises were just over 1.5 percent of GDP (OECD, 1986b, p. 35). These losses and the lack of competitive pressure led to some restructuring and privatization by 1986. Privatization from 1986 to 1992, however, only involved four publicly owned firms and was relatively small (OECD, 1998, p. 87).

Rising labor costs and a weakening economy again led to major losses in publicly owned firms, causing significant worsening of budgets in the early 1990's (OECD, 1992d, p. 51; OECD, 1993c, p. 46). As part of the Convergence Program for 1992-1996 the National Institute of Industry (INI), a public holding group that controls most of the public sector firms, was restructured, distancing it from the state budget and giving it restructuring power (OECD, 1992d, p. 52). The decision was made to partially privatize and from 1993 to 1995 707 billion pesetas worth of publicly owned firms were sold (OECD, 1998, p. 87). The government also moved toward improved competitive measures by liberalizing prices and lifting barriers put up by professional organizations in both the private and public sector (OECD, 1993c, p. 48).

In 1996 the government announced the Modernization Program to improve the competitiveness of state owned firms through privatization of profitable firms and restructuring then privatization of the non-profitable firms (OECD, 1998, p. 96). In 1996, 331 billion pesetas worth of publicly owned firms were sold and in 1997 2123 billion pesetas worth were sold (OECD, 1998, p. 87). The revenue from these sales greatly improved the budgetary position in the run up to joining the EMU, but also improves future budgetary positions by removing the subsidies and transfer payments to ailing firms. The timing of the privatization indicates that deficit restrictions did play an important role.

1.5 Conclusions

The Maastricht treaty and the SGP have played an important role in inducing structural changes to budgets across the EMU. Appendix A summarizes the structural changes undertaken by the countries in this study. France, Germany, Italy, Ireland, and Spain all have instituted major structural changes since the signing of the Maastricht treaty. Though some of these changes may have occurred had there not been any deficit restrictions, their timing suggests an important role. The numerical nature of the restrictions, however, has resulted in temporary movements which have had little or no effect on the structure of deficits and often detracted from the structural changes which were being undertaken. The temporary measures used by each country are summarized in Appendix B. France, Germany, Italy, and Spain all employed temporary measures to assure they met the 3 percent deficit to GDP threshold before entrance into Stage III of the EMU. The use of these temporary measures has tapered off under the SGP, and even those undertaken have not prevented France, Germany, or Italy from violating the SGP. These countries continued with often costly structural reform with less regard for the numerical restrictions of the SGP.²¹

Ireland and Spain have stayed within the bounds of the SGP. Ireland's strong budgetary surpluses are a result of favorable cyclical positions as well as structural improvements to its tax structure. The Irish example is more in line with what the SGP was designed to induce; a strong budgetary position that could be drawn upon without large deficits in times of economic downturn or structural readjustment. Spain, on the other hand, has adopted its own balanced budget law which is more stringent than the SGP. Their strict adherence to restrictions since its implementation provides an example of how deficit restrictions can work in inducing structural changes to improve future budgetary positions.

Recent changes to the SGP have alleviated some of the problems that were associated

 $^{^{21}}$ Germany however has aggressively returned to strong budgetary positions with spending restraint and renewed taxation since 2006 and 2007

with the strong numerical restriction. The 2005 reforms maintained the numerical restriction but put more emphasis on medium term objectives (MTO). Members must report their MTO which are subject to approval and recommendation by ECOFIN. Under the new SGP, deficits can exceed the 3 percent threshold if the structural changes included in the MTO justify such a position, taking cyclical condition into consideration (Buti, 2007). These changes reduce the need to rely on temporary budgetary tricks to meet an arbitrary restriction, yet encourage structural adjustments. The problem still remains, however, that the new SGP does not have a credible enforcement mechanism. Improvements such as those proposed by Begg and Schelkle (2004), who suggest that the problem of enforceability could be overcome with voting restrictions instead of pecuniary fines, could overcome this problem. The loosening of the deficit restrictions and the difficulties in enforcing the SGP could make moral hazard and a possible shift back to deficit biases a reality. It is still too soon to evaluate the role the new SGP will have on deficit positions in the EMU.

Chapter 2

Worsening Budgetary Balances: Fiscal Management or Fiscal Fatigue

2.1 Introduction

The European Monetary Union (EMU), established in 1999, is a grand experiment in economic integration. In many aspects, the monetary union has surpassed the expectations of its original framers. This success has attracted the attention of many other countries whose desire to join the monetary union has led to its continued expansion. In May 2004, the European Union (EU) was expanded to include many countries in Central and Eastern Europe. In 2007, the EU expanded again to include Bulgaria and Romania. In joining the EU, each of these countries agreed to eventually join the monetary union.

In spite of the continued expansion and seeming success of the EMU, there are unification issues that have not been completely resolved. One that has received attention is the role of government budgetary restrictions designed to keep deficits under control. Figure 2.1 illustrates the evolution of deficits for the current EMU members. There is a long period of deficit expansion in the late 1970s and early 1980s. This was a period of general economic unrest and expansion of the government's role in welfare and production across Europe. Deficits fell dramatically in the 1990s. This reduction coincided with the signing of the Maastricht Treaty, which stipulated that deficits must be within 3 percent of GDP before admittance into the future EMU. Since the creation of the EMU in 1999, there has been a noticeable worsening of

Figure 2.1: Deficit to GDP ratio 1964-2006



deficit positions. The deficit restrictions stipulated in the Maastricht Treaty were maintained in the Stability and Growth Pact (SGP) which came into effect with the formation of the Union.

The worsening of deficit positions and subsequent violation of the SGP deficit threshold by some has caused discord among members. As a result, there has been continual pressure to modify the SGP and loosen deficit restrictions. As the SGP comes under increased pressure, it is important to understand why budget positions have deteriorated. The reversal in the direction of fiscal balances within one year of the creation of the EMU suggests that the explanation lies in some feature of the monetary union. Understanding how the monetary union has modified the role and preferences of its policy makers is essential to evaluating deficit positions and restrictions. This paper addresses the possible explanations for the apparent loss of fiscal austerity as a result of becoming a member of the EMU. By expanding on Uhlig's (2002) New-Keynesian micro-foundation model of policy interaction and applying it both pre- and post-monetary union, two possible explanations for worsening balances are identified. First, fiscal balances may be worsening as a result of a country's increased reliance on fiscal policy to manage economic fluctuations. Increased reliance on fiscal management would be needed if 1) shocks are asymmetric across members of the EMU, 2) the policy weights of the monetary authority have changed pre- and post-EMU, or 3) the interaction between authorities has changed. In these cases an economic downturn could make the SGP overly binding. Second, member countries may have experienced "fiscal fatigue", or what Hughes-Hallet and Lewis (2004) refer to as post-entry fatigue. This fatigue is the loss of political will to maintain the strong fiscal stances taken in the run up to the formation of the union. If this is true, then there is reason to maintain and possibly strengthen the SGP.

In order to test for shock asymmetry across members, the structural shocks must be identified. A structural VAR with long-run restrictions can be used to identify aggregate supply and demand shocks. Long-run restrictions for shock identification were introduced by Blanchard and Quah (1989). Bayomi and Eichengreen (1993) use this technique to test shock symmetry across Europe before the union was formalized in 1991. Extending this analysis to include current data, this paper finds that structural shocks are similar across EMU members.

This paper also tests whether monetary and fiscal authorities have changed the way they have reacted to fluctuations in the economy as well as to each other as a result of joining the EMU. A panel VAR is used to estimate the reaction functions of the monetary and fiscal authorities pre- and post-EMU. Using contemporaneous restrictions introduced by Blanchard and Perotti (2002) to identify fiscal shocks and extended by Perotti (2002) to include monetary shocks, the structural impulse response functions are compared pre- and post-EMU. The results of this estimation indicate that the conduct of stabilization policy has changed little since the formation of the EMU. It also indicates that the change in the response of the monetary authority to fiscal shocks lessens the need for fiscal intervention. Fiscal movements, on the other hand, have become more deficit biased since the advent of the EMU, indicating the existence of fiscal fatigue.

Section 2.2 explains the motivation for and experience with deficit restrictions in the EMU. In Section 2.3 a model of monetary and fiscal policy interaction is constructed that explores the possible reasons for worsening budgetary balances in the EMU as a result of becoming a member of a monetary union. Sections 2.4 and 2.5 contain the empirical tests of the possible causes of worsening budgetary balances. The conclusions are presented in Section 2.6.

2.2 Deficit Restrictions

The Maastricht Treaty and the SGP were designed to protect the EMU from an individual member's deficit-induced economic crisis. One member's economic crisis has an immediate effect on all other members through changes in the value of the common currency. In addition, the risk of contagion increases with greater integration. The cost to the whole union of one member's mismanagement is high enough that the European Central Bank (ECB) or other members have an incentive to bail out members whose economic situation has become dire. Therefore, being a member of a monetary union in which members maintain fiscal control presents a moral hazard. Specifically, there exists an incentive for governments to spend or tax to appease domestic political demands, thus maintaining riskier budget positions with less concern for the deficit and accumulating debt. The deficit bias which has existed in much of Europe since the 1970s makes this threat even more real. The framers of the EMU determined that the best way to prevent such action was through monitoring government budget deficits and debt levels (Alesina and Perotti, 2004). By placing an enforceable rule on the size of the government deficit and debt, the ECB¹ or other members would not run the risk of having to bail out a country that had accumulated an unsustainable level of debt.

Both Maastricht and the SGP specify that member countries must maintain a deficit to GDP ratio under 3 percent and a debt to GDP ratio under 60 percent, except when the country experiences a strong economic downturn (a drop in GDP exceeding 2 percent). The difference

¹The charter of the ECB has a provision that prevents the ECB from bailing out any member, but it is up to debate if they would abide by this rule if the situation were serious enough.

lies in the enforcement of the deficit rule. The punishment for not meeting the Maastricht criteria was exclusion from the EMU. This threat was carried out on Greece, which had to delay entrance until it was able to bring its deficits under control. Under the SGP, exclusion is not a viable option, instead the EMU has a committee (ECOFIN) made up of representatives from each country in the union that monitors the fiscal positions of each member. If a member is found to be violating the SGP then they can be fined.

As figure 2.1 illustrated, deficits were reduced across all EMU candidates in the few years preceding the advent of the common currency. Every country managed to meet the Maastricht deficit criterion before joining the EMU. However, under the SGP and a weaker enforcement mechanism, deficits begin to rise and surpluses begin to fall. After 2000 there is only one country, Spain, which has not experienced some worsening of its balance.

The worsening of fiscal balances has been severe enough that a number of countries have violated the SGP deficit threshold. Table 2.1 shows the countries that have violated or currently are violating the SGP.

| Country | Years of Violation |
|-------------|--------------------|
| Germany | 2003-2006 |
| France | 2003-Present |
| Italy | 2003-Present |
| Netherlands | 2004-2005 |
| Portugal | 2002; 2005-Present |
| Greece | 2003-2006 |

Table 2.1: Stability and Growth Pact violations

Source: Public finance in the EMU - 2006 (European Commission, 2006)

France, Germany, and Italy, all major players in the creation of the EMU and its largest members, are among the notable offenders.

The inability of ECOFIN to enforce the SGP^2 and pressure from the violators has led to changes in the rules. These changes came on March 20th, 2005. They allowed a member to

 $^{^{2}}$ For a summary of the SGP action (or better yet inaction) in response to growing deficits see de Haan, Berger and Jansen (2004)

exceed the 3 percent deficit limit if it can be shown that the excessive deficit was the result of international aid, economic reform, European unification, or pension reform. This concession was agreed to by the more hawkish countries only if the deficit to GDP ratio is slightly and temporarily above 3 percent.

The ineffectiveness of the SGP has strained relationships across the union while its subsequent softening has weakened its ability to overcome the moral hazard problem and deficit biases. Some have argued that the SGP should be further softened as it does not allow enough room for counter-cyclical fiscal policy or continued restructuring. Others see the violations as a reversion to deficit biases and a lack of political will to confront the problems the SGP was set out to overcome.

2.3 Causes of Worsening Balances

While a weakened enforcement mechanism makes it easier to violate deficit restrictions post-EMU, there are different reasons why a member may loosen its fiscal stance as a result of joining the monetary union. The most obvious change for members pre- and post-EMU is the loss of the ability to conduct independent monetary policy. As the member turns over control of monetary policy to the ECB, the relationship between monetary and fiscal authorities could change. It is possible that this change could lead to greater reliance on fiscal policy in a monetary union and subsequent counter-cyclical deficit spending in order to contain output and inflation fluctuations. A model of the relationship between monetary and fiscal authorities and how this relationship changed once in a monetary union will demonstrate possible pitfalls.

Early models of monetary and fiscal interaction represent the fiscal authority as solely a provider of public goods with a limited role in stabilization. Dixit and Lambertini (2001) focus on the counter-cyclical role of fiscal policy as well as the interaction between the central monetary authority and the independent fiscal authorities in the European Monetary Union (EMU). The model they use to represent the economy is non-standard, but they find important differences in how the authorities act pre- and post-EMU. Uhlig (2002) presents a New-Keynesian macroeconomic model to assess the dangers of coordination failure in the EMU. Van Aarle, Gerretsen, and Huart (2004) assume a similar model to simulate how different weights in policy functions for fiscal rules can cause nominal divergence.

Empirical tests of the relationship between monetary and fiscal authorities have been carried out by Muscatelli, Tirelli, and Trecroci (2003). Using data from the United States, they find that monetary and fiscal authorities move in similar directions after an output shock. However, in the face of policy or inflation shocks, policy makers move in opposite directions, with fiscal policy being more inflationary.

For this representation a New-Keynesian macroeconomic model similar to Uhlig (2002) is used, but unlike Uhlig the change in the relationship pre- and post-EMU is represented. A typical model with Calvo sticky prices, no capital, and a role for government is used. Following the micro-foundations of such models, the household's optimization conditions, the firm's optimization decision, and the market clearing conditions are used to model the economy. In order to provide a tractable solution and clear illustration of the changes in how fiscal and monetary authorities interact pre- and post-EMU, a non-dynamic version of the model is used. Using these conditions the log linearized IS and Phillips curves for each country (i) can be represented by

$$y_i = -a_i(i_i - \pi_i^e) + b_i(g_i) + v_i \tag{2.1}$$

$$\pi_i = \pi_i^e + \kappa_i y_i + u_i \tag{2.2}$$

where y is the output gap, i is the nominal interest rate, π is inflation, π^e is expected inflation, v is an IS shock, and u is a supply shock (where a positive shock is inflationary; consistent with a negative supply shock or some cost-push shock). g represents government deficits and so an upward movement in g causes an increase in output and a worsening of budgetary positions.

The monetary authority cares about limiting inflation and output gap fluctuations. The monetary authority chooses the nominal interest rate to maximize:

$$-\frac{1}{2}(\theta_i^j y_i^2 + \pi_i^2) \tag{2.3}$$

where θ^{j} is the relative weight the monetary authority places on output gap verses inflation

stabilization (j=m represents the domestic monetary authority. Post-EMU the relative weight placed on output stabilization is the ECBs represented by j=M). The difference between the domestic monetary authority pre-EMU and the ECB post-EMU is that the ECB will respond to aggregate levels of the output gap and inflation instead of the country specific value. It is also possible that the ECB has a different weight on relative output gap stabilization than the domestic monetary authority had pre-EMU.

In addition to caring about smoothing output gap and inflation fluctuations, the fiscal authority of each country also wants to limit budgetary fluctuations. Thus the fiscal authorities of each country maximize:

$$-\frac{1}{2}(\theta_i^f y_i^2 + \pi_i^2 + \alpha_i (g_i - \epsilon_i)^2)$$
(2.4)

where θ^f is the relative weight the fiscal authority places on output gap verses inflation stabilization and can be different than the weight of the monetary authority. α is the weight placed on budget stabilization, while ϵ is an exogenous fiscal shock which moves the budget away from the steady state level. A positive shock would allow for a higher value of g (deficits) in the optimal solution. This would entail changes to the budget beyond optimal stabilization, including politically motivated deficit spending as the result of fiscal fatigue.

The timing of policy is important for how the monetary and fiscal authority decide to conduct policy. First, agents form inflation expectations, which before any shocks are realized is zero. After those expectations have been formed, shocks hit the economy; a government shock (ϵ_t), a non-government IS-demand shock (v_t), or a supply shock (u_t). Once the shock is realized, the monetary authority responds first, reflecting their short inside lag in policy making. The fiscal authority then responds taking into account the monetary authority's actions. The model is solved backwards as the monetary authority takes into account the fiscal authority's optimal response when it makes its policy decision.

Pre-EMU, each country had control over its own monetary and fiscal policy. Therefore, each country (i) solves its own individual country specific problem. Solving backwards the fiscal authority maximizes its objective function (2.4) subject to the IS curve (2.1) and the Phillips curve (2.2), taking the nominal interest rate and expected inflation as given. The optimal response becomes

$$g_i = \frac{1}{\sigma_i} [a_i b_i (\theta_i^f + \kappa_i^2) i_i - b_i (\theta_i^f + \kappa_i^2) v_i - \kappa_i b_i u_i + \alpha_i \epsilon_i]$$
(2.5)

where $\sigma_i = (b_i^2(\theta_i^f + \kappa_i^2) + \alpha_i).$

The domestic monetary authority takes into account the optimal reaction of the fiscal authority as well as inflation expectations and maximizes its objective function (2.3) with respect to the IS curve (2.1) and the Phillips curve (2.2), as well as the fiscal reaction (2.5). The optimal response of the monetary authority thus becomes:

$$i_i = \frac{1}{a_i}v_i + \frac{(\kappa_i b_i^2(\theta_i^f - \theta_i^m) + \kappa_i \alpha_i)}{a_i \alpha_i (\kappa_i^2 + \theta_i^m)}u_i + \frac{b_i}{a_i}\epsilon_i$$
(2.6)

Using the optimal monetary reaction, the optimal fiscal reaction function can be completed by substituting (2.6) into (2.5). Thus the optimal fiscal reaction becomes:

$$g_i = \frac{\kappa_i b_i^3 ((\theta_i^f)^2 - \theta_i^f \theta_i^m) + \kappa_i^3 b_i^3 (\theta_i^f - \theta_i^m) + \kappa_i b_i \alpha_i (\theta_i^f - \theta_i^m)}{\sigma_i \alpha_i (\kappa_i^2 + \theta_i^m)} u_i + \epsilon_i$$
(2.7)

The monetary authority reacts to each type of shock. It raises the interest rate in response to expansionary IS and fiscal shocks. Supply shocks are more complicated and depend on the relative weight that the monetary and fiscal authority place on the output gap. If the weights are the same then the monetary authority raises interest rates in response to a supply shock to combat inflation. The fiscal authority, on the other hand, does not respond to IS shocks because the monetary authority overcomes such a shock with its initial policy. Response to a supply shock depends on the relative weight that fiscal and monetary authorities place on output gap stabilization relative to inflation stabilization. If the weights are the same then the fiscal authority does not respond; the monetary authority's reaction accomplishes the same goal that the fiscal policy maker would have set out to do. If weights are different then there will be a response by the fiscal authority, even with the optimal monetary reaction. The most likely case would be that the fiscal authority places greater weight on output stabilization than does the monetary authority in relation to inflation ($\theta^f > \theta^m$). In this case, the fiscal authority would increase deficit spending to move output higher than the monetary authority caused it to be in response to a supply shock.

The output gap and inflation can be found by putting the optimal fiscal (2.7) and monetary (2.6) reaction function back into the the IS (2.1) and Phillips curve (2.2). The resulting levels are as follows:

$$y_i = -\frac{(\kappa_i b_i^2 \theta_i^f + \kappa_i^3 b_i^2 + \kappa_i \alpha_i)}{\sigma_i (\kappa_i^2 + \theta_i^m)} u_i$$
(2.8)

and

$$\pi_i = \frac{(b_i^2 \theta_i^f \theta_i^m + b_i^2 \kappa_i^2 \theta_i^m + \alpha_i \theta_i^m)}{\sigma_i (\kappa_i^2 + \theta_i^m)} u_i$$
(2.9)

The monetary and fiscal authorities are able to overcome the effect of an IS or fiscal shock on output and inflation. Supply shocks, on the other hand, still affect output and inflation even if the weights are the same and the fiscal and monetary authority act optimally. This result is consistent with optimal monetary reaction and monetary and fiscal interaction in previous studies.

Once countries become members of the monetary union, their fiscal choices change as the monetary system changes. The ECB's reaction to economy-wide fluctuations introduces a mechanism for each member's shocks to have an indirect effect on the economies of the other members. In order to model this, the output gap and inflation to which the ECB responds is a weighted aggregate of each individual member's output gap and inflation.

$$y^* = \Gamma' y \tag{2.10}$$

$$\pi^* = \Gamma' \pi \tag{2.11}$$

where Γ is an $(n \times 1)$ vector of weights corresponding to the relative economic size of the EMU members. The individual weights add up to one. y and π are $(n \times 1)$ vectors of the output gap and inflation of each of the member states.

In solving the problem backwards, the domestic fiscal authority, taking the interest rate as given, makes the same decision as before. The only difference is that the interest rate is not dictated by the domestic monetary authority, but by the ECB. The fiscal optimization result thus becomes:

$$g_i = \frac{1}{\sigma} [ab(\theta^f + \kappa^2)i^* - b(\theta^f + \kappa^2)v_i - \kappa bu_i + \alpha\epsilon_i]$$
(2.12)

where i^* is the European nominal interest rate. The subscript i has been dropped from the parameters because it has been assumed for clarity and illustrative purposes that each country has the same parameters across the union.

The ECB now takes into account the aggregate output gap and inflation of the member states, as well as the aggregate fiscal reaction, and maximizes:

$$-\frac{1}{2}(\theta^M(y^*)^2 + (\pi^*)^2) \tag{2.13}$$

The optimal monetary policy for the ECB thus becomes:

$$i^* = \frac{1}{a}\Gamma' v + \frac{\kappa b^2(\theta^f - \theta^M) + \kappa\alpha}{a\alpha(\theta^m + \kappa^2)}\Gamma' u + \frac{b}{a}\Gamma'\epsilon$$
(2.14)

where v, u, ϵ are $(n \times 1)$ vectors of country specific shocks. This reaction is similar to the pre-EMU domestic central bank's actions except the ECB reacts to weighted averages of the country specific shocks. It is also possible that the relative weight the ECB places on output gap fluctuations is different than the pre-EMU central bank ($\theta^M \neq \theta^m$). In order to solve for the domestic optimal fiscal policy once the ECB has acted, it is convenient to rewrite (2.14) as:

$$i^{*} = \frac{1}{a}\overline{\Gamma}'\overline{v} + \frac{\kappa b^{2}(\theta^{f} - \theta^{M}) + \kappa\alpha}{a\alpha(\theta^{m} + \kappa^{2})}\overline{\Gamma}'\overline{u} + \frac{b}{a}\overline{\Gamma}'\overline{\epsilon} + \frac{1}{a}\gamma_{i}v_{i} + \frac{\kappa b^{2}(\theta^{f} - \theta^{M}) + \kappa\alpha}{a\alpha(\theta^{m} + \kappa^{2})}\gamma_{i}u_{i} + \frac{b}{a}\gamma_{i}\epsilon_{i}$$

$$(2.15)$$

where $\overline{\Gamma}$ is the the ((n-1)×1) vector of weights (γ_i) excluding the weight of country (i). Similarly $\overline{v}, \overline{u}, \overline{\epsilon}$ are the ((n-1)×1) vectors of shocks excluding country (i). Plugging expression (2.15)

into (2.12) gives the following optimal fiscal response:

$$g_{i} = \frac{b(\theta^{f} + \kappa^{2})}{\sigma}\overline{\Gamma}'\overline{v} + \frac{\kappa b^{3}(\theta^{f} - \theta^{M})(\theta^{f} + \kappa^{2}) + \kappa b\alpha(\theta^{f} + \kappa^{2})}{\alpha\sigma(\theta^{M} + \kappa^{2})}\overline{\Gamma}'\overline{u} + \frac{b^{2}(\theta^{f} + \kappa^{2})}{\sigma}\overline{\Gamma}'\overline{\epsilon} + (1 - \gamma_{i})\left[-\frac{b(\theta^{f} + \kappa^{2})}{\sigma}\right]v_{i} + \frac{\gamma_{i}b^{2}(\theta^{f} + \kappa^{2}) + \alpha}{\sigma}\epsilon_{i} \quad (2.16) + \frac{(1 - \gamma_{i})(-\kappa^{3}b\alpha) + \gamma_{i}[\kappa b^{3}((\theta^{f})^{2} - \theta^{f}\theta^{M}) + \kappa^{3}b^{3}(\theta^{f} - \theta^{M})] + \kappa b\alpha(\gamma_{i}\theta^{f} - \theta^{M})}{\sigma\alpha(\theta^{M} + \kappa^{2})}u_{i}$$

If shocks and weights are identical across the EMU, this expression is the same as the one country case.³

Contrary to the pre-EMU case, the fiscal authority must take into account how large its country is in relation to other members as well as how similar country specific shocks are to those in the rest of the union. It also must take into account how the ECB's weight on output stabilization may be different than that of the pre-EMU domestic central bank.

Using the monetary response (2.15) and the fiscal response (2.16) in the country specific IS and Phillips curve, the output gap and inflation are derived:

$$y_{i} = \frac{\alpha}{\sigma} [(1 - \gamma_{i})v_{i} - \overline{\Gamma}'\overline{v}] + \frac{b\alpha}{\sigma} [(1 - \gamma_{i})\epsilon_{i} - \overline{\Gamma}'\overline{\epsilon}] - \frac{\kappa b^{2}\theta^{M}}{\sigma(\theta^{M} + \kappa^{2})} [(1 - \gamma_{i})u_{i} - \overline{\Gamma}'\overline{u}] - \frac{\kappa(b^{2}\theta^{f} + \alpha)}{\sigma(\theta^{M} + \kappa^{2})} [u_{i} + \overline{\Gamma}'\overline{u}] - \frac{\kappa^{3}b^{2}}{\sigma(\theta^{M} + \kappa^{2})} u_{i}$$
(2.17)

$$\pi_{i} = \frac{\kappa\alpha}{\sigma} [(1 - \gamma_{i})v_{i} - \overline{\Gamma}'\overline{v}] + \frac{\kappa b\alpha}{\sigma} [(1 - \gamma_{i})\epsilon_{i} - \overline{\Gamma}'\overline{\epsilon}] - \frac{\kappa^{2}b^{2}\theta^{M}}{\sigma(\theta^{M} + \kappa^{2})} [(1 - \gamma_{i})u_{i} - \overline{\Gamma}'\overline{u}] + \frac{b^{2}\theta^{f}\theta^{M} + b^{2}\kappa^{2}(\theta^{M} + \theta^{f}) + \theta^{M}\alpha + \kappa^{2}\alpha}{\sigma(\theta^{M} + \kappa^{2})} u_{i}$$
(2.18)

Once again if the shocks and weights are the same across the EMU then equations (2.17) and (2.18) collapse down to equations (2.8) and (2.9).

A comparison of the fiscal authority's optimal reaction pre-EMU (2.7) and post-EMU (2.16) illustrates how the role of the domestic fiscal authority could change after the formation of the EMU. Joining the monetary union could lead to greater reliance on fiscal management if

 $^{{}^{3}\}overline{\Gamma}'\overline{\epsilon} + \gamma_{i}\epsilon_{i} = \Gamma'\epsilon = \epsilon_{i}$ if all shocks are the same. Also $\overline{\Gamma}'v + (1 - \gamma_{i})v_{i} = 0$ if all shocks are the same. This relationship holds true for all shocks.

shocks are not sufficiently similar across the union or if the reaction of the monetary authority to fluctuations changes. If this is true, economic downturns would lead to greater deficit spending in order to maintain the same level of stabilization possible pre-EMU, thus making the SGP overly binding.

Insufficient similarity in shocks is not a new concern for monetary unions. Mundell (1961) included shock symmetry as a necessary criterion for a group of countries to be an optimal currency area (OCA). The problem of not meeting this OCA criterion for the fiscal authority can be seen by comparing equations (2.7) and (2.16). For example, pre-EMU the fiscal authority does not need to respond to any demand shocks because the monetary authority with its optimal reaction takes care of all resultant fluctuations. Yet post-EMU, the fiscal authority optimally responds to a demand shock as long as the country specific shock is different than that of the aggregate shock. Assume a member state experiences a country specific negative demand shock v_i while the average demand shock for all members in that period $\overline{\Gamma}\overline{v}$ is positive. The local fiscal authority must now increase spending in response to its negative country specific shock

$$\frac{\delta g_i}{\delta v_i} = -(1 - \gamma_i) \left[\frac{b(\theta^f + \kappa^2)}{\sigma} \right] < 0$$
(2.19)

and increase spending to overcome the monetary authorities response to the EMU wide positive demand shock

$$\frac{\delta g_i}{\delta \overline{\Gamma}' \overline{v}} = \frac{b(\theta^f + \kappa^2)}{\sigma} > 0 \tag{2.20}$$

The need for the fiscal authority to act in response to its own shock as well as to the reaction of the monetary authority, in the case of asymmetric shocks, holds true for supply and fiscal shocks as well. Mundell does not provide a threshold of how similar shocks must be, but significant asymmetry would indicate a greater need for increased reliance on fiscal intervention and will be tested in the next section.

Understanding the static relationship between shocks may not provide enough relevant information to address the role shock asymmetries play. The continued integration of Europe could in itself change the structure of the relationship between countries and thus the similarity of shocks. This argument suggests an endogenous cross-country relationship of country-specific exogenous shocks. This is not the same as saying the reaction to shocks have become more or less similar across countries. Instead, the exogenous shocks to which those countries could react (the supply and non-government spending demand shocks from the model in the previous section) have become more or less similar across countries. Thus, regardless of whether the optimal currency area criteria were met or violated at the advent of the union, the continued pace of integration could cause this relationship to change.

Greater integration can be the result of both reduced trade barriers or a reduction in the transaction costs of trade (such as adopting a common currency as in the case of the EMU). The effect of greater integration on shock similarity however is not agreed upon. One argument is that the increased trade as a result of greater integration leads countries to produce more of those goods in which they have a comparative advantage. As countries become more specialized, and thus more economically distinct from each other, shocks could become more asymmetric (Krugman, 1991; Kenen, 1969). For example, a shift in preferences from one good to another could cause divergent demand shocks between two integrated countries which specialize in the two different goods. Another example would be a technological advance which improves production in a particular industry. If there has been greater specialization, those countries which have specialized in the production of the good that has the technological advancement enjoy a positive supply shock which the other countries do not. Similarly, Babetskii, Boone, and Maurel (2004) argue that if a country is in the process of catching-up they should experience greater supply shock asymmetry. As their industrial sector is in the process of upgrading, investment flows from the more advanced countries bring technology advances, which would lead to asymmetric positive supply shocks in the developing country.

An alternative view of the results of greater integration has been presented by the European Commission (1990) European Commission (1990) and Frankel and Rose (1998). They argue that as trade increases, a shock in one country would have spillover effects on the country it trades with. This is predominant with demand shocks or where intra-industry trade accounts for most of the trade. For example, if there is a negative demand shock in one country which lowers its income and thus demand for its trading partner's goods, the trading partner will also experience a negative demand shock. This demand shock comes from a different source, net exports, but moves in the same direction as the original country's shock. With both of these explanations, the integration process causes shocks to become more similar, even though the shocks that are observed in and of themselves are still country specific exogenous shocks (also explained and tested in Babetskii, 2005 for the new member states).

Greater reliance on fiscal policy may also be necessary if the monetary union's central bank has a response function different than that of the country's monetary authority. For example, the ECB's preference for output stabilization could be less than that of the country's central bank prior to joining the monetary union ($\theta^M < \theta^m$). This is a distinct possibility for many members, as the ECB adopted the German model of monetary policy which had an established reputation of being extremely responsive to inflation (Wyplosz, 2006). In order to maintain the same level of output stabilization as before, a fiscal authority may have to act more aggressively because of the weaker response of the central bank. To illustrate, assume that the shocks that hit the economy are the same so the optimal reaction for the fiscal authority is illustrated by equation (2.7). If the weight the monetary authority placed on output stabilization θ changes then the fiscal reaction changes.

$$\frac{\delta g_i}{\delta \theta^j} = -\frac{1}{(\kappa^2 + \theta^j)} \left[\theta^f \kappa b (2\kappa^2 b^2 + \kappa^2 \alpha) + \kappa^3 b (\kappa^2 b^2 + \kappa \alpha) \right] u < 0$$
(2.21)

In this case, even if there is a common cost push shock across the union, the fiscal authority may take on a greater role if the new monetary authority is placing less weight on output stabilization (θ^m falls). The case is similar for demand and fiscal shocks; if there is some asymmetry the fiscal authority would have an even greater role.

It is also possible that the changes in the deficit are not structural at all, but that greater deficits are a result of changes in political will. In an attempt to meet the deficit criterion of the Maastricht Treaty, most countries had to implement sometimes painful structural as well as temporary changes to their budgets. For example, Italy went through major pension reform, raising the retirement age and increasing individual contributions in an attempt to cut down the budget deficit. In addition, temporary adjustments were made that did not affect the structure of the deficit but did bring it in line with the Maastricht criteria. Italy used the
sale of public assets to increase government revenue, delayed contract renegotiations, and even imposed a Eurotax which was to be repaid after entrance into the EMU. Such reforms and one-off measures are hard to maintain especially when the promised returns from joining the union have been slow in coming. Member state populations and politicians may tire from the fiscal constraints imposed on them. Eichengreen and Wyplosz (1998) suggest that European governments traditionally have a deficit bias. If politicians become tired of reform, run out of one-off measures, and see the enforcement of the SGP as weak, then worsening deficits would be expected.

The enforceability of the SGP versus the Maastricht Treaty is important if fiscal fatigue is the reason behind worsening deficit positions. Under the Maastricht criteria, rule violation would keep a country out of the union. Punishment for violating the SGP, on the other hand, comes in the form of fines. These fines are imposed by fellow members who have little incentive to strap their already strapped neighbors with further financial obligations. In such a way, governments have less incentive to meet the somewhat arbitrary deficit rules, especially when there are economic strains at home. Busemeyer (2004) has demonstrated that the weak enforcement mechanism and the existence of large countries with strong influences in the union allow for violation of the rule without fear of reprisal. The fact that it is the larger countries and those with greater political clout that are violating the SGP and that they have succeeded in changing the SGP rules supports this hypothesis.

Even those countries which have not violated the SGP have followed the lead of the larger countries and experienced worsening budget positions. Fear of reprisal is lessened as a result of the rule changes. This weakening of the SGP makes it more difficult to overcome moral hazard risks and deficit biases. It also weakens the ability of the SGP to induce needed changes to the structure of European budgets.

2.4 Testing the Nature of Fluctuations

In section 2.3 it was shown that if country specific supply (u_i) or demand (v_i) shocks are asymmetric across the union then there is a role for greater fiscal management. To test whether shocks are similar enough to meet the OCA criteria and to test if that relationship has changed over time, the structural shocks that affect the economies in Europe must be identified. Once they are identified, the relationship of shocks between members of the EMU can be estimated.

2.4.1 Estimation Techniques

In order to illustrate analytically the changing relationship between monetary and fiscal authorities as a result of joining a monetary union, the model in section 2.3 was not dynamic. Empirical identification of the supply and demand shocks does however depend on the dynamic relationship between output and prices. den Haan (2000) shows that a dynamic Keynesian model with supply and demand shocks does capture a negative long run comovement in prices and output for the United States, an indication that supply shocks dominate in the long run. Using den Haan's method, this relationship also holds for the EMU as a whole. The long-run dominance of supply shocks is a restriction that will be used to identify structural shocks.

Long-run restrictions for shock identification were first used by Blanchard and Quah (1989). Numerous studies since that time have been conducted separating economic fluctuations into supply and demand shocks using long-run restrictions on SVARs. Using annual data up to 1990 from the potential EMU members, Bayoumi and Eichengreen (1993) used this technique to test Europe's status as an optimal currency area. They compare the correlation of these shocks over specified time periods and find increased correlation for both demand and supply shocks. In addition to Bayoumi and Eichengreen, the majority of studies which use this method to look at the optimal currency area criteria concentrate on the new member states (Fidrmuc and Korhonen, 2003 and 2004; Babetskii et. al., 2004 and Kenen, 2001).

The identification of long-run aggregate demand and aggregate supply shocks hinges on the theory that the aggregate supply curve is vertical in the long run (i.e. output supplied is not affected by prices). The assumption is that real wages will adjust to changes in prices in the long run, which correct any short-run imbalances in the labor market that may result because of nominal rigidities. The aggregate demand curve is downward sloping in both the short and long run, as derived from the typical textbook IS/LM model. It is easy to see that any shock to the aggregate demand curve will have no effect on output in the long-run, but will have a long-run effect on prices. A supply shock will shift the aggregate supply curve and have a permanent effect on both output and prices in the long-run. This suggests the following long-run SVMA representation of a VAR:

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} = \begin{bmatrix} C_{11}(1) & 0 \\ C_{21}(1) & C_{22}(1) \end{bmatrix} \begin{bmatrix} \nu^s \\ \nu^d \end{bmatrix}$$
(2.22)

where y_t is the log of real GDP, p_t is the GDP deflator, and C(1) is the sum of the infinite order VMA coefficients from the Wold decomposition of the VAR, i.e. $\sum_{i=0}^{\infty} C_i$. Using these assumptions, the structural supply (ν^s) and demand (ν^d) shocks can be identified.

This identification technique differentiates between reactions to shocks and actual shocks which are exogenous to the economy. This is an advantage of using structurally identified shocks for studies of optimal currency areas. Had one just compared variables such as output or the real exchange rate, similarity across countries could be attributed not only to the similarity of shocks but also to the reaction to those shocks. This does not mean that the shocks are completely disconnected from the operation of the central bank or the fiscal authorities. They themselves can generate exogenous supply or demand shocks.

Recently, the use of long-run restrictions to identify structural shocks has come under criticism. Erceg, Guerrieri, and Gust (2005) argue that long-run restrictions have trouble separating permanent shocks from those that are highly persistent. Though a complete solution to this problem has not been fully reached, Dupaigne and Feve (2007) have suggested one way to overcome a possible source of contamination. They show that technology shock identification using long-run restrictions is not robust to aggregation across countries. They conclude that foreign non-permanent but persistent shocks can contaminate the data and thus the identification of structural shocks. The same problem could exist when using long-run restrictions to identify supply shocks. For example, a favorable supply shock in one country leads to a permanent increase in domestic income. Through the income effect, this increase in domestic income could increase the demand for goods from a neighboring country. The neighboring country in turn experiences a prolonged increase in GDP. Using long-run identification, this protracted increase in the trading partners GDP would be identified as a supply shock, when in fact it is just a persistent demand shock.

Dupaigne and Feve suggest using a cross country aggregate for the variable supporting the identifying restriction (GDP in this case). The aggregated data provides a measure less contaminated by the cross country transmission of shocks. Thus in estimating the VAR, an aggregate measure of GDP is used in place of the country specific measure of GDP. The country specific price level is still used for each regression.

In testing the OCA of the EMU members it is not only important that the shocks are properly identified but that they are also free from policy driven similarities or dissimilarities. Clearly demand shocks identified using this technique could include monetary as well as fiscal shocks. Thus the demand shocks as identified above are not a good measure of structural similarity across EMU countries. They do, however, provide information on the difficulty a central monetary authority may have in addressing country specific fluctuations, even if they are policy driven.

Supply shocks, on the other hand, are less contaminated by policy driven shocks and provide a good source for assessing the optimality of the currency area for the EMU members. This measure is not fully without policy contamination. Government spending on capital, infrastructure, and other forms of investment could also move out the aggregate supply curve and thus have long-run effects on both prices and output. To remove the possibility of these policy driven supply shocks, government investment expenditure is included as an exogenous variable in the estimated VAR.

Once the shocks have been correctly identified, similarity of shocks across the regions are measured by assuming the following relationship for each country for each type of shock:

$$X_t = c + \gamma_t X_t^{EMU} + \beta_3 \mathbf{X}_t^{\mathbf{exog}} + \eta_t$$
(2.23)

where X_t is the country specific demand or supply shock for members at time t, and X_t^{EMU} is the EMU weighted average demand or supply shock excluding the country being tested. $\mathbf{X}_t^{\mathbf{exog}}$ is a vector of any exogenous variables included in the regression. In order to test for a change in the relationship over time γ_t is allowed to change.

$$\gamma_t = \beta_1 + \alpha \cdot t + \nu_t \tag{2.24}$$

Combining (2.24) with (2.23) the relationship among shocks is estimated with the following regression:

$$X_{t} = c + \beta_{1} X_{t}^{EMU} + \beta_{2} \left(t \cdot X_{t}^{EMU} \right) + \beta_{3} \mathbf{X}_{t}^{\mathbf{exog}} + \epsilon_{t}$$

$$(2.25)$$

where t represents a linear time trend and $\epsilon_t = \eta_t + \nu_t \cdot X_t^{EMU}$ is a heteroskedastic error term.

 β_1 measures the relationship between shocks of the EMU member and its neighbors. A value closer to one indicates greater similarity, while a value further from one indicates greater dissimilarity. In the tests conducted below, the null hypothesis is that shocks move perfectly together, or that β_1 is equal to one. Rejection of this hypothesis would indicate dissimilarity in shocks for that particular member and the EMU as a whole. The time component of the relationship among shocks is measured by β_2 . A significant positive value of β_2 indicates an increase in similarity over time. Estimated supply and demand shocks for the United States are added to the regression to account for the possibility that EMU members may be more similar to countries outside of the EMU community. The significance of the coefficient on US shocks and not the EMU average shocks would indicate sufficient dissimilarity in shocks. In the tests below the null hypothesis is that the EMU members' shocks are not similar to the US, or that $\beta_3 = 0$.

2.4.2 Data and Estimation Preparation

To identify supply and demand shocks using long-run restrictions, quarterly measures from the OECD Economic Outlook 2007 of real GDP and the GDP deflator are used. An EMU aggregate level of GDP is used in all estimations except for the United States. The aggregate used is provided by the OECD and is a weighted average of the 12 Euro Area countries. The series consists of information from the first quarter of 1980 to the fourth quarter of 2006, providing 108 observations for each country. Government investment is also pulled from the OECD Economic Outlook, but quarterly measures are only available for three EMU members. Annual date was used to interpolate quarterly values for government investment, using a cubic spline interpolation. The sample consists of nine of the original members of the EMU,⁴ excluding Austria, Greece, and Luxembourg due to a lack of data. The SVAR is also run for the United States. Dickey-Fuller tests for unit roots indicate that each country's GDP and deflator series are integrated of order one except for the price series in Portugal. Andrews and Zivot's (1992) test for structural breaks indicated that Portugal's inflation data experienced a break in 1984 quarter 1. This break will be taken into account when running the VAR by including a dummy variable. Government investment is also differenced when included in the VAR.

HQIC criteria indicated a lag length of two for most countries in the sample. As such, a lag length of two is used for each country in the sample for comparison purposes in the regression.⁵ In order to verify that the ordering of the long-run restrictions is correct, cumulative impulse response functions for each of the countries are estimated. These responses are checked to see if output and inflation move in the predicted direction in response to supply and demand shocks. An identified positive supply shock should cause prices to fall and output to rise permanently. A positive demand shock should lead to a permanent increase in prices but only a temporary increase in output. Checking for these correct movements provides an overidentifying restriction of the long-run ordering assumptions. The restrictions were met for all but Finland and Portugal where prices rose as a result of a positive supply shock.⁶ Fearing that the identified supply and demand shocks for these countries are questionable, and not wanting them to influence the aggregate supply and demand shocks used in equation (2.24), these countries are excluded from the analysis.

Historical records point to the possibility of certain episodes, such as German reunification, that lead to abnormally large individual country shocks that would unduly influence the

⁴Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain

 $^{^{5}}$ HQIC tests indicated a lag length of four for Finland, the Netherlands, and Germany. BIC tests for each of these countries indicated a lower lag.

⁶Using aggregate measures of GDP as opposed to country specific measures improved the impulse response functions (as in meeting the over-identifying restrictions) for France, Italy, and Germany.

regression. Tests for such episodes indicated outliers in the regression for France and Germany in 1991, Ireland in 1997 and Spain in 1986. Each episode is taken into account with a dummy variable in the individual country's regression.

2.4.3Results

Table 2.2 presents the results of the estimation of equation (2.25) for supply shocks. The null hypothesis is that member shocks move one-to-one with EMU shocks as a whole, or that $\beta_1 = 1$. Also presented is the relationship of shocks with the US, where significance is reported for the null hypothesis that $\beta_3 = 0$. Significance for β_2 indicates a value significantly different than zero, which would be an indication of a changing relationship over time. The standard errors reported are Newey-West heteroskdastic corrected standard errors.

Table 2.2: Supply shock symmetry between members and the EMU

| $X_{t} = c + \beta_{1} X_{t}^{EMU} + \beta_{2} \left(t \cdot X_{t}^{EMU} \right) + \beta_{3} \mathbf{X}_{t}^{exog} + \epsilon_{t}$ | | | | | | |
|---|--------------------------|------------------------|---------------------------|--------|--|--|
| Country | β_1 | β_2 - time trend | β_3 - USA | R^2 | | |
| Belgium | 0.8166^{*} (0.1005) | $0.0002 \\ (0.0029)$ | -0.0062 (0.0710) | 0.5645 | | |
| France | $0.927 \\ (0.1041)$ | 00052 (0.0018) | -0.0203 (0.0593) | 0.7141 | | |
| Germany | 0.794^{*} (0.1127) | 0.0012 (0.0019) | -0.0104 (0.0493) | 0.7619 | | |
| Ireland | $0.9066 \\ (0.1108)$ | $0.00055 \\ (0.0031)$ | -0.0057 (0.0550) | 0.6972 | | |
| Italy | 0.9881 (0.0972) | -0.0006 (0.002) | 0.1158^{**} (0.0494) | 0.7953 | | |
| Netherlands | $1.0332 \\ (0.113)$ | -0.00075 (0.00187) | $0.0086 \\ (0.0460)$ | 0.8204 | | |
| Spain | $0.965 \\ (0.143)$ | -0.0013 (0.0023) | -0.0285 (0.0516) | 0.7617 | | |

 $H_0 = 1$ for β_1 and $H_0 = 0$ for β_2 and β_3

* significant at 0.1 level of significance

** significant at 0.05 level of significance

Estimated from 1980q3-2006q4

Supply shocks are highly similar; only Belgium and Germany are significantly different than one and this is only at a 10 percent level of significance. There is no discernable time trend in either direction. Neither view of the effects of integration is statistically apparent. Only in Italy does the US shock explain some of the variation of supply shocks, yet this has not diminished the significant correlation that Italy has with the other member countries. There is little evidence to support the claim that the EMU members have not met the OCA criteria of shock similarity at a structural level, nor has the relationship changed as a result of greater integration.

The results for demand shocks are presented in table 2.3. Demand shocks show more dispersion than do supply shocks. France and Ireland are significantly different than the EMU average and Italy is very close to being significantly different. Once again there is no discernable time trend, and the United States does not play an important role. In all cases other than Belgium and Germany, the demand shocks are less similar than supply shocks. This feature may be due to differences in the conduct of policy, or from structural differences in demand.

These results indicate that large asymmetry of shocks does not provide a reason for a greater need to rely on fiscal policy in order to manage economic fluctuations. As long as the ECB is responding to the aggregate shocks in the European economy by and large the members have not had to counteract those policies with fiscal policy because of shock asymmetry. In addition, no change in that relationship has occurred over the ongoing process of integration.

2.5 Testing the Nature of Responses

If shock asymmetry and a failure to meet the OCA criteria do not provide sufficient explanations for worsening budgetary balances then the reaction to such shocks might. As explained in Section 3, even if shocks are the same across the union, fiscal authorities may need to rely more on fiscal management as a result of aggregation or changes in the weight placed on inflation stabilization by the new central bank. There is also the possibility of fiscal fatigue and responses just being more deficit biased.

| $X_{t} = c + \beta_{1} X_{t}^{EMU} + \beta_{2} \left(t \cdot X_{t}^{EMU} \right) + \beta_{3} \mathbf{X}_{t}^{exog} + \epsilon_{t}$ | | | | | | |
|---|---|------------------------|----------------------|--------|--|--|
| Country | β_1 | β_2 - time trend | β_3 - USA | R^2 | | |
| Belgium | $1.1020 \\ (0.229)$ | -0.010 (0.0029) | $0.0148 \\ (0.0985)$ | 0.2573 | | |
| France | 0.5837^{**} (0.1707) | 00227 (0.0031) | $0.0505 \ (0.0950)$ | 0.2761 | | |
| Germany | 1.0057 (0.2674) | -0.0048 (0.0047) | $0.0150 \\ (0.1019)$ | 0.3448 | | |
| Ireland | $\begin{array}{c} 0.5489^{***} \\ (0.1966) \end{array}$ | $0.00376 \\ (0.0048)$ | -0.0638 (0.1009) | 0.3653 | | |
| Italy | $0.5812 \\ (0.2720)$ | 0.00243 (0.0053) | $0.0580 \\ (0.1240)$ | 0.2218 | | |
| Netherlands | $0.9415 \\ (0.2762)$ | -0.00552 (0.0878) | 0.00493 (0.0878) | 0.2502 | | |
| Spain | $0.8370 \\ (0.2526)$ | -0.0052 (0.0048) | -0.1147 (0.1011) | 0.2033 | | |

Table 2.3: Demand shock symmetry between members and the EMU

 $H_0 = 1$ for β_1 and $H_0 = 0$ for β_2 and β_3

** significant at 0.5 level of significance

*** significant at 0.01 level of significance

Estimated from 1980q3-2006q4

The behavior of fiscal variables across the EMU has been an active area of research. Fiscal reaction functions have been estimated to identify differences in the way policy responds to economic fluctuations and how the deficit rules have effected those movements (Gali and Perotti, 2003; IMF, 2005; Annett, 2006). These reaction functions consist of regressions where the dependent variable is some measure of fiscal policy. They then test how the contribution and direction of output gaps, monetary policy, budgetary balances, debt levels, and other possibly important features have changed during the different stages of monetary integration. These reaction functions do help explain how fiscal policy has changed, but they can only indirectly address fiscal fatigue. In this section a structural VAR estimation of the fiscal and monetary reaction functions is undertaken. This approach has advantages over the singular regression used in previous literature because of the simultaneous equation bias. In addition,

the structural VAR with certain ordering restrictions, can identify fiscal and monetary shocks as well as map the reaction of fiscal and monetary variables to certain impulses in the economy through impulse response functions.

Comparisons of impulse response functions pre- and post-EMU will reveal differences in how authorities behave. Changes in reactions to economic fluctuations could indicate a change in the weight policy makers put on stabilization. The reaction of fiscal policy in general as well as to monetary policy also provides important insight.

2.5.1 Estimation Techniques

As was introduced in section 2.3 the fiscal and monetary authorities respond to inflation and the output gap, yet their actions are not independent. For example a dynamic fiscal spending (s) reaction function could react to the output gap (y), inflation (π), government receipts (r), the monetary authority (i), as well as its own lag and the lags of the other variables:

$$s_{t} = \beta_{12}^{0} r_{t} + \beta_{13}^{0} y_{t} + \beta_{14}^{0} \pi_{t} + \beta_{15}^{0} i_{t} + \beta_{11}^{1} s_{t-1} + \beta_{12}^{1} r_{t-1} + \beta_{13}^{1} y_{t-1} + \beta_{14}^{1} \pi_{t-1} + \beta_{15}^{1} i_{t-1} + \dots + \nu_{t}^{s}$$

Yet receipts also respond to spending, the output gap, inflation, the interest rate, and its lag as well as the lags of the other variables:

$$r_{t} = \beta_{21}^{0} s_{t} + \beta_{23}^{0} y_{t} + \beta_{24}^{0} \pi_{t} + \beta_{25}^{0} i_{t} + \beta_{22}^{1} r_{t-1} + \beta_{21}^{1} s_{t-1} + \beta_{23}^{1} y_{t-1} + \beta_{24}^{1} \pi_{t-1} + \beta_{25}^{1} i_{t-1} + \dots + \nu_{t}^{r}$$

The output gap, inflation, and interest rate would have a similar representation. Thus an OLS estimation of the first equation would be biased because of simultaneity. Gali and Perroti (2003) use instrumental variables to overcome this problem, but finding a good instrument is often difficult. A structural VAR approach provides consistent estimates of the structural parameters of the model, specifically the structural error terms which will provide measures of structural fiscal and monetary shocks. The simultaneous system of equations can be collected and written in vector form as:

$$B_0 Y_t = B_1 Y_{t-1} + B_2 Y_{t-2} + \dots + \nu_t$$
(2.26)

where (\mathbf{Y}) is a vector containing government spending, government receipts, output, inflation, and the interest rate. $(\mathbf{B_j})$ is a coefficient matrix and (ν) is a vector of structural error terms. The reduced form VAR can be obtained by pre-multiplying by $\mathbf{B_0^{-1}}$.

$$Y_t = \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + ... + u_t$$
 (2.27)

where $\Phi_{\mathbf{j}} = \mathbf{B}_{\mathbf{0}}^{-1}\mathbf{B}_{\mathbf{j}}$ and $\mathbf{u} = \mathbf{B}_{\mathbf{0}}^{-1}\nu$. The reduced form parameters can be estimated equation by equation using OLS, but this will not provide an estimation of the structural parameters. Identification of the structural parameters and shocks requires that the unknown parameters in the $\mathbf{B}_{\mathbf{0}}$ matrix have no more unknown parameters than distinct values in the covariance matrix. Because of the symmetry of the covariance matrix, there are only 15 free parameters for the $(5 \times 5) \mathbf{B}_{\mathbf{0}}$ matrix. This means that 10 restrictions must be placed on the $\mathbf{B}_{\mathbf{0}}$ matrix in order to identify the structural shocks.⁷ The timing and response to fiscal and monetary policy provide these restrictions.

In the established literature on monetary shock identification, the important assumption is that monetary authorities are able to react to contemporaneous changes in the economy. On the other hand, slow transition mechanisms of monetary instruments to the economy insure that output and prices react to monetary policy with a lag. The use of quarterly data is assumed to be a short enough frequency that these timing assumptions hold.⁸

Identification of discretionary fiscal policy shocks relies on the assumption that fiscal authorities react to economic fluctuations but are unable to do so contemporaneously because of the time necessary to draft and approve changes to spending or taxes. Blanchard and Perotti (2002) have one of the more influential initial papers on fiscal shock identification via a SVAR. Perotti (2002) and Canzoneri, Cumby, and Diba (2002) have expanded on Blanchard and Perotti's technique by including more variables.

The timing of fiscal policy and the restriction it imposes is complicated by the existence of

⁷See Hamilton (1994)

⁸See Chistiano, Eichenbaum, and Evans (1999) for a good summery of the state of the literature on monetary shock identification

fiscal automatic stabilizers. Blanchard and Perrotti, along with the other authors cited above, use government spending and tax revenue (net of transfers) as arguments in their SVAR. These series respond within the quarter to movements in output through more (less) unemployment claims or decreased (increased) tax revenues when output is falling (rising). These authors remove the cyclical component from the reduced form residuals using outside estimations of the elasticity of government spending and tax revenue to output found in Giorno, Richardson, Roseveare, and van der Noord (1995). These estimations allow them to construct a cyclically adjusted government spending and tax revenue residual. Using the cyclically adjusted residuals as instrumental variables, they are able to identify structural output, spending, and revenue shocks. The authors take an agnostic stance on the ordering of taxes and spending; with no exact theory to follow they run their analysis switching the ordering assumptions.

This exercise will assume similar ordering assumptions, which combine monetary and fiscal policy into the same SVAR. Instead of adjusting for automatic stabilizers in the residual, cyclically adjusted measures of government spending and taxes are used in the original SVAR. These values come from the OECD Economic Outlook database and are calculated using the same elasticities of government spending and taxes to output from Giorno et. al. that Blanchand and Perrotti use. They are constructed to remove the cyclical component (those portions that contemporaneously respond to output fluctuations i.e. automatic stabilizers) from the government accounts. The cyclically adjusted series can be seen as a measure of discretionary policy. Under this ordering assumption, the monetary authority reacts contemporaneously to movements in spending, taxes, GDP, and inflation. On the other hand, each of these responds with a lag to a monetary shock. Fiscal policy, in the form of cyclically adjusted tax or spending innovations, does not respond contemporaneously to GDP, inflation, or the interest rate. Output and inflation, on the other hand, do respond contemporaneously to these fiscal variables. These timing restrictions provide a \mathbf{B}_0 matrix that is lower triangular and can be obtained from a Cholesky decomposition of the covariance matrix from the reduced form VAR. Using the fact that $\mathbf{u} = \mathbf{B}_0^{-1} \mathbf{v}$ the structural shocks used in the previous section are identified by pre

multiplying u by $\mathbf{B_0}$.⁹

The strategy used to identify changes in the response of monetary and fiscal authorities to each other and to macroeconomic fluctuations is to compare impulse response functions preand post-EMU. Impulse response functions could be estimated for each country separately but these results must be interpreted with a measure of doubt. The EMU has been in existence since 1999, allowing for only thirty-one post-EMU observations. For a five variable VAR this is an alarmingly small number of observations. In order to get the most information from the available data the panel VAR is used instead.

The advantage of using a panel data set is greater efficiency (Nijman and Verbeek, 1990). The use of panel data, however, does require that the underlying structure of the model is the same for each country in the panel. This can be partially overcome by allowing fixed effects into the model. Unfortunately, the auto-regressive nature of the VAR means that usual fixed effects estimation, instrumental variable estimation with mean differencing, no longer provides an unbiased estimation.¹⁰ Arellano and Bover (1995) show how this problem can be overcome using a 'Helmert procedure', which removes only the forward mean of the variable in the VAR. As a result the lagged original variables are orthogonal to the transformed variable and can be used as instruments just as in the normal fixed effects estimation. These orthogonal relationships provide moment conditions from which the panel VAR can be estimated using GMM.¹¹

Once the impulse response functions have been estimated, a Wald test is performed testing the differences in whole impulse response functions up to three periods after the initial shock. The covariance matrix used in this Wald test is bootstrapped from 500 Monte Carlo simulations of the differences in impulse response function pre- and post-EMU. The null hypothesis tested is that there is no difference up to 3 periods after the shocks pre- and post-EMU.

⁹Structural output and inflation shocks are not specifically identified, and will be referred to as impulses.

¹⁰For a good summary of dynamic linear models with panel data refer to Verbeek (2000) pp. 327-336

 $^{^{11}}$ Love (2006) provides an example of this technique being used in firm level data. She has graciously provided the code for the estimation of the panel VAR (Love, 2001)

2.5.2 Data

Proper identification of fiscal and monetary shocks, as well as estimation of the fiscal and monetary reaction functions and their impulse responses, requires data for government spending, government revenues, GDP, prices, and the interest rate. As explained above, proper identification of discretionary fiscal policy requires that quarterly data be used. Using quarterly data also increases the number of observations, which is critical in the relatively short estimations post-EMU. Data come from the OECD Economic Outlook. The government spending series is cyclically adjusted current government disbursements excluding interest payments, while revenue is cyclically adjusted current government receipts. The GDP deflator is used for the price series while the three month market rate is used for the interest rate series. The GDP, spending, and revenue series are transformed into real per capita terms and logged for the analysis. Inflation is defined as the log difference in the GDP deflator.

The limited availability of quarterly data restricts the number of countries that can be used to Finland, France, Ireland, and the Netherlands¹². Each of these countries has experienced a worsening of their budget, but only France and the Netherlands have violated the SGP as a result. The Netherlands drastically improved its budgetary position the last two quarters of 2006 and is no longer running excessive deficits. Ireland and Finland still have budget surpluses though they have diminished. These four countries will be combined to form a panel data series consisting of 444 observations, 128 of which are post-EMU (taking the start date of the EMU as 1999 quarter 1).

The reaction functions and estimates will be obtained using a VAR, therefore it is important that each series used in the VAR be stationary to obtain consistent estimators. Each of the panel series were tested for stationarity with Im, Pesaran, Shin (2003) tests for unit roots in a panel series. The test rejects the null hypothesis of non-stationarity for the inflation series. The GDP, spending, and revenue per capita series as well as the interest rate series fail to reject the null hypothesis. Further testing indicates that these series would be stationary if

 $^{^{12}}$ The length of the series varied for each country: Finland 1976q4 - 2006q4, France 1972q1 - 2006q4, Ireland 1979q2 - 2006q4, Netherlands 1972q4 - 2006q4. I will use a balanced panel and take data from 1979q2 onward.

either a trend or other time effects were removed. The non-stationarity of the interest rate series is surprising, yet tests suggest that removing a trend would make the series stationary. Close inspection of the interest rate series for each of these countries does show a pronounced downward trend. This is a product of the time period over which the sample covers. Oil shocks in the 1970's caused high inflation to which monetary authorities across Europe responded with tight monetary policy. Since that time rates have steadily fallen as inflation has been brought under control allowing for looser monetary policy. In addition, the Maastricht treaty required a convergence to a lower interest rate in preparation for joining the union. Understanding that this downward trend cannot be sustained but still needing a stationary series for the VAR, a Hodrick-Prescott filter was applied to the interest rate series. The log of GDP per capita as well as government receipts and spending per capita were also filtered using a Hodrick-Prescott filter with $\lambda = 1600$. Tests show that all filtered series are stationary. HQIC tests for each country suggest a lag length of two.

2.5.3 Results

Impulse response functions are first estimated across the whole sample. Responses to policy shocks generally follow what one would typically expect. In response to a positive monetary shock, output and inflation fall after a delay. In response to a positive shock to government receipts, such as a tax increase, output and inflation fall. Government spending shocks cause an initial increase in output and, in the only anomaly, an immediate fall in inflation. This drop in inflation is small and only lasts for one period, after which the response is not significantly different than zero.

Important for this paper is the response of policy variables to movements in output and inflation. In the case of monetary policy, an increase in inflation leads to a significant initial rise in the monetary instrument. The initial response to an increase in output is insignificant, but also positive, and becomes significantly positive after two periods. These observations both suggest that monetary policy has been used in a counter-cyclical manner. Fiscal policy has also responded with a delay counter-cyclically to output, with taxes raised and spending reduced in response to a positive output impulse. The response is stronger in significance and magnitude on the revenue side. In the case of inflation, the revenue response combats inflation while the spending response is inflationary. This is similar to what Muscatalli and Tirelli found for the United States. This suggests that in making spending decisions, policy makers have been less concerned about the inflationary consequences.

Impulse response functions do show some interaction between policy makers. In response to a positive shock to government receipts, interest rates fall and in response to a positive shock to interest rates government spending increases. Thus monetary and fiscal authorities are competing with one another; contractionary monetary policy is met with expansionary fiscal policy and visa versa. The interaction between the two fiscal instruments is deficit biased, spending shocks are met with increased government receipts, but the revenue increase is not as large as the original spending shock.

To determine differences in the responses pre- and post-EMU the SVAR is estimated and impulse response functions are generated separately from 1980q1 to 1998q4, and from 1999q1 to 2006q4. In order to test for differences in the responses pre- and post- EMU the difference in the responses through the four quarters following the initial shock are tested with a Wald test. The null hypothesis is that there is no difference between impulse responses up to three quarters from the time of the shock pre- and post-EMU. The Wald test statistics for the relevant tests are listed in figure 2.2. As the Wald test indicates, there has been no significant

| Policy Response | | | | Policy Interaction | | | | | |
|-----------------|---|------|------|--------------------|-----|---|-------|-------|---------|
| | | S | r | i | | | S | r | i |
| ılse | у | 7.17 | 4.35 | 2.30 | cks | S | | 9.14* | 2.00 |
| Impı | π | 2.38 | 0.70 | 4.39 | Sho | r | 4.353 | | 18.2*** |
| | | | | | | i | 0.59 | 9.49* | |

Figure 2.2: Wald test statistics - difference in impulse response functions

* significant at 10% level of significance

*** significant a 1% level of significance

H₀: difference in impulse response the same pre and post EMU, critical value from Chi distribution with 4 degrees of freedom s = spending, r = receipts, i = interest rates (monetary shocks), y = output, and π = inflation

difference in the way that policy makers have responded to fluctuations in the economy pre-

and post-EMU. Recall from the model presented in section 2.3, that differences in the conduct of fiscal policy pre- and post- EMU could be tied to different weights placed upon output and inflation stabilization by the policy regimes pre- and post- EMU. This result suggests that the differences in weight placed on smoothing fluctuations have not been significant enough to account for changes in deficit positions.

There are significant differences in policy interaction pre- and post- EMU. The test indicates a significant difference in the way government receipts (r) respond to monetary shocks (i). A visual inspection of the difference in impulse response functions with confidence intervals generated by Monte Carlo simulation indicates that the difference does not appear until at least three periods after the initial shock, where the interpretation of such differences are not as forthright.

Figure 2.3 shows the response of the monetary instrument to a government receipts shock with Monte Carlo generated 95 percent confidence bands. There is a significant negative



Figure 2.3: Interest rate response to a fiscal receipt shock

response pre-EMU indicating that the monetary authority would fight against the fiscal authority actions. A contraction by the fiscal authority (a positive receipts shock) is met by an expansionary lowering of the interest rate. Post-EMU there is no significant response of the monetary instrument to the fiscal action. This is most likely due to the aggregation of fiscal policies to which the ECB would have to respond. In addition, there is no change in how monetary authorities respond to spending shocks, government spending responds to monetary shocks, or government receipts respond to monetary shocks in the first three quarters. The fact that the only significant change in the response of authorities to each other makes reliance on fiscal policy less important, excludes this as a possible explanation of worsening fiscal balances.

One significant difference remains between the response of the different fiscal instruments to each other. A significant difference pre- and post-EMU was found in the response of receipts to a spending shock. Figure 2.4 illustrates the differences in the reactions pre- and post-EMU. This significant difference is an indication of fiscal fatigue. A positive response of receipts to



Figure 2.4: Receipt response to a spending shock

a positive spending shock does indicated a balanced fiscal move. A positive spending shock which would increase the deficit is met by an increase in government receipts. This increase, however, does not match the size of the shock to spending.¹³ Thus the spending shock worsens deficit positions. Within the first three quarters, the response of receipts to a spending shock is significantly smaller post-EMU and thus more deficit biased.

To illustrate the sample has been split into three distinct periods; pre-Maastricht (1980q1-1991q1), the Maastricht period (1991q2-1998q4), and post-Maastricht (1999q1-2006q1). Deficits in response to positive spending shocks are depicted in figure 2.5. The only period in which the initial spending shock is met with a non-deficit inducing increase in receipts is during the Maastricht period, when enforcement of deficit rules was credible. The initial response post-Maastricht, in which deficit rules remain under the SGP, has essentially the same deficit

¹³All shocks have been normalized to be one percent pre- and post-EMU.





response as did the pre-Maastricht period under no deficit rules. Over the whole response function, deficit biased responses have been largest post-Maastricht. When the order of spending and receipts are reversed in the VAR, the deficit bias remains in response to a negative receipts shock. This response would be consistent with a fiscal authority trying to meet political aims with less regard for budget balances, a sign of fiscal fatigue.

This conclusion of deficit bias is only true if fiscal shocks are expansionary. If, on the other hand, shocks are contractionary the estimated outcome above would lead to a deficit reduction. Table 2.4 presents the post-EMU average of the estimated fiscal shocks for each country. The average spending shock for each member post-EMU is positive, though relatively

| Country | Spending | Receipt |
|--------------|----------|---------|
| Finland | 0.0003 | 0.1133 |
| France | 0.1105 | -0.0186 |
| Ireland | 0.0238 | -0.0929 |
| Netherlands* | 0.0897 | -0.0207 |

Table 2.4: Average fiscal shocks post-EMU

* Netherlands excludes 2006 quarter 3 and 4

small for Finland.¹⁴ Post-EMU average revenue shocks are negative for each member in the

 $^{^{14}}$ If the last two quarters of 2006 are included for the Netherlands, the average spending shock is negative. This reflects the Netherlands sharp deficit contraction in the last two quarters of 2006 after a steady worsening

sample excluding Finland. Finland's smaller spending shocks and positive revenue shocks reflect their budgetary position, which has been one of the strongest throughout integration. The results do indicate that fiscal shocks have been predominantly expansionary post-EMU. Thus the change in fiscal reaction among instruments has been deficit biased, making fiscal fatigue a significant contributor to worsening budgetary conditions.

2.6 Conclusions

After successful efforts to bring deficits into compliance with the Maastricht treaty, EMU members' budgetary balances have deteriorated. Some members have even violated the deficit rules set out by the SGP. The worsening of budgetary balances could be linked to a greater reliance on fiscal policy as a result of losing the ability to conduct independent monetary policy. The problem arises if members do not meet the OCA criteria or if shock asymmetry worsens as a result of greater integration. The conduct of fiscal policy could also change in the way authorities respond to output and inflation fluctuations. Specifically, if the ECB responds differently to fluctuations than did the individual monetary authorities. It is also possible that the loosening has little to do with structural changes, but more to do with political factors. The inability of ECOFIN to enforce the SGP and the tough reforms undertaken to meet the entrance criteria have made sustaining the same austerity politically difficult. Fiscal fatigue could have set in as countries lost the will and incentive to maintain tight balances by reverting to the deficit biases that were common in Europe starting in the 1970s.

The limited amount of data since the advent of the monetary union has made it difficult to differentiate empirically between possible causes of the worsening of fiscal balances. Yet even with limited data, this study finds support for fiscal fatigue. Identification and correlation of supply and demand shocks suggests that, in general, structural supply shocks are similar across members. This indicates that the structures of the EMU members are similar enough that a common monetary policy should not force excessive reliance on fiscal policy to smooth country specific fluctuations. Demand shocks are also similar, though not as much as supply shocks.

of deficit positions post-EMU

This could be driven by non-structural differences, such as fiscal policy, as fiscal shocks are much less correlated in this sample. There is no evidence to suggest that shocks have become more or less asymmetric as a result of joining the EMU.

Estimation of SVAR response functions and generated impulse response functions from four EMU countries illustrate how policy has changed as a result of joining the EMU. There is no statistical difference in how the fiscal or monetary authorities have responded to fluctuations in output and inflation. Thus, fiscal authorities have not needed to increase their role to make up for differences in how the ECB conducts policy compared to when they had their own independent monetary authorities. Differences in responses have been detected in how authorities interact with each other. Monetary authorities have become less responsive to fiscal policy shocks, lessening the need for stronger reliance on fiscal policy. On the other hand, fiscal policy has become more deficit oriented in the face of expansionary policy since the start of the EMU. Revenues do not increase enough in response to a positive spending shock to prevent deficits. This response is most pronounced under the SGP, whereas under the Maastricht criterion, initial spending shocks were met with equivalent revenue increases.

This result indicates that fiscal fatigue is largely responsible for worsening deficit positions post-EMU. Shocks are not sufficiently different and the relationship is not changing across time. Responses to economic fluctuations are similar pre- and post-EMU, yet fiscal shocks have been more deficit inducing. Such a response is consistent with a fiscal authority trying to meet political aims with less regard for budget balances.

Chapter 3

Productivity Differences and Fiscal Policy in a Monetary Union

3.1 Introduction

The expansion of the European Union (EU) in 2004 included many countries which recently adopted a market economy. Each country is required to eventually join the European Monetary Union (EMU). Becoming a member of the monetary union provides these new member states (NMS) important opportunities to advance trade, attract capital, achieve stability, and continue to grow. It will also lead to important changes in the way the country operates stabilization policy. Once a member joins the EMU it turns over the ability to conduct independent monetary policy to the European Central Bank (ECB). The ECB responds to aggregate fluctuations in output and inflation instead of country specific fluctuations. Members do however maintain control over their fiscal balances. This allows them to conduct fiscal stabilization policy, as well as pursue their own domestic objectives in how they tax and spend. Budgetary balances, however, are monitored by the members of the EMU through a group of finance advisors called ECOFIN. This group can censure members for budgetary positions which are not in line with the overall stability goals of the union.

These important features of being a member of the EMU have just recently been addressed in macroeconomic models. Benigno (2004), Beetsma and Jenson (2005), and Gali and Monecelli (2006) have constructed models which simulate individual countries as members of the EMU. Canzoneri, Cumby, and Diba (CCD) (2004) have worked on models which include the role ECOFIN has in influencing budgetary balances among members of the EMU. Each of these models are built to understand current members of the monetary union. They are not complete, however, in representing some of the exceptional circumstances facing the NMS once they become members of the EMU.

These new entrants have been in the process of switching from a planned economy to a market oriented economy. Coming out of the planned system, these countries were less developed than their Western European counterparts and have been in the process of restructuring and catching up through technological advances. Becoming a member of the EU and eventually becoming a member of the monetary union will lead to even greater increases in technology and productivity. These increases in productivity lead to greater production and improved budgetary positions. They can also cause real exchange rate appreciation and inflation through the Balassa-Samuelson (BS) effect ((Balassa, 1964 and Samuelson, 1965). To capture this effect, the economy must have productivity differences across sectors. Egert et. al. (2005) document the real exchange rate appreciation in some of the NMS, and can tie a portion of that appreciation to the BS theory. The effect is not as large as the original BS effect would predict, partially due to failure of PPP to hold in the tradable sector. Natalucci and Ravenna (2002) and Vilagi (2004) have constructed current models that include productivity differences across sectors, but have not applied them directly to a new member state once it enters the EMU.

This paper seeks to incorporate these important features of the NMS in the EMU into a macroeconomic model, effectively joining the two strands of literature discussed above. The model is calibrated to fit the Czech Republic, a new member state which hopes to join the EMU by 2010. The model is then used to analyze possible responses by the fiscal authority to the productivity advances. In particular, productivity advances lead to both budget surpluses and inflation. The government would come under political pressure at home to lower the surplus through either tax cuts or increased spending. At the same time, they may also be under pressure from ECOFIN to use their fiscal tools to rein in inflation. Both responses are simulated and consumer welfare is compared to see the effects of each type of policy response.

The paper proceeds as follows. The next section gives a more detailed explanation and literature review of the particular features of the EMU that are modeled. Section 3.3 and 3.4 explain the model and how it was calibrated. Section 3.5 presents the simulations, followed by the conclusions in Section 3.6.

3.2 Features of the EMU and New Member States

Studies exploring the effects a currency union has on the participants are few due to the limited number of examples in history. The United States is the most cited example of a currency union, but its usefulness as a case study is limited because of the age of the union and its gradual evolution through time. Other historical examples of currency unions are so small or of such short duration that they have not been subject to intense economic investigation or model building (Bordo and Jonung, 2003).

The EMU as a whole can be modeled much in the same way as the United States (Fagen et. al. (2001)). However, modeling the EMU as a whole neglects some unique features which make modeling individual members important. Domestic issues, inflation differentials, fiscal governance, national sentiment, and the relative infancy of the union lead EMU members to act more like an independent economic entities than the states do in the United States.

General equilibrium models of members within a currency union have just recently been developed. Benigno (2004) introduces a two country model designed to represent the larger countries in the EMU. It incorporates monopolistic competition and price stickiness to evaluate optimal monetary policy for the European Central Bank (ECB). Beetsma and Jensen (2005) expand on Benigno's model and introduce an expanded role for fiscal policy which is independent to each country. Gali and Monacelli (2006) have constructed a model which represents smaller countries in the EMU such as Ireland or Portugal. They build on Beetsma and Jensen by expanding the two country model to an (n) country model where each individual country is small and has no effect on currency union level variables.

The addition of independent fiscal policy reflects a modeling necessity particular to countries within the EMU. Each individual country has maintained control over its own fiscal policy, while there are almost no fiscal instruments at the union level. This is different than in the United States where states' fiscal roles are much less important on the union level and are hardly used for stabilization purposes. In fact, many states are required by law to run a balanced budget, removing any possibility of conducting stabilizing fiscal policy.

Allowing individual countries to maintain complete control over their own fiscal policy introduces the possibility of a country's budgetary practices not aligning with the overarching goal of stability across the union. Fiscal policy makers do want to smooth fluctuations, but they also have a number of other, often politically motivated, objectives to meet. In an attempt to impose the economic stability goals of the union onto fiscal policy makers, restrictions have been placed on the budgets of EMU members.

Restrictions have come in one of two ways. First, rules restricting the size of deficits have been put in place. By placing a rule on the size of the government deficit and debt, the ECB does not run the risk of being expected to bail out a country that has accumulated an unsustainable level of debt. The first deficit rules were introduced in the Maastricht Treaty which laid out the entrance criteria for the EMU. This rule was successful in bringing every member of the EMU within the specified three percent deficit to GDP ratio by the time the EMU was formed. The same deficit rule was extended under the Stability and Growth Pact (SGP) after the advent of the EMU, but the weak enforceability of the SGP has made keeping members' deficits within the specified threshold less successful.

Another way in which budgets have been restricted in the EMU is through monitoring budgetary positions and applying pressure to those who have taken stances that are not in line with the goals of the union. The best example of this is The Broad Economic Policy Guideline's (BEPG) reprimand of Ireland in 2000. Ireland enjoyed strong economic growth after joining the EMU and had a budget surplus. As a result, the Irish government proposed a plan of tax cuts to give the surplus back to the people. ECOFIN, the monitoring enforcing arm of the EMU, instead recommended that fiscal authorities raise taxes or decrease spending to fight inflation, in line with the union's overarching goal of stability. Ireland ignored this recommendation and a reprimand was published by ECOFIN in the Irish papers and the Financial Times. Though no direct penalty was assigned, the BEPG used public pressure to push Irish politicians into a more counter-cyclical budget (Hallerberg (2004), p.60-61). This tendency was not limited to Ireland, Gali and Perotti (2003) and the IMF staff (2004) have found that since joining the EMU, current members have become more deficit biased in budgetary balances. They find that in times of improved budgetary conditions members either increase spending or decrease taxes.

The fiscal restraints placed on members, therefore, become another important feature to take into account when modeling members of the EMU. Models of countries within the EMU that take into account the fiscal constraints of the EMU have been considerably less frequent. Canzoneri, Cumby, and Diba (CCD) (2004) create a model of a country in the currency union that is subject to fiscal restraints such as those in the SGP. This model is a one country, one sector model which is calibrated to both a typical large and small EMU country. It also is calibrated to a typical EMU country with a large debt to GDP ratio and one with a smaller debt to GDP ratio.

Such models have begun to increase our understanding of the current situation in the EMU just as the the EMU prepares for its next expansion. In 2004, the EU expanded to include five Central Eastern European countries (CEEC), three Baltic states, and two Mediterranean states. Written into the rules for acceptance into the EU was a requirement that each country eventually join the monetary union. Most of the Baltic States are expected to join the EMU sometime in 2007 or 2008, while all are scheduled to enter by 2010 (though recent turmoil may delay entrance for some). These countries are different than most of the original members of the EMU in an important way. With the exception of Malta and Cyprus, all of these countries are coming from the former Soviet bloc and have recently moved from a planned economy system to a market based system. Coming out of the Soviet system these countries were less developed than their Western European counterparts and have been in the process of restructuring and catching up through technological advances.

Though all sectors could gain from the technological advances being used in the more advanced countries of the world, the greatest potential for technological gains is in the antiquated industrialized sectors and other sectors that are subject to international competition. This increase in productivity concentrated in the tradable sector of the economy is often thought of as an important component of the catching up process. Productivity growth differences across sectors would also be expected once members become members of the EMU and the risk premium falls, as these countries gain a stable currency and the structure of being a member of the EMU.

Productivity differences as a result of a continued catching up process or increased investment from a fall in the risk premium have received little attention in the modeling of members in a monetary union. The implications of productivity differences are most often presented in the effects they have on the real exchange rate and inflation differentials across countries. One popular theory that attempts to explain why PPP may not hold, and thus real exchange rate fluctuations and inflation differentials as a country catches up to others, is the Balassa-Samuelson (BS) effect (Balassa, 1964 and Samuelson, 1965).

This theory assumes there are two sectors in the economy, one that is open to trade and one that, because of transportation costs, is not open to trade. Countries that are in the catching up process are most likely to realize technology gains in the tradable goods sector. It is assumed that the law of one price holds for goods in the tradable sector so that their price is determined exogenously. As a result, technology improvements in the tradable sector cannot be reflected in the price. To keep the real wage equal to the marginal product of labor, tradable firms must increase the nominal wage paid to its workers. Assuming that labor is mobile across sectors, the wage increase in the tradable sector translates into a wage increase in the non-tradable sector. Producers in the non-tradable sector are forced to raise their prices in response to higher wages. With tradable prices fixed, this results in inflation and an appreciation of the real exchange rate (rer).

Original models of the BS effect were purely supply side models and not useful in analyzing the role of monetary and fiscal policy. Sticky price models in both the closed and open economy have been useful in capturing the role of monetary and fiscal policy as well as explaining short run economic fluctuations. The addition of the demand side and sticky prices make the inflationary tendencies of the BS effect difficult to capture. New Open Economy Macroeconomic (NOEM) models, such as the one presented in this paper, have monopolistic competitive firms with differentiated products. These firms optimally choose their price, but not in every period. This makes prices sticky and introduces an important role for demand. The introduction of these features violates the original BS assumption that the price of tradable goods is fixed. Hit with a positive productivity shock, a monopolistically competitive firm will reduce prices. MacDonald and Ricci (2002) as well as Benigno and Thoenissen (2003) show that in a sticky price model this fall in the price of tradable goods overcomes Balassa-Samuelson CPI inflation as well as the real exchange rate effect.

To illustrate, the real exchange rate between two countries can be defined as

$$rer = \frac{eP^*}{P} \tag{3.1}$$

where P is the domestic price, eP^* is the price of foreign goods in terms of the domestic currency, and (e) is the nominal exchange rate.

Assume the domestic economy is made up of two sectors; one which produces tradable goods (subscript T) and one which produces non-tradable goods (subscript N). Using the consumption aggregate of Obstfeld and Rogoff (1998), the following price index can be derived

$$P = (P_N)^{\gamma} (P_T)^{(1-\gamma)} \tag{3.2}$$

 γ comes from the aggregate consumption function and represents the share of total expenditure allocated to the consumption of non-tradable goods. After equation (3.2) is plugged into the definition of the real exchange rate (3.1) and that is multiplied by $\frac{P_T}{P_T}$ then the following expression for the real exchange rate is obtained:

$$rer = irer^{\gamma} tot \tag{3.3}$$

Where

$$irer = \frac{P_T}{P_N} \tag{3.4}$$

and the terms of trade are the price of imports for the domestic economy divided by the price

of exports in terms of the domestic currency:

$$tot = \frac{eP^*}{P_T} \tag{3.5}$$

This expression for the real exchange rate allows us to see the different sources of real exchange rate movement. According to the BS assumptions, there would be no terms of trade effect because prices of tradable goods are determined exogenously in the foreign market. In this case, the productivity differences across the tradable and non-tradable sector would lead to an appreciation of the real exchange rate through the appreciation of the internal real exchange rate (irer). The real exchange rate measured in the economy and derived in sticky price models, however, does have a terms of trade component. As productivity increases faster in the tradable sector the advances push down the price of tradable goods and the terms of trade worsen for the domestic economy (represented by an increase in the terms of trade). This worsening of the terms of trade can overcome the appreciation of the internal real exchange rate and the real exchange rate would depreciate as a result of the tradable sector productivity growth. In addition, the price decrease in the tradable sector can be larger than the price increase in the non-tradable sector and CPI would actually fall. Both of these results are not what the BS effect predict and are not what one seems to see in "catching up" countries where inflation is high and the real exchange rate is appreciating.

Vilagi (2004) shows how sticky price models with demand factors can replicate the BS effect which one would expect to see in the NMS. If the substitutability between tradable goods in the two countries is high enough, when prices begin to fall in the domestic tradable sector foreign buyers will substitute away from their tradable good and into the domestic tradable good. This increase in demand for the domestic tradable good will put pressure on prices to rise or at least slow down the original disinflation.

Some models have been constructed which attempt to capture the effect of productivity differences across sectors. Natalucci and Ravenna (2002) use a New Open Economy Macroeconomic (NOEM) model calibrated to the Czech Republic which includes two sectors. They explore the optimal monetary policy and exchange rate regime for an accession country before it enters the EMU. Duarte and Wolman (2002) construct a model of members in the EMU that is calibrated to match Germany. They also include two sectors, yet do not capture the exchange rate appreciation or inflationary effects one would expect for the new member states, though they do find productivity differences play an important role in inflation differentials.

Because the model in the next section places emphasis on the BS effect in the NMS, it is important to look at what role the BS effect has played in these accession countries. Figure 3.1 shows the real effective exchange rate of the new members state which had previously planned economies. Each country experienced a strong appreciation in their real exchange rates shortly

Figure 3.1: Real exchange rates in the new member states



New mebers state's real effective exchange rates 12 major trading partners - CPI

after the fall of the Soviet Union. The appreciation begins to slow after 2000, but continues for every country except Latvia.

Early research supported the BS theory as a cause of the real appreciation (Sinn and Reutter, 2000; Halpern and Wyplosz, 2001; Jazbec 2002). Subsequent research has tempered some of the results of the earlier papers, and attribute about half of the appreciation to the BS effect (Fleck et al., 2002; Egert et al., 2003; Wagner and Hlouskova, 2004; Garcia-Solanas,

2007). One important reason subsequent research has reduced the role of the BS effect is the failure of PPP to hold in the tradable good sector. The failure of PPP allows a terms of trade effect which reduces the appreciation of the real exchange rate.

The remainder of the appreciation can be explained by factors other than the BS effect. Krajnyak and Zettelmeyer (1998) find that the former Soviet Republics started out the transition process with undervalued currencies. Halpern and Wyplosz (1999) also find that these currencies were initially undervalued, though most had corrected themselves. As these currencies moved toward their correct valuation, an appreciation was necessary. MacDonald and Wojcik (2004) also find that the process of deregulating prices that was ongoing through the transition process contributed to the explanation of the initial appreciation.¹

These studies also confirm that the real exchange rate in these accession countries has begun to slow. This reflects the correction for the undervaluation of the currency as well as a slow down in the catching up process. By the time the accession countries enter the EMU the initial undervaluation should have self-corrected and the process of price deregulation, according to specification for entrance into the EMU should be near completion. Thus these sources of appreciation and inflation should be a non-factor. The process of technology improvement once these countries enter the EMU should strengthen as they continue to catch up. In addition, the technology growth could even be expected to increase as each country's risk factor falls in international markets once they become a member of the EMU. Therefore the BS effect through technology differentials across sectors remains an important area of modeling for the new accession countries.

Much like the case of Ireland, the high growth and inflation may threaten the price stability that the ECB has strived to maintain for the Union as a whole. If every new country that entered the EMU had this inflationary effect, the ECB may have to raise interest rates to the detriment of the original EMU members. There could be extra incentive for ECOFIN to pressure the new member states to conduct fiscal policy designed to reduce inflationary pressures. At the same time the productivity improvement in the tradable sector causes a

¹See Egert et. al. (2005) for a comprehensive survey of the real exchange rate literature.

budget surplus. Politicians have an incentive to conduct pro-cyclical policy i.e. give the surplus back to the people or spend it, which would be even more inflationary. This is exactly what happened in Ireland which brought a condemnation from ECOFIN. Gali and Perotti (2003) find evidence of pro-cyclical policy in good times for all members of the EMU.

3.3 Model Description

This model captures some of the characteristics of the new EU member states once they join the EMU, as explained above. It is a two region model with the EMU being one region and a new member state the other. The model is calibrated and designed to represent the Czech Republic as a new member of the EMU. Consistent with the situation in the EMU, the Czech Republic has control over its own fiscal policy. Monetary policy is controlled by the ECB and responds to union-wide inflation on which the Czech Republic's inflation rate only has a small influence.

The Czech economy has a non-tradable and tradable sector, in order to look at the possible implication of productivity differences associated with catching up and the fall of the risk premium. Labor can move freely between the non-tradable and tradable sector but not across regions. Thus, wages equalize across sectors but not across regions. Each sector produces a differentiated good along the unit interval. There are assumed to be complete markets for state-contingent securities across the union including the Czech Republic. In addition, each sector is subject to sticky prices. An exogenous third region, representing the rest of the world, is added with which the Czech Republic trades. This region is added for calibration purposes and it is assumed that the Czech Republic is small enough that any interaction with the world does not affect the exchange rate. Prices in the world as well as the exchange rate are take as exogenous.

3.3.1 Households

The representative household in both the EMU and the Czech Republic seeks to maximizes its utility:

$$U_t = E_t \sum_{\tau=t}^{\infty} \beta^{\tau-t} \left[\log C_{\tau} - \frac{N_{\tau}^{1+\chi}}{1+\chi} \right].$$
 (3.6)

where χ is the inverse of the labor supply elasticity. This functional form is the same for both the EMU and the Czech Republic through the consumption, labor decision, and χ are region specific.

Households in the the Czech Republic have a choice of consuming a non-tradable (N) or tradable (T) good according to the following Dixit-Stigliz consumption aggregate.

$$C_{t}^{CZ} = \left[(\gamma_{czn})^{\frac{1}{\eta_{czn}}} (C_{N,t}^{CZ})^{\frac{\eta_{czn}-1}{\eta_{czn}}} + (1-\gamma_{czn})^{\frac{1}{\eta_{czn}}} (C_{T,t}^{CZ})^{\frac{\eta_{czn}-1}{\eta_{czn}}} \right]^{\frac{\eta_{czn}-1}{\eta_{czn}-1}}$$
(3.7)

The tradable good can come from a Czech producer (H), a EMU producer (E), or a world producer (W). The tradable good aggregate is represented by:

$$C_{T,t}^{CZ} = \left[(\gamma_{czh})^{\frac{1}{\eta_{cz}}} (C_{H,t}^{CZ})^{\frac{\eta_{cz-1}}{\eta_{cz}}} + (\gamma_{czw})^{\frac{1}{\eta_{cz}}} (C_{W,t}^{CZ})^{\frac{\eta_{cz-1}}{\eta_{cz}}} + (1 - \gamma_{czh} - \gamma_{czw})^{\frac{1}{\eta_{cz}}} (C_{E,t}^{CZ})^{\frac{\eta_{cz-1}}{\eta_{cz}}} \right]^{\frac{\eta_{cz}}{\eta_{cz}-1}}$$
(3.8)

Where $C_{subscript}^{superscript}$ is consumption in "superscript" of a good originating from the "subscript" sector. γ is proportion of the basket of goods that is made up of that particular good. η is the elasticity of substitution between the given goods in the consumption aggregate.

For simplicity and to concentrate on the Czech Republic, the EMU household is only modeled in its interaction with the Czech Republic. Its consumption choice is between its own produced tradable good and that of the Czech Republic according to

$$C_{t}^{E} = \left[(\gamma_{E})^{\frac{1}{\eta_{e}}} (C_{E,t}^{E})^{\frac{\eta_{e}-1}{\eta_{e}}} + (1-\gamma_{E})^{\frac{1}{\eta_{e}}} (C_{H,t}^{E})^{\frac{\eta_{e}-1}{\eta_{e}}} \right]^{\frac{\eta_{e}}{\eta_{e}-1}}$$
(3.9)

Again where $C_{H,t}^E$ is consumption in the EMU (E) of the Czech produced tradable good (H). The Czech Republic does export outside of the EMU and for calibration purposes export demand for Czech tradable goods by the world is a constant fraction of tradable production.

$$C_{H,t}^W = \gamma_w Y_{H,t}^{CZ} \tag{3.10}$$

Where $Y_{H,t}^{CZ}$ is total production in the Czech tradable sector and γ_w is the fraction of that production exported to someone other that the EMU members.

Using the consumption aggregate, the consumer price index for the EMU can be derived as

$$P_{c,t}^{E} = \left[\gamma_{E}(P_{t}^{E})^{1-\eta_{e}} + (1-\gamma_{E})(P_{H,t}^{CZ})^{1-\eta_{e}}\right]^{\frac{1}{1-\eta_{e}}}$$
(3.11)

Similarly the consumer price index for the Czech Republic is

$$P_{c,t}^{CZ} = \left[\gamma_{czn} (P_{N,t}^{CZ})^{1-\eta_{czn}} + (1-\gamma_{czn}) (P_{T,t}^{CZ})^{1-\eta_{czn}}\right]^{\frac{1}{1-\eta_{czn}}}$$
(3.12)

where

$$P_{T,t}^{CZ} = \left[\gamma_{czh} (P_{H,t}^{CZ})^{1-\eta_{cz}} + \gamma_{czw} (P_t^W)^{1-\eta_{cz}} + (1-\gamma_{czh}-\gamma_{czw}) (P_t^E)^{1-\eta_{cz}}\right]^{\frac{1}{1-\eta_{cz}}}$$
(3.13)

and $P_{subscript}^{superscript}$ is the price in region "superscript" for sector "subscript", where "c" as a subscript represents CPI.

Using the consumption aggregates and the consumer price index, the consumer's nominal budget constraint for both the EMU and the Czech Republic is

$$P_{c,t}(1+\tau_t^c)C_t + E_t(Q_{t,t+1}B_{t+1}) + TR_t = (1-\tau_t^w)W_tN_t + B_t$$
(3.14)

Where each variable is region specific. τ_t^c and τ_t^w are taxes on consumption and wages respectively while TR_t is government transfers. Because the EMU as a whole does not have its own independent fiscal authority τ_t^c , τ_t^w , and TR_t will be set to zero for the EMU. B_{t+1} is the nominal payoff in period t+1 of the portfolio (including shares in EMU and Czech firms) at the end of period t. $Q_{t,t+1}$ is the stochastic discount factor for one-period ahead nominal payoffs, which because of the nature of the monetary union, is common across the EMU and Czech Republic. It is equivalent to the inverse of the gross nominal interest rate, which will be the main instrument of monetary policy by the ECB. W_t is the nominal wage earned on providing labor N_t . For the Czech Republic, households have the option of providing labor in the tradable and non-tradable sector. Assuming perfect substitutability and labor mobility across sectors within the Czech Republic $N_t^{CZ} = N_{N,t}^{CZ} + N_{H,t}^{CZ}$. This assures that $W_{N,t}^{CZ} = W_{H,t}^{CZ} = W_t^{CZ}$. Labor is not mobile across regions so W_t^E does not equal W_t^{CZ} .²

Utility maximization (3.6) by the household subject to its budget constraint (3.14) provides the following labor supply condition in each region.

$$(N_t)^{\chi} = \left(\frac{w_t}{C_t}\right) \left(\frac{(1-\tau_t^w)}{(1+\tau_t^c)}\right)$$
(3.15)

Where w_t is the real wage $W_t/P_{c,t}$. The Euler condition is

$$\frac{1}{1+i} = \beta E_t \left[\left(\frac{C_t}{C_{t+1}} \right) \left(\frac{P_{c,t}}{P_{c,t+1}} \right) \left(\frac{(1+\tau_t^c)}{(1+\tau_{t+1}^c)} \right) \right]$$
(3.16)

Once again, each of these first order conditions are region specific.

Because of complete markets for state-contingent securities across the union and the common gross nominal interest rate, the Euler condition for each region can be combined to show

$$C_t^E = \varrho C_t^{CZ} (1 + \tau_t^c) rer_t^{-1}$$
(3.17)

where ρ is a constant which depends on the initial relative net asset positions. Assuming zero initial net foreign assets for the EMU and the Czech Republic, $\rho = 1$.

Once the overall level of consumption in each region has been optimally chosen the consumer chooses between the possible consumption choices according to:

$$C_{E,t}^{E} = \gamma_E \left(\frac{P_{c,t}^{E}}{P_t^{E}}\right)^{\eta_E} C_t^E \tag{3.18}$$

²Halpern and Wyplosz (2001) do provide some evidence of wage equalization for the transition countries from 1992-1999. Crescenzi, Rodriguez-Pose, and Storper (2007) provide evidence of low labor mobility across Europe compared to the US.

$$C_{CZ,t}^{E} = (1 - \gamma_E) \left(\frac{P_{c,t}^{E}}{P_{H,t}^{CZ}}\right)^{\eta_E} C_t^E$$
(3.19)

$$C_{N,t}^{CZ} = \gamma_{czn} \left(\frac{P_{c,t}^{CZ}}{P_{N,t}^{CZ}} \right)^{\eta_{czn}} C_t^{CZ}$$
(3.20)

$$C_{T,t}^{CZ} = (1 - \gamma_{czn}) \left(\frac{P_{c,t}^{CZ}}{P_{T,t}^{CZ}}\right)^{\eta_{czn}} C_t^{CZ}$$
(3.21)

$$C_{H,t}^{CZ} = \gamma_{czh} \left(\frac{P_{T,t}^{CZ}}{P_{H,t}^{CZ}}\right)^{\eta_{cz}} C_{T,t}^{CZ}$$
(3.22)

$$C_{E,t}^{CZ} = \left(1 - \gamma_{czh} - \gamma_{czw}\right) \left(\frac{P_{T,t}^{CZ}}{P_t^E}\right)^{\eta_{cz}} C_{T,t}^{CZ}$$
(3.23)

Which were derived from the respective consumption baskets and price indices.

3.3.2 Firms

Each sector (the EMU (E), Czech produced tradable (H), and Czech produced non-tradable (N)) is made up of a continuum of firms producing differentiated products. The existence of differentiated products allows each of the firms to set prices, but it is assumed that each individual seller is small relative to the whole market and thus they take the consumption and price indices as given. Prices are assumed to be sticky according to Calvo (1983). Each period the individual firm has a fixed probability of changing its price $(1 - \alpha)$, where α is specific to the sector but is constant within each particular sector. Therefore, when setting its price, the firm maximizes its expected discounted profit taking into consideration the probability that it may not be able to change its prices at a future date. A linear production technology for each firm (f) in each sector is used. For example, for the non-tradable sector in the Czech Republic each firms production function is

$$Y_t^N(f) = Z_t^N N_t^N(f)$$
(3.24)

where Z_t is each firm's exogenous productivity level which is common across the sector. Each sector is made up of a continuum of firms on the interval [0,1]. Following Chari, Kohoe, and
McGattan's (2000) algebra for a composite good, a bundler takes each individual firm's good and bundles them into a final good. For the Czech non-tradable sector,

$$Y_t^N = \left(\int_0^1 Y_t^N(f)^{\frac{(\sigma_N - 1)}{\sigma_N}} df\right)^{\frac{\sigma_N}{(1 - \sigma_N)}}$$
(3.25)

Using the bundler artifice, the demand for each individual firm's good can be derived. For the Czech non-tradable good sector it is

$$Y_t^N(f) = \left(\frac{P_{N,t}^{CZ}}{P_{N,t}^{CZ}(f)}\right)^{\sigma_N} Y_t^N$$
(3.26)

The non-tradable firms pricing decision is to choose the price $P_{N,t}^{CZ*}(f)$ to maximize

$$E_t \sum_{k=t}^{\infty} (\alpha\beta)^{k-t} \lambda_k \left[P_{N,k}^{CZ*}(f) Y_k^N(f) - TC_N Y_k^N \right]$$
(3.27)

Where $\lambda_k = (P_{c,k}^{CZ} C_k^{CZ} (1 + \tau_k^c))^{-1}$ and $Y_k^N(f)$ is given in equation (3.26). TC_k is the total cost where the first derivative is the firm's marginal cost. Using the production function and profit maximization $MC_k = W^{CZ}/Z_k^N$, where W^{CZ} is the nominal wage in the Czech Republic (recall the wage was assumed to equalize across the tradable and non-tradable sector). According to the first order conditions for the individual firm, the optimal price level for the Czech non-tradable firm is

$$P_{N,t}^{CZ*}(f) = \frac{\sigma_N}{(\sigma_N - 1)} \left(\frac{E_t \sum_{k=t}^{\infty} (\alpha\beta)^{k-t} \lambda_k (W^{CZ}/Z_k^N) (P_{N,k}^{CZ})^{\sigma_N} Y_k^N}{E_t \sum_{k=t}^{\infty} (\alpha\beta)^{k-t} \lambda_k (P_{N,k}^{CZ})^{\sigma_N} Y_k^N} \right)$$
(3.28)

Where following Calvo

$$(P_{N,t}^{CZ})^{(1-\sigma_N)} = (1-\alpha)(P_{N,t}^{CZ*})^{(1-\sigma_N)} + \alpha(P_{N,t-1}^{CZ})^{(1-\sigma_N)}$$
(3.29)

The decision for the Czech tradable firms and the European firms will be the same, with each sector having its own parameters and prices.

3.3.3 Market Clearing and Policy

Goods produced in the EMU can be consumed by EMU households and by households in the Czech Republic

$$Y_t^E = C_{E,t}^E + C_{E,t}^{CZ} (3.30)$$

Goods produced in the Czech tradable sector can be consumed by Czech households, EMU households, world households, and the Czech government.

$$Y_{H,t}^{CZ} = C_{CZ,t}^E + C_{H,t}^{CZ} + C_{CZ,t}^W + G_{H,t}$$
(3.31)

Goods produced in the Czech non-tradable sector can be consumed by Czech households and the Czech government.

$$Y_{N,t}^{CZ} = C_{N,t}^{CZ} + G_{N,t} aga{3.32}$$

Total production in the Czech republic is simply

$$Y_t^{CZ} = \left(\frac{P_{N,t}^{CZ}}{P_{c,t}^{CZ}}\right) Y_{N,t}^{CZ} + \left(\frac{P_{H,t}^{CZ}}{P_{c,t}^{CZ}}\right) Y_{T,t}^{CZ}$$
(3.33)

Fiscal policy in both spending and taxes will be taken as exogenous. In the simulations, the technology shock is an anticipated exogenous shock. When looking at how fiscal policy responds to such shocks, the changes in spending and taxes will be calibrated to either reduce inflation or control budgetary balances.

The real budget balance is current receipts less payments on last period's debt (D_{t-q}) , government spending, and transfer payments.

$$S_{t} = \tau_{t}^{c} C_{t}^{CZ} + \tau_{t}^{w} W_{t}^{CZ} N_{t}^{CZ} - \left[i_{t-1} \left(\pi_{c,t}^{CZ} \right)^{-1} D_{t-1} + \left(\frac{P_{c,t}^{CZ}}{P_{T,t}^{CZ}} \right) G_{T,t} + \left(\frac{P_{c,t}^{CZ}}{P_{N,t}^{CZ}} \right) G_{N,t} + TR \right]$$

$$(3.34)$$

The debt level is defined as

$$D_{t} = (1 + i_{t-1}) \left(\pi_{c,t}^{CZ}\right)^{-1} D_{t-1} + \left(\frac{P_{c,t}^{CZ}}{P_{T,t}^{CZ}}\right) G_{T,t} + \left(\frac{P_{c,t}^{CZ}}{P_{N,t}^{CZ}}\right) G_{N,t} + TR - \tau_{t}^{c} C_{t}^{CZ} - \tau_{t}^{w} W_{t}^{CZ} N_{t}^{CZ}$$

$$(3.35)$$

The government's fiscal balance must be zero in the steady state. Using fiscal data from the Czech Republic which includes sources of revenue and disbursement not modeled here, and the fact that the Czech Republic was not running a balanced budget when the values were calibrated make it impossible to calibrate a model with a balanced budget as the initial condition. To correct for this, a piece of the government spending or revenue must be calibrated to insure solvency. This calibration may deviate from the actual value in the data. Government transfers are designed and calibrated to insure that the balance zeros out in the steady state.

Monetary policy is controlled by the ECB. The ECB does not look at one particular country's inflation rate when setting monetary policy, but at an aggregate of the region as a whole. Because of the relatively small size of the Czech Republic, when the ECB looks at the aggregate inflation rate, Czech inflation will play only a minor role. Thus the inflation rate the ECB looks at when making its policy decisions is

$$\pi_t^{UNION} = (\pi_{c,t}^E)^{\theta} (\pi_{c,t}^{CZ})^{(1-\theta)}$$
(3.36)

Where $(1 - \theta)$ is the weight placed on Czech inflation in the aggregate. The ECB follows a simple Taylor rule according to

$$i_t = -\log\beta + \vartheta \pi_t^{UNION} + \epsilon_t^i \tag{3.37}$$

The terms of trade, real exchange rate, and internal real exchange rate are defined as

$$tot_t = \frac{P_{E,t}^E}{P_{H,t}^{CZ}} \tag{3.38}$$

$$rer_t = \frac{P_{c,t}^E}{P_{c,t}^{CZ}} \tag{3.39}$$

$$irer_t = \frac{P_{T,t}^{CZ}}{P_{N,t}^{CZ}}$$
 (3.40)

3.4 Calibration

For most parameters this model is calibrated to the Czech Republic following Natalucci and Ravenna (NR, 2002) and to the EMU following Canzoneri, Cumby, and Diba (CCD, 2004). Among accession countries, the Czech Republic provides relatively clean and available historical statistics (NR 2002 and Hledik, 2003). Following standard measures found in the literature, the quarterly discount factor, β , is set to 0.99 for both regions which implies a world interest rate of 4 percent in the zero inflation steady state. The reciprocal of the Frisch elasticity of labor supply, χ , is set to 4 for the Czech case and set to 3 for the EMU, both of these measurements fall within common empirical estimates of the Frisch elasticity of 0.05 to 0.35. NR used a value of 2, which does not fall within the common bounds, so the alternative is chosen here. Empirical evidence of the length of time that prices remain unchanged is mixed. Evidence cited by Gali and Gertler (1999) and Begnino and Woodford (2003) suggest that price adjustments occur between once and twice a year. Subsequently, for each sector α_i is set to 0.67, allowing prices to adjust on average every three quarters. The elasticity of substitution across goods (σ) determines the firms' markup of price over marginal cost. CCD use Bayoumi, Laxton, and Pesenti (2003) to choose a mark up of 17 percent by setting σ equal to 7. NR choose a smaller markup and set σ equal to 10 for an 11 percent markup. These are the calibrated values chosen to represent each respective region.

The relative weights placed on consumption of each particular good in the Dixit-Stigliz consumption aggregates are calibrated to match certain characteristics of the Czech economy. The weight placed on non-tradable goods (γ_{czn}) is set to 0.53. This reflects the fraction of output that comes from the non-tradable sector according to the Czech Statistical Office National Accounts: Output by Economic Activity (2006)³. The remainder of the weights are calibrated in order to match the average net export to GDP ratio (-0.03) and the fraction of GDP that does not come from government spending or net exports (0.81). These ratios represent the average ratio in the Czech Republic from 1993 quarter one to 2006 quarter four.

³Activities included in the tradable sector are agriculture, fishing, mining and quarrying, manufacturing, electricity, and gas.

The calibrated weight placed on Czech goods by the members of the EMU is 0.09, reflecting the small economic size of the Czech Republic in relation to the EMU as a whole. In order to match the net export and consumption to GDP ratio, the fraction of Czech tradable output demanded by the world (γ_w) is set to 0.35 and the weight placed on consumption of the world good by the Czechs (γ_{czw}) is 0.4. The elasticity between consumption in the tradable goods sector (η_e , η_{cz}) is set as in Vilagi (2004) to 30. The elasticity between tradable and non-tradable goods η_{czn} is set to 2.

In order to solve the model numerically, initial values for exogenous variables must be calculated. Quarterly data for the Czech Republic from 1995 to 2005 come from the OECD Economic Outlook (2007). These data are used to find the average ratio of debt, government purchases, and government transfers to GDP. Government spending is defined as total government consumption plus fixed investment. The average ratio of government spending to GDP is 0.216 in the Czech Republic. This is the starting value used for government spending in both the tradable and non-tradable sector. The end of period stock of debt as a percentage of GDP has an average of 0.43. As explained above the only case in which parameterizations will deviate from the data is in the transfer to GDP ratio. The model sets this value to be 0.31 where the value in the actual data is 0.18. Average tax rates on consumption and labor income for the Czech Republic come from Carey and Rabesona (2002) and are 0.20 and .415 respectively.

The final parameters that need to be calibrated come in the monetary policy rule. First, in calculating the union wide inflation rate that the ECB responds to, the weight put on the Czech inflation $(1 - \theta)$ is set to match the relative economic size of the Czech Republic compared to the rest of the EMU. Using 2006 measures of real GDP, the Czech Republic is 0.014 the size of the current EMU as a whole. The coefficient on union wide inflation in the ECB's Taylor rule (ϑ) is set as in CCD to 2.7. A complete table of the calibrated values can be found in Figure D.1.

3.5 Simulations

3.5.1 Productivity Shock to the Tradable Sector

Continued and accelerated improvements to the production of tradable goods and continued catching up can be expected once the Czech Republic joins the EMU. Therefore anticipated productivity shocks to the tradable sector are simulated. Because the shocks are anticipated a Newton-Raphson method is used to solve the model forward. The initial condition from which the economy begins corresponds to a zero inflation, balanced budget, steady state solution to the model using averages of government spending and taxes as measured above.

Figure 3.2 presents the impulse response functions for a permanent increase of productivity in the tradable sector, or a 10 percent increase in the growth rate of productivity in period one. As predicted, the internal real exchange rate appreciates (recall it is defined as the price of tradable goods divided by the price of non-tradable). This is driven by the initial increase in non-tradable prices as well as a drop in the price of home produced tradable goods in the Czech Republic. Inflation in the non-tradable sector begins to fall after the initial shock as higher prices cause consumption of non-tradable goods (CCN) to fall. The increase in non-tradable price is working through the BS mechanism. Productivity increases in the tradable sector cause wages to increase across both sectors in the Czech Republic. This forces non-tradable producers to raise the price of their goods, insuring that the real wage is still equivalent to the marginal product of labor.

Prices of home produced tradable goods fall with improved productivity because tradable good producers can set prices, a violation of the original BS criteria. The high substitutability of tradable goods causes EMU consumers to increase their consumption of the Czech tradable good (CEC). This increase in demand is large enough to limit the fall in the price of domestically produced home goods such that the rise of prices in the non-tradable good sector leads to CPI inflation. The fall in the price of home produced tradable goods leads to a worsening of the terms of trade for the Czech Republic. Due to the high elasticity of tradable goods, the worsening of the terms of trade are not strong enough to overcome the appreciation of the internal real exchange rate. As a result the real exchange rate appreciates. This result



Anticipated productivity shock in the tradable sector – 10% level increase

Figure 3.2: Shock to productivity in the tradable sector

is consistent with empirical estimations that find evidence of real exchange rate appreciation in accession states as a result of productivity differences, but it is not as high as a traditional Balassa-Samuelson representation would predict (which, in essence, is the internal real exchange rate).

In the EMU, the improved terms of trade as well as a dominant wealth effect lead to increased consumption (CE). The increase in consumption of its own good (CEE) overcomes the small decrease in consumption of the EMU good in the Czech Republic (CCE) and there is a slight increase in prices in the EMU (even excluding the Czech inflation). There is no such wealth effect in the Czech Republic because they anticipate both a fall in tradable prices and a increase in non-tradable prices. Therefore they do not feel any richer than they would have had there not been a shock. The fact that non-tradable prices rise more than tradable prices fall leads to gradual reduction of consumption in the Czech Republic (CC) after an initial increase.

The rise in inflation in the Czech Republic is tied to the increased wage, but has little effect on the inflation rate for the EMU because of its small weight in aggregate European inflation. The slight reaction of the ECB to union wide inflation is much less than what the Czech National Bank would have done to maintain a stable inflation rate.

The productivity shock does lead to a positive deviation away from a balanced budget in the first four quarters after the shock. This improvement in the budgetary position at this point of the analysis is unrestricted and leads to a fall in the debt level.

One interesting outcome of the favorable technology shock to the tradable sector is that it lowers welfare in the Czech Republic over the simulated period. Welfare is measured as the aggregate utility of the represented agent in each country. Changes in welfare are measured as the sum of deviations away from the steady state level of utility over the simulated time period. The eventual fall in consumption in the Czech Republic, as well as increased work as a result of a permanently higher wage leads to a reduction in welfare over the simulated period.⁴

⁴The permanent increase in the level of productivity does lead to a current account surplus. The future claims of foreign assets as a result are not included in the utility function and thus the calculation of welfare over the length of the simulation. In alternate measures of welfare this current account surplus could be welfare improving. On a related note if the substitutability between tradable goods is lowered such that BS effect is

3.5.2 Fiscal Responses to Productivity Improvements

Surplus Reduction

As illustrated above, the positive technology shock in the tradable sector leads to an improvement in fiscal budgetary balances. The surplus to GDP ratio increases from an initial value of zero to 2.66 percent one period after the shock. The balance remains near or above zero for the rest of that year. The Czech Republic would most likely experience the same political pressure Ireland did and as a new member of the monetary union follow the trend of more established members by increasing spending or decreasing taxes in light of surpluses.

Assuming the government also anticipates the technology advancement and the subsequent surplus, fiscal responses are simulated to begin the same period as the shock and last until period five. The size of the fiscal response is calibrated so that the surplus is reduced to zero in period one.

The government could respond to the surplus by increasing spending. If the government spending to GDP ratio was increased from 0.216 to 0.2467, the surplus is reduced to near zero for the duration of the response. The effects of this simulation are presented in figure E.1, where the response with the government action (+ line) is compared to the impulse response functions without any intervention (dotted line). There is increased production in the domestic sectors but a small crowding out of consumption in the Czech Republic (CC) for most of the stimulus. The additional demand by the government leads to higher wages which lead to higher inflation. The higher prices decrease consumption (CC for Czech and CE for the EMU) during the stimulus, but it eventually recovers and is stronger than it would have been without the stimulus. This along with the increase in labor during the stimulus to take advantage of higher wages leads to a decrease in utility during the stimulus but higher welfare for the rest of the simulation. Over the whole simulation, welfare is higher then it would have been without the government intervention in both the Czech Republic and the EMU.

Surplus reduction could also be accomplished through tax reductions. Figure E.2 simulates the reduction in consumption taxes from its initial rate of 0.2 to 0.163. This value has been

overcome, the welfare effects (as measured here) of a productivity increase are positive.

calibrated to insure that the surplus is zero in period one. Once again inflation is higher as a result of the tax cut but not as high as it was with the increase in government spending. One major difference is the effect on consumption in the Czech Republic. The tax cut, in comparison to a spending increase, increases consumption and thus welfare in the Czech Republic. Changes in European welfare are similar to that of the spending increase. This occurs because changes in consumption for the EMU are mainly driven by changes in prices which are similar to the spending case.

Reducing the surplus using taxes on wages provides different results and are presented in Figure E.3. A reduction of income taxes from its initial rate of 0.415 to 0.39 is needed to bring surpluses down to zero in period one. This tax reduction actually reduces inflation, as the supply side effects of the tax cut dominate. Lower taxes on income lead to increases in labor supplied (NC) and output. Wages however, do not respond and consumption demand does not rise enough to compensate for the increased supply. The increase in hours worked overcomes the gains in consumption from the mild decrease in inflation and welfare falls in the Czech Republic as a result of the temporary drop in taxes.

Table 3.1 summarizes some of the outcomes associated with the fiscal moves aimed at reducing the surplus that results from the favorable technology shock in the tradable sector (baseline). Increasing government spending to bring down the surplus has the highest inflationary consequences for the Czech Republic. Using income tax reductions avoids the inflationary aspect of reducing the surplus, but it does not improve welfare. A consumption tax reduction does lead to inflation, but it is not as high as inflation would be using government spending. Welfare gains from a consumption tax cut are by far the highest in this simple model.

| Table 3.1. Govern | ment response to | technology shock in | laucea surpius |
|--|-----------------------|------------------------|--------------------|
| Difference | from baseline as a | a result of surplus re | duction |
| | Spending | Consumption tax | Income tax |
| Change | $\rm G/Y$ up 0.0307 | Rate down 0.037 | Rate down 0.025 |
| Czech inflation (1-5) Czech utility | 0.0133 0.0999 | $0.005 \\ 0.2247$ | -0.0022 -0.0576 |

Table 2.1. Community regranges to technology sheet induced surplus

The inflationary results of the increase in spending or reduction in consumption taxes make it a point of concern for the EMU. Its firm commitment to price stability would cause the ECB as well as ECOFIN to take notice of such inflationary fiscal policy. As a result, such welfare improving policy could lead to a reprimand from ECOFIN, just as it did in the case of Ireland.

Inflation Reduction

As illustrated above, a favorable productivity shock to the Czech tradeable sector leads to inflation in both the Czech Republic and the EMU. This comes as a result of the Balassa-Samuelson effect as well as the terms of trade effect. Even though the rise in EMU inflation is small, the elevated high inflation in the Czech Republic might catch the eye of those monitoring the new members of the EMU. Stability across the region is a goal of the monitoring agencies of the EMU and though they would discourage surplus spending as illustrated above, they might also encourage fiscal policy driven inflation reduction. To illustrate the effects of contractionary fiscal policy to contain the technology induced inflation, an arbitrary fiscally induced inflation reduction of a quarter of a percent is simulated. Changes in government spending and taxation are calibrated to obtain a drop in CPI inflation by a quarter of a percentage point once the shock hits the economy, and will be maintained for four quarters.

If government spending is used, a decrease in the spending to GDP ratio from 0.216 to 0.1811 will lead to a quarter of a percentage point drop in inflation at the point of the initial productivity shock. The results of such a reaction are compared to the response with no government intervention in figure F.1. This reduction in spending leads to an initial fall in prices in both the Czech Republic and the EMU, but after the stimulus has ended prices rise above what they would have been originally. Surpluses grow during the contraction only to fall once spending returns to its original level. The lower prices increase consumption in both the Czech Republic and the EMU while spending is low, but falls in relation to the baseline after the contraction ends. With little change in labor, this leads to an increase in welfare during the contraction, but an overall decrease across the whole horizon.

A quarter point reduction in inflation requires an increase in consumption taxes from 0.2 to 0.28. The response of EMU inflation is very similar to that of an increase in government spending and is presented in figure F.2. Surpluses are again high at the start of the retraction, but fall greatly after. A key difference again is in the effect on consumption. Consumption drops in the Czech Republic as taxes increase and never recovers. This causes utility to fall by much more than in the case of an increase in government spending. EMU consumption increases in response to the fall in prices but after the retraction it again fall for a net reduction in utility over the simulation.

As illustrated above, a decrease in a tax on wages actually leads to a fall in inflation. In order to obtain a quarter of a percent drop in inflation the tax rate on wages must be reduced from 0.415 to 0.31. The results of this action are presented in figure F.3. This reduction in taxes leads to increased work effort (NC) and output, which in turn brings down price for the duration of the tax cut. The large increase in hours worked, however, does not compensate for the small gains to consumption that result from the fall in prices and utility over the entire period is less than the baseline case.

Utility comparisons in the Czech Republic for different fiscal responses to inflation are presented in table 3.2.

| Table 5.2: | Government respons | se to technology show | ck induced innation |
|-----------------|-----------------------|--------------------------|-------------------------|
| Difference from | m baseline as a resul | t of inflation reduction | on a quarter of a point |
| | Spending | Consumption tax | Income tax |
| Change | G/Y down 0.0348 | Rate up 0.08 | Rate down 0.105 |
| Czech utility | -0.1076 | -0.4569 | -0.2344 |

Table 2.2. Community manages to task palary should induced inflation

For the same reduction in inflation, using government spending to slow down the economy has the smallest welfare costs. Because of the strong reaction of consumption to a tax change any movement leads to large changes in the consumer's utility and thus this measure of welfare. Though fiscal authorities are not constrained to use only spending or only taxes, this exercise sheds some light on what effect a particular fiscal move could have.

3.6 Conclusion

A model representing the unique situations confronting new members states once they join the EMU has been calibrated to fit the Czech Republic. In order to capture the situation facing the Czech Republic once it joins the EMU, a two country monetary union model has been constructed where the new member maintains control over its own fiscal policy but not over monetary policy. Two sectors have been modeled in the new member to allow the Balassa-Samuelson effect to work on the real exchange rate and inflation. Empirical evidence suggests the new member states are experiencing real exchange rate appreciation and inflation in part through technology advances to the tradable sector. More recent studies show how the appreciating effect during the catching up process is not as strong as the original supply-side BS hypothesis would predict. This is partially due to the failure of PPP to hold in the tradable sector. New Keynesian models with sticky prices require monopolistic firms that can choose their prices, thus PPP will not hold in the tradable sector. In order to maintain the Balassa-Samuelson effect (in a reduced role) some price parity must be maintained in the tradable sector, which is accomplished with a high level of substitutability across tradable goods. With this model the uses of fiscal policy are reviewed.

One result of a productivity shock to the tradable sector is budgetary surpluses. Political pressure could lead to a decision by the government to "give back" the surplus through tax cuts or increased spending. Spending increases and consumption tax decreases are welfare improving, but they are inflationary. A reduction in consumption taxes has the highest welfare gain with a smaller inflationary result.

The second important result of the technology shock is inflation. This is "natural" inflation that is a byproduct of the catching up process, nonetheless it could attract the attention of the ECB and ECOFIN. Pressure could be put upon the fiscal authority to combat this inflation to improve stability across the region. Such fiscal contractions reduce welfare in the Czech Republic, though they are successful in reducing inflation. A government spending decrease has the least negative effect on welfare, whereas a consumption tax has the most.

Appendix A

Structural Changes

| Labor | | 92) Training | 94 Overtime | 95 🕇 Reduce | 99 rigidities | 00 | | 98 Reduce work | 00 week | 02- Reduce | rigidities | | 05 – Cut | unemployment | benefits/duration | | | | 99 – Training |) | 00 – Reduce | rigidities | 1 | | | | |
|------------|------------|------------------------|------------------|--------------------------|----------------------------|------------------------------|-----------------|---------------------|-------------|------------------------|-----------------|-------------------|---------------|-----------------|--------------------------|-------------------|-----------------------|---------------|------------------|--------------------------|------------------|-------------------|---------------------|-----------------|-------------------------|----------------|---------------------|
| Healthcare | | 91) 03 Cost control | 96 Organization | 02 ل | | | | | | 89 – Cost control | 92 – Efficiency | 93 – Cost control | | 97 – Patient | Rights | | 99 Cost control | 02 | <u>1</u> | | | | | | | | |
| Pension | | 93 – Cut benefits | Aujust uutanut | 95 - Adjust contribution | | 03 - Cut benefits | Adjust duration | Adjust contribution | | 88 L Increase age | 6 | 97 – Increased | contributions | | 02 – Private pensions | | 05 – Link benefits to | contributions | 92 - Eliminate | indexation | | 95 – Increase age | Contribution system | | 04 – Adjust eligibility | | 05 – Increase age |
| Tax | Ketorm | 91 Simplify | 34- NOULOC LAICS | 97] | 99 \uparrow Broaden base | 00 ^J Reduce rates | | 05 – Reduce labor | distortions | 86-91 – Simplify | Reduce rates | | 93) | 97 Broaden base | 99 \nearrow Reduce and | to Increase rates | 05 ک | | 97) Broaden base | 03 \downarrow Simplify | 05 Reduce rates | | | | | | |
| Fiscal | Governance | Pluralistic/Delegation | INU CITAILEC | | | | | | | Pluralistic/Delegation | No change | | | | | | | | 80-94 | Proportional/Fiefdom | 94 – Pluralistic | 96 - Delegation | introduced | 01 - Delegation | institutionalized | 06 – Return to | proportional system |
| Regional | Control | | | | | | | | | 2003 – | Domestic | Stability Pact | | | | | | | 1999- Internal | Stability Pact | | | | | | | |
| Country | | France | | | | | | | | Germany | | | | | | | | | Italy | • | | | | | | | |

Figure A.1: Structural change

| Labor | 90's and 00's - Tax incentives 93 98 01 Education | 92 Reduce 97 rigidities 01 Cut unemployment benefits/duration | 00 – Keduce rigidities Education |
|----------------------|--|---|---|
| Healthcare | | 86 – Expand coverage 02 - Decentralize | |
| Pension | 99 to 00 –Adjust contribution Private accounts | 95 – Toledo Pact 98 Increase age 00 Adjust entribution 05 Adjust eligibility | |
| Tax Reform | 87-03 Social consensus model - tax cuts in exchange for moderate wage increases | 77 – Income tax introduced 85 – VAT introduced | 91 Broaden Base 98 Lower Rates 03 Increase 07 incentives |
| Fiscal Governance | 80-87 Unstable/Fiefdom 89 – Stability Proportional 92 – Commitment Program managers | 77-93 Proportional/Fiefdom 93 – Minister's power increases | 00 - Delegation |
| Regional Control | | 2001- Financial Stability Law | |
| Country | Ireland | Spain | |

Figure A.2: Structural change continued

Appendix B

Temporary Changes

| Year | One-off (% of GDP)* | ytsənmA % of GDP)* %) | Тетрогагу Тах | Wage Freeze | Hiring Freeze | Other Spending Freezes | Delay Wage Netations | Оғрег |
|----------------------|------------------------|-----------------------------|------------------|-------------|------------------|------------------------------|-------------------------|-----------------------|
| 1994 | | | | | | X | | |
| 1995 | | | | | | | | |
| 1996 | u; | | | X | | | | |
| 1997 | .53 | | X | | X | X | X | Transfer from Telecom |
| 1998 | .03 | | | | | | | |
| 1999 | .13 | | | | | | | |
| 2000 | .14 | | | | | | | |
| 2001 | .07 | | | | | | | Mobile license sale |
| 2002 | 60 [.] | | | | | | | Mobile license sale |
| 2003 | .08 | | | | | | | |
| 2004 | : | | | | | | | |
| 2005 *Values fror | n Koen and y | van der Noo | ord (2005) – | - no valu | tes for 2004 | . and 2005 | | |

Figure B.1: Temporary changes - France

| One-off (% of GDP)* (% of GDP) Temporary Temporary Breeze Spending Freezes Delay Wage Treezes Treezes Denay Wage Treezes Treez | x | Х | X | .24 Lotay tax cut, Move up privatization | Revalue gold | | Mobile license sale | .II | | X X | Χ | rom Koen and van der Noord (2005) – no values for 2004 and 2005 |
|---|------|-----|-----|--|--------------|------|---------------------|-----|-----|-----|-----|---|
| 110-9nO *(9D 10 %) | 4 | 5 | 9 | 7 .24 | 8 | 6 | 0 | 11 | 2 | 3 | 4 | 5 ues from Koen i |
| Year | 199, | 199 | 199 | 199′ | 1998 | 1999 | 200 | 200 | 200 | 200 | 200 | 200. *Val |

| Other | Deferred indexation | Deferred indexation | | | | | Mobile license sale | Securitization | Securitization | Securitization | Securitization | Phase out one-offs 2006 |
|-------------------------------------|---------------------|---------------------|------|------|------|------|---------------------|----------------|----------------|----------------|----------------|-------------------------|
| Delay Wage Negotiations | | | | X | | | | | | | | |
| Other Spending Freezes | X | X | Х | X | | | | | | | | 2005 |
| gniring Freeze | | X | | X | | | | | | | | for 2004 and |
| Scere Freeze | | | | | | | | | | | | no values |
| Temporary Tax | | | | X | | | | | | | | 1 (2005) – |
| GDD)* (% of Yunnesty GDD)* | 4. | ¢. | .02 | .08 | | | | .1 | .1 | 1.5 | : | id van der Noor |
| 0% of | .1 | 4. | .45 | 6. | | | | | .2 | | : | .5 m Koen ar |
| Year | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 *Values fro |

Figure B.3: Temporary changes - Italy



| Year | One-off (% of GDP)* | Amnesty (% of GDP)* | Tax Temporary | Wage Freeze | gniriH 979574 | Other Spending Freezes | Delay Wage Negotiations | Other |
|----------------------|------------------------|------------------------|------------------|-------------|------------------|------------------------------|----------------------------|---------------------------|
| 1994 | | | | Х | Х | | | |
| 1995 | 4. | | | | | X | | |
| 1996 | 4. | | | | | | | |
| 1997 | 4. | | | Х | Х | | | Delay investment payments |
| 1998 | | | | | | | | |
| 1999 | | | | | | | | |
| 2000 | | | | | | | | Mobile license sale |
| 2001 | | | | | | | | Capped payroll |
| 2002 | | | | | | | | |
| 2003 | | i | | | | | | |
| 2004 | : | : | | | | | | |
| 2005 *Values fror | n Koen and | I van der No | ord (2005) | – no valı | tes for 200 | t and 2005 | | |

Appendix C

General Economic Data











---Growth ----Inflation

Figure C.3: Important economic data - Italy







Figure C.5: Important economic data - Spain

Appendix D

Calibration

| Parameter | | Czech | | EMU | World |
|-----------------------|-----------------------|-----------------------|----------|-------------------|--|
| | | Non- Tradable | Tradable | | |
| β - Discount | 0.99 | | | 0.99 | |
| χ - 1/Frisch | 4 | | | 3 | |
| α – Calvo prob | | 0.67 | 0.67 | 0.67 | |
| σ - Elas | | 10 | 10 | 7 | |
| γ - C weight | $\gamma_{czh} = 0.26$ | $\gamma_{czn} = 0.53$ | | $\gamma_e = 0.91$ | $\frac{\gamma_{czw} = 0.4}{\gamma_{w} = 0.35}$ |
| v - Elas goods | 30 | | 2 | 30 | |
| θ - Inf weight | | | | 0.98 | |
| artheta - Taylor | | | | 2.7 | |
| G/Y Steady state | 0.216 | | | | |
| τ_c Steady state | 0.2 | | | | |
| τ_w Steady state | 0.415 | | | | |

Figure D.1: Calibration

Appendix E

Fiscal Responses to Surplus



Figure E.1: G/Y increased to bring surplus to zero in period 1 Surplus w/o gov response . , with + Inflation in Czech w/o gov response . , with +



Figure E.2: τ_c reduced to bring surplus to zero in period 1 Surplus w/o gov response . , with + Inflation in Szech w/o gov response . , with +



Figure E.3: τ_w reduced to bring surplus to zero in period 1 Inflation in Czech w/o gov response . , with +

Appendix F

Fiscal Responses to Inflation



Figure F.1: G/Y reduced to lower inflation a quarter of a point in period 1 Surplus w/o gov response . , with + Inflation in Czech w/o gov response . , with +



Figure F.2: τ_c increased to lower inflation a quarter of a point in period 1 Surplus w/o gov response . , with + Inflation in Czech w/o gov response . , with +



Figure F.3: τ_w reduced to lower inflation a quarter of a point in period 1 Surplus w/o gov response . , with + Inflation in Czech w/o gov response . , with +

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