Universiteit Antwerpen

Academic year 2015 – 2016

UNIVERSITY OF ANTWERP
FACULTY OF APPLIED ECONOMIC SCIENCES

Master's Thesis

Fiscal Policy and Debt: The Net Effect on Growth

The impact of the debt ratio, state-dependent fiscal multipliers, spillover effects and hysteresis effects

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Master's Thesis submitted to obtain the degree of:

Master of Economic Policy

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Abstract

Should the government spend less, or spend more? This paper examines different arguments for fiscal contraction and fiscal expansion, considering the level of indebtedness of a country and the economic circumstances. It finds that high debt-to-GDP ratios are a burden on the economy that represent a progressive cost to government deficit, which it captures through introducing the concept of a debt multiplier. It also finds that recessions strongly increase the benefits of fiscal spending, both in the short-run and in the long-run through hysteresis-effects. Furthermore, it shows that taking into account international fiscal spillovers has a significant impact on the choice of fiscal policy, and that international policy coordination can prevent serious policy mistakes. The paper formulates a new non-ideological paradigm for thinking about fiscal policy that incorporates arguments for fiscal spending and fiscal contraction alike. It postulates that the net effect of fiscal policy can be captured using a cost-benefit approach that takes into account these varying costs and benefits of fiscal policy, and proposes a new model of fiscal policy based on this approach. The model is empirically tested for the countries of the Euro Area and yields some surprising results that pulls into question many widely held opinions on optimal fiscal policy for different countries. The analysis shows that optimal fiscal policy varies greatly from country to country and from year to year, and relies on a pragmatic and internationally oriented approach that objectively evaluates each country's individual circumstances.

Key Words: Fiscal Policy, Debt Ratio, Fiscal Multiplier, Spillover Effects, Cost-Benefit Model

Fiscaal Beleid en Schulden: Het Netto Effect op Groei

Executive Summary (Dutch)

1. Introductie

Zou de overheid meer moeten uitgeven, of juist moeten bezuinigen? Sinds Keynes het idee gepopulariseerd heeft dat landen hun economie in een recessie kunnen steunen door hun uitgaven te verhogen, is er zowel op academisch als op publiek niveau een continue strijd gaande tussen actief fiscaal stimuleren enerzijds en balanceren van de overheidsbegroting anderzijds. Voorstanders van een actief fiscaal beleid wijzen erop dat extra overheidsuitgaven niet alleen economisch lijden kunnen verlichten maar zichzelf bovendien meer dan terug kunnen verdienen, terwijl voorstanders van een gebalanceerde begroting erop wijzen dat overheidsuitgaven de markt verstoren en ineffectief zijn, en dat overheidsschulden zwaar op de economie wegen.

Recentelijk is dit onderwerp bijzonder actueel geworden in de Eurozone, gezien de Financiele Crisis van 2008 gezorgd heeft voor een spectaculaire groei van de overheidsschulden in de Eurozone (zie **figuur 1**), en tegelijkertijd geleid heeft tot wat nu bekend staat als De Grote Recessie. Hierdoor is een situatie ontstaan waar zowel veel behoefte is aan maatregelen om de overheidsschulden terug te dringen, als aan fiscale stimulans door de overheid. Daar komt nog bij dat monetair beleid momenteel maar beperkt mogelijk is doordat rentetarieven aan de zogenaamde 'Zero Lower Bound' zitten, waardoor het belang van fiscaal beleid is toegenomen.

Figuur 1. Overheids Bruto Schuldquote in de Eurozone.

Op het academische front is sinds de crisis ook veel aandacht geweest voor fiscaal beleid, wat geleid heeft tot enkele belangrijke nieuwe inzichten rond fiscaal beleid. Enerzijds, ter ondersteuning van het argument voor besparingen, is er de literatuur rond het effect van overheidsschulden: Reinhart en Rogoff (2010) stellen dat er een schuldendrempel bestaat waarboven overheidsschulden een negatieve impact op economische groei hebben, en Alesina en Ardagna (2009) verschaffen bewijs dat fiscale consolidatie door te snijden in de uitgaven zelfs kan leiden tot economische groei. Anderzijds, ter ondersteuning van het argument voor meer stimulans door de overheid, is er de literatuur rond de conjunctuurgevoeligheid van fiscale multipliers, overloopeffecten en hysteresis-effecten: Blanchard en Leigh (2013) tonen aan dat fiscale multipliers in recessies steevast onderschat worden, Auerbach en Gorodnichenko (2013) leren dat fiscaal beleid vergezeld wordt door significante overloopeffecten op de productie in andere landen, en DeLong en Summers (2012) argumenteren dat recessies lange-termijn schade aan de productiecapaciteit toebrengen.

Het tegenstrijdige bewijs van deze recente academische vorderingen heeft helaas de ideologische toon van het debat rond fiscaal beleid niet verminderd. In deze paper bestudeer ik het recente onderzoek betreffende deze inzichten in fiscaal beleid, en volg hun imlicaties langs een pad van logische conclusies. Mijn hypothese is dat al deze academische bevindingen een waarheid bevatten waar rekening mee gehouden zou moeten worden in het bepalen van fiscaal beleid, en dat hun tegenstrijdigheden opgelost kunnen worden door ze samen te plaatsen in een bredere context. Hiermee hoop ik een nieuw, niet-ideologisch paradigma voor het denken rond fiscaal beleid te kunnen construeren, waarbinnen argumenten voor zowel fiscale expansie als fiscale consolidatie vervat zitten. Binnen dit paradigma bouw ik vervolgens een dynamisch theoretisch model om de effecten van fiscaal beleid mee te bepalen, en welke kan dienen om concreet fiscaal beleidsadvies te voorzien.

Het model is gebaseerd op een kosten-baten benadering van fiscaal beleid, en houdt rekening met zowel de individuele economische omstandigheden van elk land als met de internationale effecten van fiscaal beleid. Ik laat de beleidsimplicaties van het model zien voor landen in de Eurozone, en concludeer dat de vraag of de overheid meer of minder zou moeten uitgeven geen ideologische zaak hoeft te zijn, maar op een pragmatische manier beantwoord kan worden gebaseerd op meetbare economische omstandigheden. Het model onderstreept het belang van rekening te houden met de schuldquote, de conjunctuurcyclus, overloopeffecten en lands-specifieke eigenschappen voor het bepalen van succesvol fiscaal beleid.

2. Theoretisch Kader

Deze paper volgt op een reeks recentelijk gepubliceerde papers over fiscaal beleid, welke het gevolg zijn van de hernieuwde academische interesse in fiscaal beleid sinds de Financiele Crisis. Vanuit mijn studie van dit volume aan nieuw onderzoek vorm ik de hypothese dat succesvol fiscaal beleid rekening dient te houden met enkele kerninzichten die we uit deze literatuur kunnen destilleren:

1. Een hoge publieke schuldquote heeft een significant deprimerend effect op economische groei: zodra publieke schulden een zekere drempel bereikt hebben heeft elke verdere schuldengroei een sterke negatieve impact op de economische groei.

2. Fiscale multiplier-waardes worden sterk beïnvloed door economische omstandigheden: multipliers kunnen variëren van rond de nul in tijden van hoogconjunctuur tot meer dan twee in tijden van laagconjunctuur.

3. Fiscaal beleid heeft overloopeffecten naar andere landen die zowel statistisch als economisch significant zijn: volgens sommige studies is de overloop-multiplier vaak zelfs relatief groter dan de fiscale multiplier.

4. Recessies vandaag beïnvloeden de potentiële productiecapaciteit in de toekomst door hysteresis-effecten: gedurende recessies worden menselijke en kapitaal-middelen verkwanseld of zelfs permanent verloren, waardoor toekomstige potentiële productie verlaagd wordt. Deze effecten zijn cumulatief, waardoor zij sterker worden naarmate een recessie langer duurt.

2.1 De Kosten van Schulden

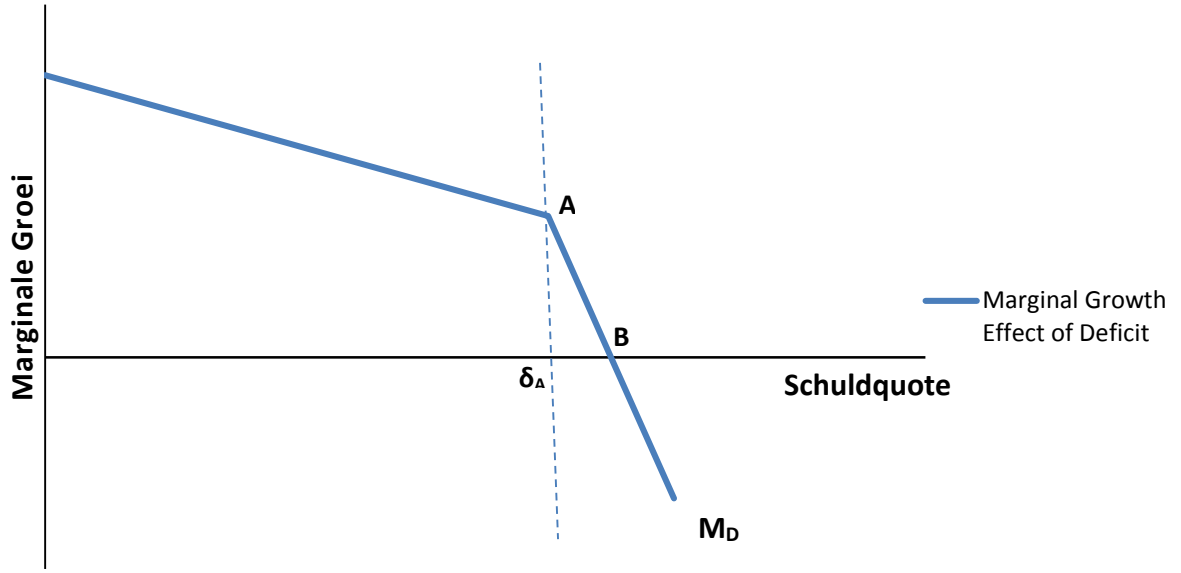
Recent onderzoek toont aan dat schulden een toenemend deprimerend effect op economische groei hebben naarmate de schuldquote groter wordt. Dit is in eerste instantie het gevolg van enkele lineaire effecten: naarmate de schuld stijgt stijgen de rentelasten, en neemt de gevoeligheid voor economische schokken (zoals veranderingen in de rentetarieven of de inflatie) toe. Daarnaast spelen er ook niet-lineaire effecten: wanneer de schuldquote voorbij een bepaald niveau gaat worden schulden plotseling gezien als veel gevaarlijker en worden nieuwe schulden plotseling geconfronteerd met drastisch veranderde voorwaardes voor lenen en terugbetalen. Reinhart en Rogoff (2010) speculeren dat dit wordt veroorzaakt door iets wat zij 'schulden intolerantie' noemen. Dit concept suggereert dat *"wanneer schuldquotes stijgen tot historische limieten, risicopremies scherp beginnen te stijgen, wat overheden met hoge schulden confronteert met lastige tradeoffs. Zelfs landen die toegewijd zijn aan het volledig betalen van hun schulden worden gedwongen om de fiscale broekriem dramatisch aan te halen om geloofwaardig over te komen op investeerders en daarmee hun risicopremies te verlagen".*

Een andere prominente paper over de schuldendrempel, van Checherita en Rother (2012), onderzoekt twaalf Eurozone landen en vindt empirisch bewijs voor vier hoofdkanalen waarvia overheidsschuld de economische groei beïnvloedt: de private spaarquote, publieke investeringen, totale factorproductiviteit en souvereine lange-termijn nominale en reële rente. Bovendien bevinden zij dat rentetarieven meer afhangen van de verandering in de schuldquote dan van de hoogte van de schuldquote, wat suggereert dat rentetarieven heel gevoelig zijn voor fiscaal beleid.

Op basis van deze en andere papers concludeer ik dat het zeer aannemelijk lijkt, gestaafd door zowel theorie als empirisch bewijs, dat stijgende overheidsschuld een negatieve en niet-lineaire

invloed heeft op economische groei. Dit verband modelleer ik vervolgens zoals beschreven in **figuur 2**: deze laat een hoogst gestileerd beeld zien van het marginale effect van bijkomende schulden op de groei van het BNP onder de aanname van een niet-lineaire schuldendrempel; ik noem dit de M_D curve. Op de x-as bevindt zich de schuldquote δ, en op de y-as bevindt zich de marginale per capita BNP groei resulterend uit een toename van de door schulden gefundeerde overheidsuitgaven. Bij een lage schuldquote ondervinden nieuwe schulden slechts een lichte afname van de marginale opbrengsten. Wanneer een bepaald niveau van schulden bereikt wordt, wordt de negatieve reactie op extra schulden plotseling veel heftiger en worden schulden snel onproductief en zelfs schadelijk; een reflectie van het schulden intolerantie effect, weergegeven door de stijle daling van de M_D curve voorbij punt **A** bij een schuldquote van δ_A. Het punt **B** waar de lijn de x-as snijdt weerspiegelt de schuldendrempel: voorbij dit punt heeft een verdere toename van de schulden een negatief effect op de groei.

Figuur 2. Het Niet-Lineaire Groei Effect van Schulden.



De M_D curve kan weergegeven worden door een gesegmenteerde regressiefunctie:

$$M_D = c_0 - \alpha_\alpha \cdot \delta \qquad \text{voor alle } \delta \leq \delta_A$$

$$M_D = c_1 - \alpha_\beta \cdot \delta \qquad \text{voor alle } \delta \geq \delta_A \qquad [2.1.1]$$

Waar α_α en α_β de hellingen zijn van beide segmenten van de curve, met $\alpha_\beta > \alpha_\alpha$, en c_0 en c_1 als de waardes van de snijpunten op de y-as, en $c_1 = c_0 + c$. De M_D curve richt zich op de fiscale beleidsimpact, en heeft derhalve als uitgangspunt dat het niet zozeer puur de schuldquote is die econonomische groei beïnvloedt, maar vooral de combinatie van de schuldquote en de toe- of afname van de schuld.

Een belangrijke implicatie van de M_D curve is dat we kunnen zeggen dat de marginale kosten van publieke schulden (welke ik **κ** zal noemen) stijgen naarname de schuldquote stijgt. Bij een schuldquote van nul zijn de marginale kosten van schulden ruwweg gelijk aan hun monetaire

waarde plus een basisrente ($\kappa = 1$). Echter, naarname de schuldquote stijgt brengen extra schulden een groeiende blootstelling aan risico en een opwaartse druk op het rentetarief en de private spaarquote met zich mee, en krijgen dus een economische kostprijs voorbij hun initiële waarde. In termen van de M_D curve kan dit voorgesteld worden door de volgende functie:

$$\kappa = (1 + \alpha \cdot \delta) \qquad [2.1.2]$$

waar $\alpha = (\alpha_\alpha , \alpha_\beta)$ de lands-specifieke negatieve economische impact weergeeft van een stijgende schuldquote. In essentie betreft κ een multiplier effect voor schulden, en is derhalve crucial voor een kosten-baten model van fiscal beleid, gezien κ gebruikt kan worden om de echte kosten van overheidstekorten te berekenen:

$$C_G = \kappa \cdot \Delta D \qquad [2.1.3]$$

2.2 De Fiscale Multiplier

Gedefinieerd als hoeveel het BNP veranderd per eenheid verandering in fiscale uitgaven, is de fiscale multiplier in essentie de vertaling van de impact van fiscaal beleid op de economie in één enkele factor. Het belang van de fiscale multiplier in het evalueren van fiscaal beleid staat dan ook buiten kijf. De grootte van de fiscale multiplier, daarentegen, is een voortdurende bron van onenigheid in de academische literatuur. Desondanks menen Blanchard en Leigh (2013) dat er een vrij duidelijke consensus-multiplier in 'normale tijden' is van ongeveer 0,5. De recente literatuur toont echter overtuigend aan dat multipliers zeer conjunctuur-gevoelig zijn, en in recessies waardes kunnen hebben van meer dan 2. Deze gevoeligheid heeft een zeer grote impact op de evaluatie van fiscaal beleid.

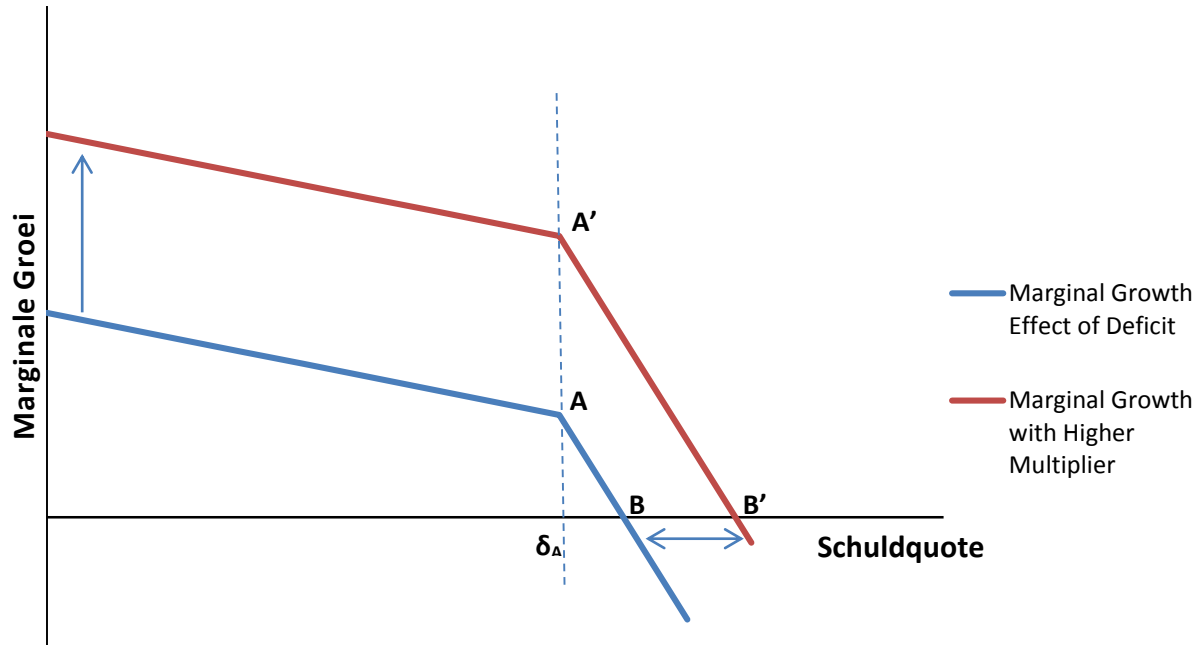
We kunnen de conjunctuur-afhankelijke fiscale multiplier hypothese vervolgens combineren met de hypothese van schuldquote-afhankelijke schuldenkosten: omdat de marginale groei op de y-as van figuur 2 overeenkomt met de fiscale multiplier van door schulden gefundeerde overheidsuitgaven, kunnen we de snijpuntwaarde c_o vervangen door de multiplier μ:

$$M_D = \mu - \alpha_\alpha \cdot \delta \qquad \text{voor alle } \delta \leq \delta_A$$

$$M_D = (\mu + c) - \alpha_\beta \cdot \delta \qquad \text{voor alle } \delta \geq \delta_A \qquad [2.2.1]$$

In het grafische model wordt dit weergegeven door het verschuiven van de curve zoals in **figuur 3**. Elke verandering in de fiscale multiplier verschuift de lijn nu langs de y-as, terwijl de karakteristieken van de curve in tact blijven: zowel de helling als het punt δ_A zijn ongewijzigd. Wel observeren we dat de schuldendrempel verschuift van punt **B** naar punt **B'**: de schuldendrempel is dus variabel met de fiscale multiplier. We kunnen hier dus concluderen dat fiscaal beleid niet geëvalueerd kan worden op basis van de schuldquote zonder rekening te houden met de fiscale multiplier, en vice versa.

Figuur 3. Het Niet-Lineare Groei Effect van Schulden met Variabele Multipliers.



2.3 Het Overloop-Effect

Met het overloopeffect wordt bedoeld: de impact van fiscaal beleid in het thuisland op het BNP in het buitenland. In een wereld die steeds verder economisch geïntegreerd raakt worden de grensoverschrijdende effecten van fiscaal beleid ook steeds prominenter. Meerdere recente papers, waaronder die van Auerbach en Gorodnichenko (2013), tonen aan dat overloopeffecten statistisch en economisch significant zijn, en dat overloopeffecten ook zeer conjunctuurgevoelig zijn, en bijzonder sterk aanwezig zijn wanneer zowel de bron als de ontvanger in recessie verkeren. Hebous en Zimmermann (2013) concluderen dat overloopeffecten voornamelijk worden overgedragen door handel, en dan ook bijzonder prominent zijn in de Eurozone. Hierdoor hebben verschillende auteurs ook gepleit voor een gecoördineerd fiscaal beleid in Europa welke rekening houdt met overloopeffecten.

Het belang van overloopeffecten kan geïllustreerd worden aan de hand van een eenvoudig voorbeeld. Stel een model voor met twee identieke landen, Home en Foreign, waarvan het netto effect van fiscaal beleid voorgesteld kan worden doormiddel van de volgende functie:

$$\Delta\delta_H = \kappa_H{*}\Delta G_H - \mu_H{*}\Delta G_H - \mu_F{*}\Delta G_F \qquad [2.3.1]$$

Waarbij δ_H de verandering in de schuldquote van Home is, κ_H de schulden-multiplier van Home, μ_H de fiscale multiplier van Home en μ_F de fiscale multiplier van Foreign, en ΔG_H en ΔG_F de verandering in overheidsuitgaven zijn in respectievelijk Home en Foreign. Met behulp van een spelmatrix kan dan aangetoond worden dat het negeren van fiscale overloopeffecten tot ernstige beleidsfouten kan leiden:

Tabel 1. Fiscaal Beleid met Overloopeffecten in een Model met Twee Identieke Landen.

	Home consolideert	Home blijft neutraal	Home expandeert
Foreign consolideert	$-\kappa+\mu_H+\mu_F$	μ_F	$\kappa-\mu_H+\mu_F$
Foreign blijft neutraal	$-\kappa+\mu_H$	0	$\kappa-\mu_H$
Foreign expandeert	$-\kappa+\mu_H-\mu_F$	$-\mu_F$	$\kappa-\mu_H-\mu_F$

Deze matrix toont verschillende uitkomsten gebaseerd op beleidsbeslissingen in Home en Foreign. Nu kunnen we enkele aannemelijke waardes invullen om de beleidsfouten te tonen:

$\mu_H = 0.5, \mu_F = 0.2, \kappa = 1$		
-0.3	0.2	0.7
-0.5	0	0.5
-0.7	-0.2	0.3

$\mu_H = 0.7, \mu_F = 0.3, \kappa = 1$		
0	0.3	0.6
-0.3	0	0.3
-0.6	-0.3	0

$\mu_H = 1, \mu_F = 1, \kappa = 1.5$		
0.5	1	1.5
-0.5	0	0.5
-1.5	-1	-0.5

$\mu_H = 1.8, \mu_F = 1.2, \kappa = 2$		
1	1.2	1.4
-0.2	0	0.2
-1.4	-1.2	-1

$\mu_H = 1.5, \mu_F = 0, \kappa = 1$		
0.5	0	-0.5
0.5	0	-0.5
0.5	0	-0.5

$\mu_H = 2, \mu_F = 1.5, \kappa = 2$		
1.5	1.5	1.5
0	0	0
-1.5	-1.5	-1.5

Positieve waardes betekenen een stijging van de schuldquote, en negatieve waardes een daling. De groene kleur geeft de beleidsvoorkeur aan van beide landen wanneer geen rekening wordt gehouden met het beleid in het buitenland. Het resulterende gecombineerde beleidseffect is aangeduid in het blauw. De rode waardes geven het optimale resultaat voor beide landen aan wanneer dit niet overeenstemt met de gemaakte beleidskeuzes: dit zijn de beleidsfouten die resulteren wanneer geen rekening wordt gehouden met het buitenlandse beleid. We zien dat deze beleidsfouten voorkomen wanneer $\mu_H \leq \kappa$ maar $\mu_H + \mu_F > \kappa$, en dat ze tot serieuze verschillen kunnen leiden met het optimale beleidsresultaat. Bovendien zien we dat de beleidsfouten met betrekking tot overloopeffecten beperkt zijn tot consolidaties of neutraal beleid. Beleidsfouten die betrekking hebben op expansies zijn beperkt tot situaties waar $\mu_H < \kappa$, en zijn dus onafhankelijk van buitenlands beleid.

2.4 Het Hysteresis Effect

Hysteresis refereert aan het negatieve effect van recessies (tijdelijke productiedalingen) op het lange-termijn niveau van potentiële productie. Volgens DeLong en Summers (2012) manifesteert dit effect zich via drie kanalen:

1. Mensen die lange tijd werkeloos zijn verliezen langzaam hun vaardigheden en hun netwerkbanden, waardoor het niet alleen lastiger wordt om een nieuwe job te vinden maar ze ook gedemotiveerd kunnen raken en zich terugtrekken van de arbeidsmarkt.
2. Wanneer bedrijven failliet gaan als gevolg van een langdurige economische depressie gaat er kapitaalgoederenvoorraad en bedrijfs-specifieke kennis voorgoed verloren.
3. Een voortdurend laag niveau van privé-investeringen is slecht voor toekomstige groei, omdat het potentiële productieniveau nauwelijks stijgt gedurende de depressie.

Model-technisch stellen DeLong en Summers voor dat *"in toekomstige periodes potentiële en echte productie $\boldsymbol{Y_f}$ lager zal zijn met een fractie η van de diepte van de depressie waarin de economie in het heden verkeert"*. De grootte van het hysteresis-effect **η** wordt bepaald door zowel grootte als de duur van de huidige output gap.

$$\Delta Y_f = \eta \Delta Y_n \qquad [2.4.1]$$

Om dit te vertalen naar de mate waarin fiscaal beleid hier impact op stel ik voor om de ΔY_n te vervangen door mate waarin deze veroorzaakt wordt door de fiscale beleidsimpulse (ΔG):

$$\Delta Y_f = \eta \mu \Delta G \qquad [2.4.2]$$

3. Fiscaal Beleidsmodel

Het fiscale beleidsmodel wat hier ontwikkeld wordt is een kosten-baten model wat de verschillende delen van het theoretische kader samenbrengt. Dit bouw ik op in twee stappen: eerst bouw ik het model voor één enkel land, zonder rekening te houden met beleidseffecten van of naar het buitenland. Daarna voeg ik internationale effecten toe om het model uit te breiden tot op het niveau van een monetaire unie.

Het model tracht het marginale beleidseffect (MBE) in kaart te brengen; als we de huidige uitgaven met één eenheid zouden veranderen, hoe groot is dan het effect op de economie? De eerste stap in het model leidt tot de volgende vergelijking:

$$\text{MBE} = (1 + \eta)\mu - (1 - \mu\tau)\kappa \qquad [3.1]$$

Waarbij $(1 + \eta)\mu$ staat voor de baten van fiscaal beleid, en $(1 - \mu\tau)\kappa$ staat voor de kosten van fiscaal beleid. De baten worden bepaald door zowel het hystesis effect (η) als de fiscale multiplier (μ); wanneer eender welke groter wordt, stijgen de baten, en vice versa. De implicatie van het hysteresis-effect is dat overheidstekorten aantrekkelijker worden naarmate recessies dieper worden en/of langer duren. De kosten worden bepaald door de kosten van schulden (κ) maal de effectieve schuldimpact $(1 - \mu\tau)$, welke gelijk staat aan de fiscale verandering min het terugverdieneffect van de belastingen (τ). Hoe hoger het belastingsniveau, hoe lager de kosten van fiscaal beleid. En, gezien κ stijgt wanneer de schuldquote stijgt, zien we dat er steeds hogere fiscale multipliers en/of hysteresis-effecten nodig zijn om begrotingstekorten te kunnen verantwoorden bij hogere schuldquotes.

Het toevoegen van internationale effecten leidt tot onderstaande vergelijking voor het marginale beleidseffect op het niveau van een monetaire unie:

$$MPE = (1 + \eta)\mu + \sum_i[(1+ \eta_i)\mu_{Si}] - (1 - \mu\tau)[\kappa + \sum_i(\Delta\kappa_i)] \qquad [3.2]$$

Waarbij $\sum_i[(1 + \eta_i)\mu_{Si}]$ de som van alle overloopeffecten op elk ander lid *i* van de unie is, en $\sum_i(\Delta\kappa_i)$ de som van alle kosten-effecten op elk ander lid *i* van de unie.

4. Empirische Evaluatie

Eerst maak ik een reeks van redelijke aannames omtrent de waardes van de verschillende parameters van het model voor de Eurozone als geheel, en vervolgens voor alle individuele leden van de Eurozone gebaseerd op enkele simpele formules die de economische omstandigheden van het land ten opzichte van het gemiddelde van de Eurozone meten. De resulterende waardes voor de marginale baten, marginale kosten en het resulterende marginale beleidseffect per land worden getoond in tabel 2. Een negatief marginaal beleidseffect duidt op een voorkeur voor bezuinigingen in dat land, een positief marginaal beleidseffect duidt op een voorkeur voor exdtra uitgaven. Hogere waardes in absolute zin duiden op een sterkere voorkeur.

Tabel 2. Totale Marginale Baten en Kosten van Fiscaal Beleid in de Eurozone.

Land	Marginale Baten	Marginale Kosten	Marginaal Beleidseffect
België	0.90	0.88	**0.02**
Duitsland	0.66	0.93	**-0.27**
Ierland	-0.13	1.49	**-1.62**
Griekenland	3.30	3.65	**-0.35**
Spanje	1.12	1.24	**-0.12**
Frankrijk	0.97	0.91	**0.06**
Italië	1.35	1.22	**0.13**
Cyprus	1.53	1.71	**-0.18**
Luxemburg	0.45	0.94	**-0.49**
Malta	-0.04	1.38	**-1.42**
Nederland	0.86	0.78	**0.08**
Oostenrijk	1.19	0.69	**0.50**
Portugal	1.60	1.41	**0.19**
Slovenië	0.96	1.23	**-0.27**
Slowakije	0.71	1.08	**-0.37**
Finland	1.52	0.49	**1.03**
Estland	1.02	0.98	**0.04**
Letland	0.47	1.31	**-0.84**
Litouwen	0.82	1.29	**-0.47**

Enkele opvallende uitkomsten die tegen de algemene opvattingen indruisen zijn het negatieve effect van overheidstekorten in Duitsland, de licht positieve effecten van overheidstekorten in Portugal en Italië, en het zeer sterk positieve effect van overheidstekorten in Finland. Ik verklaar waarom deze opvallende uitkomsten eigenlijk heel logisch zijn aan de hand van enkele voorbeelden. De diversiteit van de uitkomsten toont aan hoe belangrijk het is om fiscaal beleid per land te evalueren op basis van de individuele economische omstandigheden, en niet alle landen volgens dezelfde normen te beoordelen.

Tenslotte test ik nog in hoeverre het kosten-baten model van deze paper de geobserveerde groeipatronen in de Eurozone zou kunnen verklaren. Wegens het ontbreken van exacte data ben ik hier ook gedwongen enkele ruwe schattingen van de parameters te maken. Dit wordt gereflecteerd in de keuze om de fiscale beleidskeuzes (ϕ), het geschatte groei-effect van het beleid (Δg_ϕ) op basis van het model, en de geobserveerde groeiverandering (Δg_e) te noteren aan de hand van minnetjes en plusjes in plaats van exacte getallen. Niettemin geeft het resultaat een interessant beeld, waarvan de algemene conclusies bovendien niet staan of vallen bij de precisie van de parameter-keuzes.

Tabel 3. Historische Schattingen van het Kosten-Baten Model.

Year	μ	μ_s (0.2 μ)	η	MBB	MBK	MBE	ϕ	Geschatte Δg_ϕ	Echte Δg_e
2009	1.5	0.3	0.20	2.16	0.8	1.36	+++	+++	+++
2010	1.2	0.24	0.15	1.66	1.3	0.36	++	+	++
2011	0.8	0.16	0.10	1.06	1.36	-0.30	+	_	_ _
2012	1.1	0.22	0.15	1.52	1.34	0.18	_ _ _	_	_
2013	1.1	0.22	0.20	1.58	1.34	0.24	_ _	_	+
2014	0.9	0.18	0.15	1.24	1.28	-0.04	_	+	+
2015	0.8	0.16	0.10	1.06	1.16	-0.10	_	+	+

Merk bijvoorbeeld op dat het marginale beleidseffect (MBE), welke wordt gevormd door de marginale beleidsbaten (MBB) min de marginale beleidskosten (MBK), sterk varieert van jaar tot jaar. Optimaal fiscaal beleid vereist dan ook dat het beleid regelmatig wordt aangepast op de veranderende economische omstandigheden.

Als we het geschatte groeieffect vergelijken met de geobserveerde groeiverandering zien we dat de schattingen doorgaans sterk overeenkomen met de werkelijkheid. Rekening houdend met het feit dat de echte groei van veel meer factoren afhankelijk is dan van fiscaal beleid, is dit een verrassend sterke correlatie die de verklarende kracht van het model onderschrijft.

5. Conclusie

De continue strijd tussen actief fiscaal stimuleren enerzijds en balanceren van de overheidsbegroting anderzijds ligt al jaren aan het hart van vele fiscale beleidsdebatten, en wordt vaak op ideologische gronden uitgevochten. De financiele crisis heeft geleid tot een hernieuwde academische interesse in fiscaal beleid, welke heeft geleid tot een dieper begrip van de achterliggende krachten die aan beide zijden aan het werk zijn. Deze paper heeft geprobeerd de resulterende inzichten samen te bundelen tot een theoretisch kader waarin beide zijden verenigd worden. Hiermee toont het aan dat het antwoord op de vraag of de overheid meer of minder zou moeten uitgeven niet ideologisch van aard hoeft te zijn, maar op een pragmatische en objectief meetbare manier beantwoord kan worden. De paper toont ook aan dat succesvol fiscaal beleid flexibel genoeg zou moeten zijn om zich aan te kunnen passen aan veranderende economische omstandigheden.

Deze paper maakt gebruik van een kosten-baten model van fiscaal beleid, welke gestoeld is op de hypothese dat rekening gehouden dient te worden met vijf belangrijke aspecten:

1. De overheids-schuldquote
2. Toestand-afhankelijke fiscale multipliers
3. Fiscale overloopeffecten
4. Hysteresis effecten
5. Het belastingsniveau

Een belangrijke bijdrage van deze paper is het ontwikkelen van het concept van de marginale schuldenkosten multiplier, κ. De basisaanname van κ is dat de kosten van nieuwe schulden toenemen naarmate landen een hogere schuldquote hebben. Dit opent de weg voor een nieuwe aanpak betreffende het effect van de schuldquote op fiscaal beleid, en staat toe om deze effecten te kwantificeren en te modelleren.

De tweede belangrijke bijdrage is de ontwikkeling van het kosten-baten model waarin de vijf bovengenoemde aspecten verenigd worden. Dit model toont duidelijk aan dat het effect van fiscaal beleid sterk verschilt per land en per periode, en dat algemeen heersende beleidsopvattingen regelmatig niet door de feiten ondersteund worden. Het succes van het model in het verklaren van recente groeipatronen ondersteunt de hypothese dat fiscaal beleid bepaald zou moeten worden op basis van de vijf bovengenoemde aspecten.

List of Figures

List of Tables

Table of Contents

1. Introduction

Should the government spend less, or spend more? Ever since Keynes popularized the notion that states could strengthen an economy in recession by increasing their spending, the topic of active fiscal stimulus versus balanced government budgets has been a continuous ideological tug-of-war, both academically and in the public realm. Proponents of active fiscal policy argue that well-targeted state spending can not only alleviate economic hardship but also end up paying for itself and more, whereas proponents of balanced budgets argue that state spending has a distortionary effect on the market while hardly affecting the real economy, and that debt acts as a weight that drags down the economy.

Recently this topic has become especially current in the Euro area, as the Financial Crisis of 2008 has caused government debt-to-GDP ratios in the Euro area to soar and simultaneously triggered what is now known as The Great Recession, thus creating a situation where there are strong incentives for both reducing government debts and stimulating the economy. Moreover, fiscal policy is becoming increasingly important in a world where interest rates are close to the 'Zero Lower Bound', rendering monetary policy increasingly impotent.

In the Euro area, the choice of fiscal policy has been heavily influenced by fears of a breakup of the Euro area as a result of rising interest rates, leading to possibly unsustainable debt in some member states: in a panicky attempt to please the financial markets and stop the situation from spiralling out of control, focus has been on short-term results regarding the reduction of government deficits. Vigorous rhetoric regarding the virtues of discipline, thriftiness and the importance of fiscal responsibility ensured that states in the Euro area have been strictly focussed on compliance with the rigid fiscal targets in the Stability and Growth Pact, and on attempting to generate a government surplus and ultimately lower debt-to-GDP ratios through spending cuts and tax increases; a policy generally known as austerity.

On the academic front, the choice of committing to a policy of austerity has been further emboldened by the recent body of literature regarding the constricting effect of government debt on economic growth, led by a paper by Reinhart and Rogoff (2010); they presented evidence which indicated that, once a government reaches a debt ratio of 90 percent of GDP, any additional government debt negatively impacts economic growth. While the existence of such a clear-cut threshold has been questioned by many, it is easy to imagine that at some point the interest payments on government debt become large enough to offset economic growth, and thus become a crippling and possibly unsustainable burden on the economy.

Another argument in favour of austerity was provided by Alesina and Ardagna (2009), who provide evidence that fiscal consolidation through spending cuts need not have a negative effect on economic growth, and can in fact have expansionary effects on the economy. Many other academics have echoed their resulting call for swift and decisive spending cuts to bring down the ballooning debt levels.

Contrasting this are several recent papers which indicate that this singular focus on austerity measures may not have been the most economically sensible course of action, and that for many

states a countercyclical policy focussed on minimizing the impact of the recession and promoting growth would be more beneficial. Most notably, an IMF paper by Blanchard and Leigh (2013) caused a stir by showing that fiscal multiplier values since the Financial Crisis had been grossly underestimated; the implication being that expectations of the economic effects of austerity had been too rosy, while expectations regarding potential benefits of fiscal stimulus had been overly sombre. Other recent literature confirms that multipliers during times of recession and strongly negative output gaps are much higher than during normal times, thereby increasing the effectiveness of fiscal policy.

Additionally, as has recently been investigated by, among others, Auerbach and Gorodnichenko (2013), fiscal policy is accompanied by significant cross-border spillover effects on output in other countries. This means that a fiscal expansion (contraction) in country A increases (decreases) output in country B. This is an especially significant consideration in the Euro area, where countries are highly economically linked and share a common economic fate through their shared currency. For this reason, many have expressed their worries that simultaneous austerity policies across all Euro Area members would prove to have severely negative effects on economic growth, as negative growth effects from austerity at home are compounded by negative spillover effects from austerity abroad.

Moreover, a recent paper by DeLong and Summers (2012) provides an updated analysis of a phenomenon called hysteresis. Hysteresis occurs when the long-term potential level of output is negatively affected by lingering after-effects of a current recession. Effectively, what this entails is that *"productive capacity might get lost forever if temporary unemployment would become permanent and firms would unnecessarily go bankrupt, thereby destroying firm-specific knowledge, technology and human capital."* (Jacobs, 2013). DeLong and Summers (2012) argue that, even assuming moderate fiscal multipliers and modest hysteresis effects, expansionary fiscal policy can be self-financing or even help to reduce long-term debt levels.

The contradictory evidence of these recent academic advances has unfortunately not diminished the ideological nature of the fiscal policy debate. In this paper, I will examine the recent research regarding these fiscal policy insights and follow their implications down a path of logical conclusions. My hypothesis is that all these academical findings have their merit and should be taken into account when determining fiscal policy, and that their contradictions can be solved by placing them together in a larger context. By doing so, I seek to construct a new, non-ideological paradigm for thinking about fiscal policy that incorporates arguments for fiscal expansion and fiscal contraction alike. Within this paradigm I then construct a new dynamic theoretical model for determining the effects of fiscal policy, and which can serve to provide concrete fiscal policy advice.

This model is based on a cost-benefit approach to fiscal policy, and takes into account the individual economic circumstances of each country as well as the international effects of fiscal policy. I show the policy implications of the model for countries in the Euro Area, and find that the question whether fiscal policy budgets should expand or contract need not be a matter of ideology, but can be answered in a pragmatic way based on measurable economic conditions. The model stresses the importance of taking into account the debt ratio, the business cycle, spillover effects and country-specific characteristics in determining successful fiscal policy.

2. The Crisis and the Literature

In 2008, as the Financial Crisis shook the foundations of the modern financial system, many governments felt the need to step in and stabilize the financial sector with a huge inpour of money. While successful in preventing a systemic collapse, it caused a spectacular rise in government debt (see **figure 1**) which, combined with revelations about fiscal mismanagement and fiddling with official figures in countries such as Greece, caused investors to worry about the ability of some countries to repay their debts or even their interest payments. As a result, in 2010 interest rates in several countries started to rise to reflect the increased risk on their loans, thus creating a situation wherein fears about the unsustainability of debt would become a self-fulfilling prophecy. Furthermore, it led to doubts about whether the Euro area was equipped to deal with economic crises in individual countries, and for the first time the possibility that the Euro area might break up seemed to be realistic.

Figure 1. Government Gross Debt-to-GDP in the Euro Area.

Meanwhile, in the academic literature, Reinhart and Rogoff (2010) published a paper that drew a lot of attention. They study the impact of different levels of government debt on economic growth, and find that, although additional government debt has only a weak impact on real GDP growth at low levels of government debt, the impact becomes strongly negative once government debt rises above 60 percent of GDP for developing economies, and 90 percent of GDP for advanced economies. They theorize that this is a result of strongly increasing risk premia due to concerns about the ability to repay this debt.

Their findings have been supported by a number of other papers: Checherita and Rother (2010) presented an investigation of the effect of government debt on economic growth for 12 euro area countries, and found an inverted u-shape relation with a turning point at debt levels around 90-100 percent of GDP, with statistical confidence starting as low as 70 percent of GDP. They point to their results as *"an additional argument in favour of swiftly implementing ambitious strategies for debt reduction"*.

Cechetti et al. (2011) publish an examination of debt levels for 18 OECD countries wherein they find a threshold level for when additional government debt has a negative impact on economic growth at around 85 percent of GDP, stating that *"the only possible conclusion is that advanced countries with high debt must act quickly and decisively to address their looming fiscal problems"*.

Baum, Checherita and Rother (2013) expand on their previous research by using a dynamic threshold panel methodology to examine the short-run effect of debt on growth for 12 euro area countries, and find a positive short-run effect of debt on growth for debt-to-GDP ratios up to 67 percent, and a negative impact for ratios above 95 percent.

Nickel and Tudyka (2013) employ an interacted panel VAR for 17 euro area countries, and they also find evidence to support the notion that fiscal stimuli have positive effects on growth at low debt-to-GDP ratios, whereas their effects become less positive or even negative increasingly sooner after their impact at higher debt-to-GDP ratios.

Drawing a general consensus conclusion from these papers, we can surmise that government debt has a non-linear effect on growth. While at low debt-to-GDP levels additional government debt increases real GDP growth, the effect becomes weaker as the debt-to-GDP ratio rises. Beyond a certain threshold level, any additional government debt begins to have a strongly negative effect on real GDP growth.

Another paper that was highly influential in shaping thinking on fiscal policy was that of Alesina and Ardagna (2009), who examine the effects of large fiscal policy stances – both expansionary and contractionary – and conclude that contractionary fiscal policy need not have negative effects on economic growth; on the contrary, they cite several cases in which fiscal contraction led to higher economic growth.

In 2010, Alesina wrote another paper which he presented to the European Union's finance ministers in Madrid, in which he states that *"debts will not stop growing without discretionary fiscal tightening"* and that spending cuts can be *"immediately followed by sustained growth rather than recessions"* if the cuts are *"large, credible and decisive"*.

In light of these findings, and forced by a panicky capital market that demanded swift action, in 2010 the European Commission (EC), the European Central Bank (ECB) and the International Monetary Fund (IMF), commonly called the Troika, embarked on a quest to reduce government deficit and debt-to-GDP ratios in the Euro Area through drastic austerity measures, mostly in the form of spending cuts. Thanks to this policy of austerity a measure of calm was restored to the markets, and the initial 2011 results of continued economic growth and falling government deficits looked promising enough to deem the bitter pill of austerity an effective medicine. Both stories, the Reinhart & Rogoff debt-threshold and the Alesina & Ardagna growth-inducing fiscal contraction, appeared to have been correct in their assessments of the dangers of high debt and the benefits of strong fiscal action to reduce the debt.

Unfortunately, in 2012 the growth rate fell hard enough for the euro area to once again dip into recession (see **figure 2**), even as the United States continued on a steady growth path of around 2 to 3 percent per year, comparable to their pre-crisis level. For the Euro Area, the recession was even prolonged throughout 2013, and it was not until 2014 that the Euro Area could boast a careful economic growth again, albeit at less than 1 percent per year. And in spite of all austerity

measures, debt-to-GDP ratios in the Euro Area had continued to rise (as was shown in figure 1). Moreover, the combination of a double-dip recession and spending cuts had gradually pushed unemployment rates in the Euro Area up to 12 percent (see **figure 3**).

Figure 2. Annual GDP Growth Rate in the Euro Area.

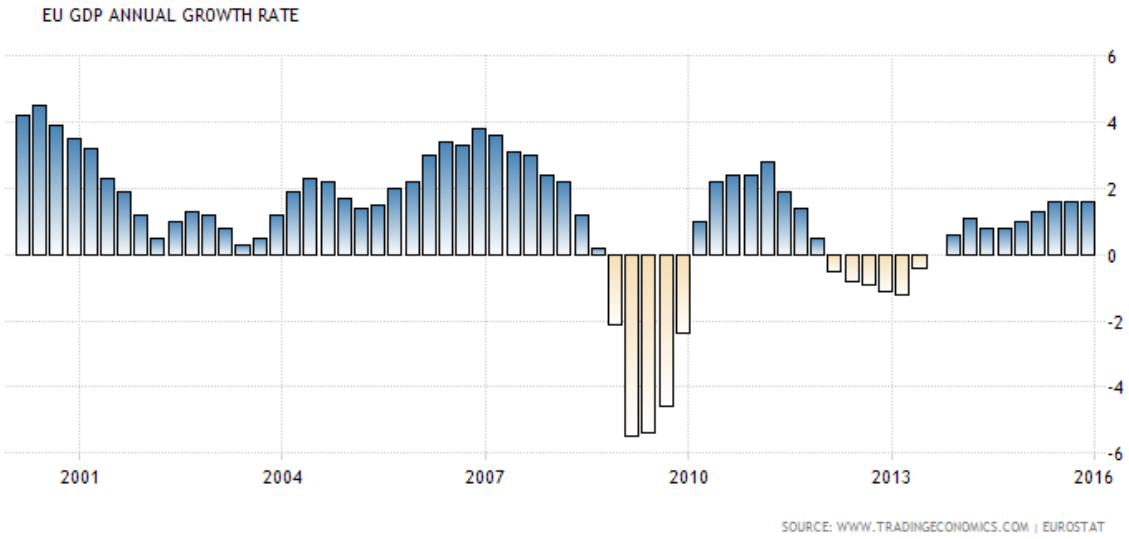
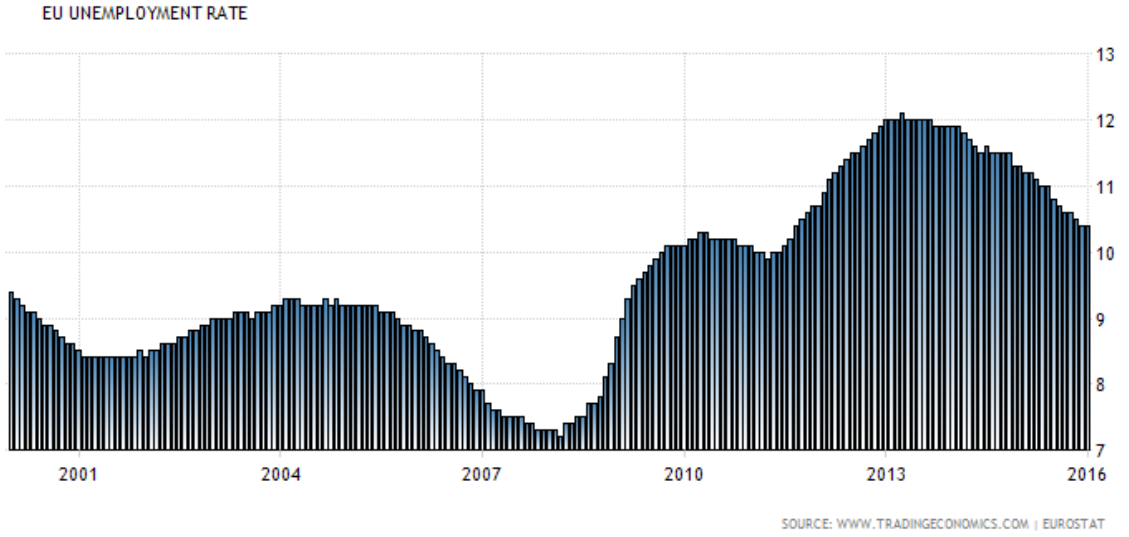


Figure 3. Unemployment Rate in the Euro Area.



It was under these circumstances that the IMF published a remarkable paper by Blanchard and Leigh (2013), in which they show that assumptions about the fiscal multipliers since the crisis have been much too conservative. They argue that forecasters had consistently used pre-crisis multipliers of around 0.5 to predict the effects of fiscal policies, whereas they find evidence *"that actual multipliers were substantially above 1 early in the crisis"* (p19). The implication is that any fiscal policy conducted during the crisis would have a much bigger impact on the real economy than could be expected during normal times, and hence that austerity would have a strongly depressing effect on economic growth. The paper is all the more remarkable seeing as Olivier Blanchard at the time of publishing also held the position of chief economist for the IMF, and the IMF is part of the Troika which advices and enforces austerity in the Euro Area.

Several other papers, some of which predate the paper by Blanchard and Leigh, have found similar results. Auerbach and Gorodnichenko (2012b) examined a large number of OECD countries in order to determine the effect of recessions and expansions on the size of the multiplier. They find evidence that multipliers are responsive to the state of the economy, and that multipliers can vary from near zero in expansions to 2.5 in recessions.

In a very recently published paper, Canzoneri et al. (2016) employ a Curdia-Woodford model as an alternative to standard business cycle models which have trouble generating high and state-dependent multipliers. With this approach they too find that fiscal multipliers can indeed be strongly state-dependent, with multipliers exceeding 2 during recessions but dropping below 1 during expansions.

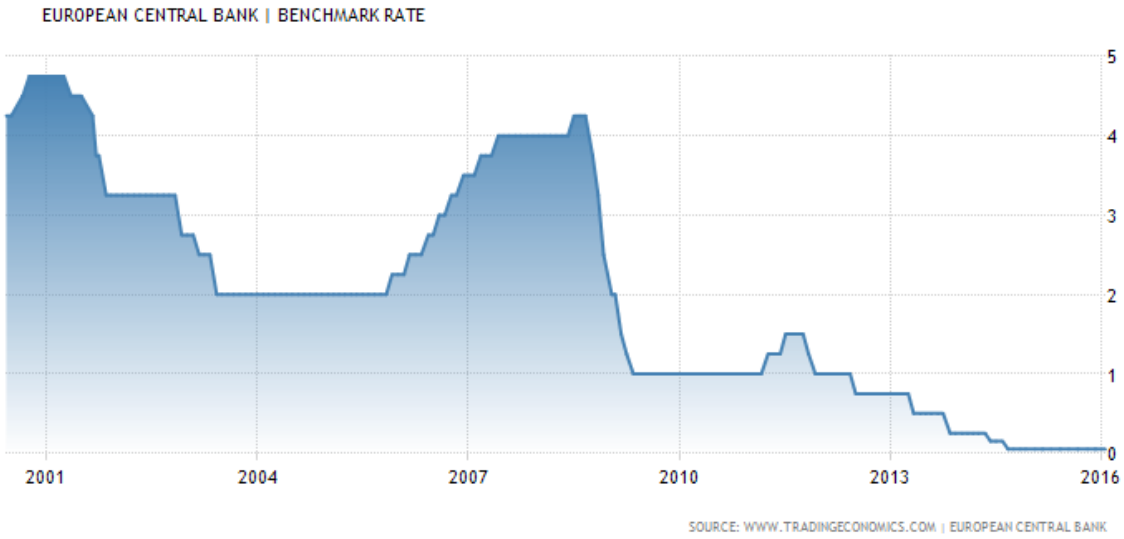
Relatedly, Ilzetzki, Mendoza and Végh (2013) examine a dataset of 44 countries and find that fiscal multipliers are largely determined by key country characteristics such as level of development, exchange rate regime, openness to trade and public debt. A 2012 paper by Baum, Poplawski-Ribeiro and Weber examine six of the G7 economies on a country-by-country basis in order to determine the effect of fiscal policy on output in relation to the output gap. They find that multipliers not only vary within countries according to the business cycle, but also significantly differ from country to country, calling for *"a tailored use of fiscal policies and a country-by-country assessment of their effects"*.

Another topic that has long peeked interests of academics, commentators and politicians, is that of cross-border spillover effects of fiscal policy. This topic is of special relevance to the highly interconnected and interdependent Euro Area, where spillover effects are generally assumed to be larger. As early as 2010, French finance minister Christine Lagarde (currently head of the IMF since 2011) called on Berlin to boost domestic demand so that other European countries could benefit from spillover effects through trade linkages; a call that has been echoed by many policy commentators. Several recent papers, the most prominent of which is probably that of Auerbach and Gorodnichenko (2013), indeed show that spillover effects are highly significant, especially during recessions. They argue that coordinated fiscal stimulus could internalize these fiscal policy externalities, and as such increase the total benefits of fiscal stimulus.

Meanwhile, in an attempt by the ECB to promote economic activity as economic growth in the Euro Area slumped, interest rates were reduced to compensate for the limited investment opportunities and the falling returns on investment. Currently, interest rates have fallen so low (see **figure 4**) that monetary policy faces a unique limitation known as the binding Zero Lower Bound (**ZLB**). Under normal circumstances, the Central Bank can promote economic activity by lowering interest rates and thereby making investment and spending money more attractive. This mechanism can be used to compensate for government spending cuts, reducing the overall negative effect on GDP. However, since interest rates cannot drop far below zero (since people can always choose to hold cash, which has effectively a zero interest rate), monetary policy cannot compensate in the traditional sense for a contractionary fiscal policy. Although other methods, such as Quantitative Easing (QE) which involves a Central Bank buying up financial assets from commercial banks and other private institutions, have been developed to conduct monetary policy, the ZLB still constitutes a serious limitation on monetary policy. Because of this limitation the importance of fiscal policy as an instrument to stabilize and promote economic growth has grown. Furthermore, due to the current limitations on monetary policy it

cannot be used to offset the effects of fiscal policy, and the impact of any fiscal policy is thus effectively enhanced; in other words, the ZLB limitation on monetary policy increases the fiscal multiplier.

Figure 4. Interest Rates in the Euro Area.



Moreover, the current near-zero interest rate combined with the low growth and the high unemployment has sparked fears about the Euro Area heading towards a period of falling prices of goods and services, als known as deflation. The problems of deflation are twofold:

- As prices and wages fall, people tend to defer on big expenses and investments. This, in turn, causes the economy to slow down even more, driving down prices and wages even further, thus creating a deflationary spiral.
- As the price level of goods and services falls, GDP shrinks. Government debt, on the other hand, remains untouched by this deflationary process, and the debt-to-GDP ratio therefore automatically rises.

Under these circumstances, where monetary policy is rendered increasingly impotent due to losing the interest rate channel and where the economy is trapped in a deflationary spiral, reducing the overall government debt ratio is near impossible: any spending cuts will tend to aggravate the deflationary spiral, and if spending remains untouched the deflation will automatically raise the debt-to-GDP ratio. Combined with the currently already high debt-to-GDP ratios, deflation could be very dangerous indeed. Clearly this is a highly undesirable situation that should be avoided as much as possible.

DeLong and Summers (2012) re-visit another risk to long-term economic depression: hysteresis, which refers to the negative impact on potential future output caused by a prolonged recession in the present. They provide evidence that, even assuming moderate fiscal multipliers and modest hysteresis effects, expansionary fiscal policy can be self-financing or even help to reduce long-term debt levels. They argue that fiscal policy can be very effective under circumstances

such as those in the Euro Area in recent years: multipliers are likely strongly elevated because of the slack in the economy as a result of the recession and because monetary policy is constrained by the ZLB, while hysteresis-effects are likely present as private investment has been low for a prolonged period of time, bankruptcy-levels have been elevated in many Euro Area countries and unemployment rates have strongly risen.

While they point out that their analysis does not diminish the importance of addressing unsustainable fiscal policies, they state that their analysis *"simply demonstrates that additional fiscal stimulus, maintained during a period when economic circumstances are such that multiplier and hysteresis effects are significant and then removed, will ease rather than exacerbate the government's long run budget constraint."*

The recent academic literature thus provides us with compelling arguments for reducing government spending on the one hand, and increasing government spending on the other hand. How can we reconcile these apparent contradictions in the literature, or are they not as contradictory as they may seem? And how do we draw clear policy conclusions from these contradictory insights?

This paper argues that successful fiscal policy is a balancing act between managing government debt levels on the one hand, and optimizing government spending levels with respect to the economic circumstances on the other hand. Furthermore, it postulates that this balancing act can be captured with a country-specific cost-benefit model, in which costs are represented by a variable cost of debt dependent on the debt ratio and the tax rate, and benefits are captured by a return on investment calculation based on the standard fiscal multiplier, spillover multipliers and the hysteresis coefficient. Here it draws and expands upon the work by Delong and Summers (2012); where they formulate an equation to calculate the net present value of fiscal policy, this paper adapts their equation to calculate a net effect on growth and introduces government debt-ratio dynamics into the equation. In doing so, it seeks to create a dynamic model that captures both sides of the recent literature and provides clearer real-world policy advice.

Additionally, this paper evaluates the determination of fiscal policy within the complex reality of a monetary union, and provides some guidance on how to determine fiscal policy not only on a country level but also on a monetary union level where fiscal policy choices have international implications.

The paper is organized as follows: in section 3, I develop a theoretical framework for assessing fiscal policy based on the recent academic advances in the field of fiscal policy. My goal here is to combine the different conflicting strands of research and unite them into a single theoretical framework that allows us to better understand the intricacies of fiscal policy.

Subsequently, in section 4, I will build a model based on this theoretical framework. The purpose of this model is to provide a working tool for determining the optimal course that fiscal policy should take, taking into account the economic circumstances of each country.

In section 5, I take a pragmatic approach to calculating the parameters of the model and interpret the policy implications of the model for fiscal policy in the Euro Area, given a set of reasonable assumptions.

Finally, section 6 will summarize the insights and conclusions I draw in this paper.

3. Theoretical Framework

This paper is riding on a wave of recently published papers about fiscal policy, which are the result of the renewed academic interest in fiscal policy since the Financial Crisis. From my reading of this volume of new research it appears a few key insights can be distilled, which I hypothesize should all be taken into account in order to determine successful fiscal policy:

1. High public debt-to-GDP ratios have a significantly depressing impact on economic growth: once public debt reaches a certain threshold level, any additional debt will quickly have a negative impact on economic growth.

2. Fiscal multiplier values are strongly influenced by economic circumstances: multipliers can vary from values near zero in expansions to more than two in recessions.

3. Fiscal policy causes spillover effects to other countries that are both statistically and economically significant: according to some studies, the spillover multiplier is at least as large as the international trade share of the fiscal multiplier.

4. Recessions today impact potential output in the future through hysteresis effects: during recessions, human and capital resources are wasted or even permanently lost, lowering future potential output. These effects are cumulative, meaning that the longer a recession lasts, the stronger the hysteresis effects become.

In this section I will provide a closer examination of these insights: what is the rationale behind them, what are their implications for fiscal policy, and how do they interact? Furthermore, I will construct a theoretical framework based upon interpretation of these insights with the aim of providing a new paradigm for determining fiscal policy.

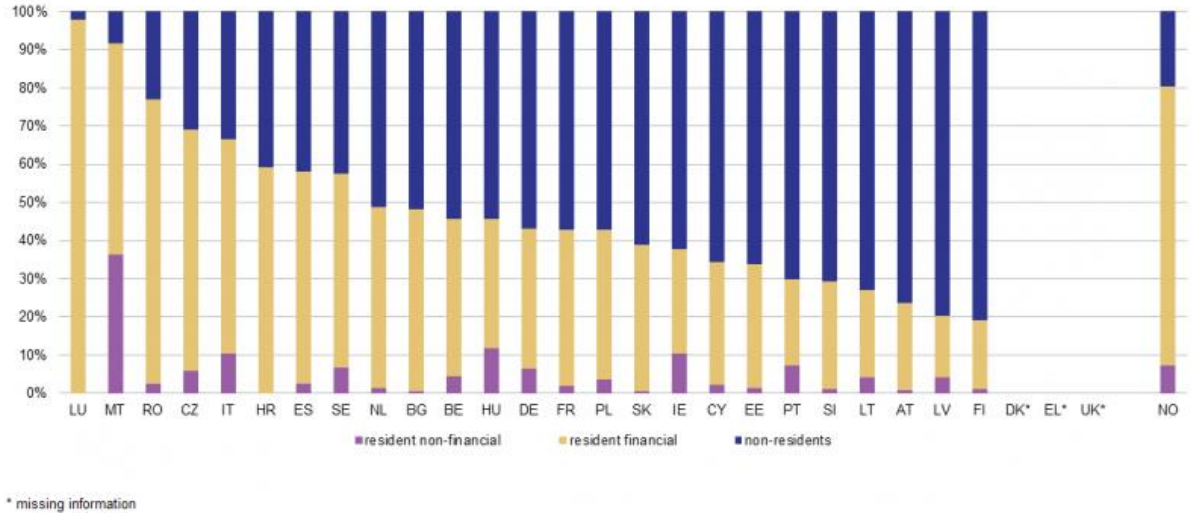
3.1 The Cost of Debt

As mentioned earlier, a recent body of research argues that debt has an increasingly depressing effect on economic growth as the debt ratio rises. In order to understand why this would be the case, let's consider how debt might impact economic growth. There is the straightforward interest burden of public debt: if we consider the economy of a single country, the interest burden can be viewed as a steady leak of funds from the economy, especially as a large share of the debt is typically foreign-owned and another large share is held by resident financial corporations (see **figure 5**) who mostly do not contribute to the real economy. As the debt ratio rises and the interest burden grows, it takes a higher portion of the economic growth just to compensate for this leak. At some point the interest rate burden on the economy becomes big enough that it completely offsets the average growth rate.

Furthermore, several authors point out that debt poses a threat to economic stability, and that countries with high debt are more susceptible to shocks in the economy. Changes in interest and inflation rate are far more impactful when debt ratios are high, and countries are less capable of stabilizing economic shocks as fiscal policy becomes more constrained at higher debt levels.

This becomes apparent in the deflationary spiral risk mentioned earlier: as debt levels rise, the negative effects of deflation aggravate and the ability of countries to break the deflationary spiral weakens. Because rising debt levels thus serve to increase volatility – which is generally viewed as bad for growth – and debt carries inherent exposure to risk with it, it follows that increased debt would have a negative impact on growth.

Figure 5. General Government Gross Debt by Sector of Debt Holder.



* missing information

SOURCE: EUROSTAT

So far this is a fairly linear story, but the recent research regarding debt thresholds suggests that debt has a non-linear effect on growth: once a certain level of debt has been reached, debt is suddenly perceived as being far more dangerous and additional debt suddenly faces drastically different conditions for lending and repayment.

Reinhart and Rogoff (2010) speculate that this is caused by something they call 'debt intolerance'. This concept, developed in an earlier paper by Reinhart, Rogoff and Savastano (2003), suggests that *"as debt levels rise towards historical limits, risk premia begin to rise sharply, facing highly indebted governments with difficult tradeoffs. Even countries that are committed to fully repaying their debts are forced to dramatically tighten fiscal policy in order to appear credible to investors and thereby reduce risk premia."* (Reinhart and Rogoff; 2010). This appears a credible argument, especially considering that this closely resembles the situation recently seen in Greece and other peripheral European countries. Moreover, the non-linearity effect is enhanced as the rising interest rates not only affect new loans but also the outstanding debt as it is being rolled over: the higher the debt, the higher the impact of rising interest rates thus becomes. Reinhart and Rogoff further stress that debt thresholds are very much country-specific, and that countries that are perceived as economically strong have much higher debt thresholds than countries with weak or emerging economies.

Another prominent paper on the subject of government debt thresholds, by Checherita and Rother (2012), examines twelve euro area countries and finds empirical evidence for four main channels through which government debt impacts the economic growth rate: private saving, public investment, total factor productivity and sovereign long-term nominal and real interest rates. The aggregate effect of these channels reveals a concave relationship between public debt and economic growth. Interestingly, they find that interest rates depend mainly on

the change in the public debt ratio rather than the level, which suggests that interest rates are highly sensitive to fiscal policy.

Ardagna et al (2007) provide evidence for the responsiveness of interest rates to public deficits: their empirical analysis reveals that *"a one-percentage-point increase in the primary deficit relative to GDP increases contemporaneous long-term interest rates by about 10 basis points"*. Additionally, they find evidence for the nonlinearity of this effect, which appears only to be present when the public debt-to-GDP ratio is above its median value (estimated in their samples to be around 65 percent of GDP). As long as the public debt-to-GDP ratio is below this level, an increase in public deficit actually leads to a decrease of long-term interest rates. Ardagna et al attribute this to investors rating government bonds as high quality when the debt ratio is low, but rating them as low quality when the debt ratio is high.

A third view on the mechanism behind the debt threshold is presented by Nickel and Tudyka (2013), who argue that the private sector exhibits strongly non-linear Ricardian features; private agents expect that higher debt now leads to higher taxes in the future, and they adjust their spending in order to accommodate for this. They find that crowding-out of investments through government spending increases significantly with rising levels of debt, and that at the effect of government spending on the trade balance turns from negative to positive as debt levels rise, indicating that total spending in the home country is falling even as governments spend more.

It must be mentioned that there are endogeneity concerns regarding the research on debt thresholds: it is not always clear from the research whether high debt caused low growth, or whether low growth caused high debt. For instance, a recent IMF working paper by Pescatori, Sandri and Simon (2014) presents a different way of analysing the data in which they try to circumvent these endogeneity concerns by taking a longer-term perspective. Indeed, as they expand the time horizon from 1 to 5 to 15 years, and eventually ignore the first 5 years, the evidence for a threshold becomes substantially weaker. However, this method for eliminating endogeneity effects seems somewhat arbitrary and questionable: it provides no solid counter-evidence for the existence of a threshold in the short run, and is not supported by a strong argument why long-run effects would outweigh short-run effects.

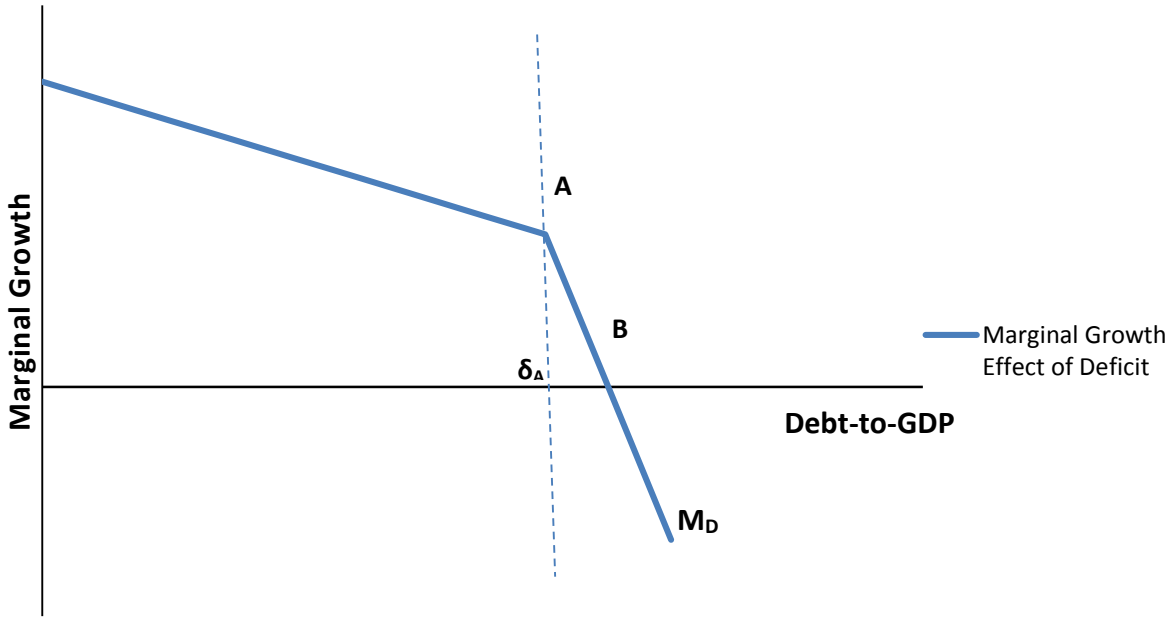
Indeed, by choosing to focus on the long run you ignore some of the most important sources of the debt threshold effect: expectations and uncertainty about the future, which are at the root of interest changes and Ricadian behaviour. When observing the effects of a singular event (e.g. public debt crossing a certain threshold), the effects of uncertainty about the future and expectations are strongest shortly after the event. As time moves on, uncertainty about the future becomes irrelevant as the uncertain future inevitably becomes the observable present and then the recorded past; speculation about possible effects subsides as the actual effects become observable and expectations converge towards the proven track record of effects since the event. Private investors may panic at first when government debt first breaks a certain threshold, but if they observe that the new level of debt is stable they may decide to tolerate the new level.

Another paper, by Herndon, Ash and Pollin (2013), provides a critique of the original Reinhart and Rogoff study by redoing their calculations and finding several errors and inconsistencies which, if corrected, largely nullifies their proof of a clear debt threshold. Other papers, such as that of Panizza and Presbitero (2013), echo this criticism on the existence of a singular debt

threshold above which growth collapses. Yet, while proof of the existence of some general debt threshold is certainly weak, most authors critical of the debt threshold theory acknowledge that rising debt levels are a legitimate source of concern, especially when coupled with public deficits. For instance, Chudik et al. (2015) report: *"we find no evidence for a universally applicable threshold effect in the relationship between public debt and economic growth. Regardless of the threshold, however, we find significant negative effects of public debt build-up on output growth."* Moreover, like the Pescatori, Sandri and Simon paper and the Herndon, Ash and Pollin paper, none of the critical papers offer a logical argument in the form of economic reasoning that would disprove the existence of a debt threshold, or provide counter-arguments to the theories mentioned earlier; all criticism is focused merely on the weakness of existing theories and on the lack of solid, unquestionable proof of the existence of any debt thresholds.

Considering the evidence for and against the existence of a debt threshold, there appears to be a high likelihood, backed by both theory and empirical evidence, that debt has at least a negative and probably non-linear effect on growth. Whether through the interest burden, through the interest rate channel, through Ricardian behaviour or through increased volatility, it seems more than plausible that rising debt levels have an increasingly adverse effect on the economy, and that nonlinearity in some form of debt intolerance exists; not all debt is equal. Assuming this negative relationship between public debt and growth is indeed real, let us attempt to model this relationship in order to assess its effect on fiscal policy.

Figure 6. The Non-Linear Growth Effect of Debt.



The above **figure 6** showcases a highly stylized image of the marginal effect of additional debt-to-GDP on GDP growth under the non-linear debt threshold assumption; I will call this the M_D curve. On the x-axis is the debt-to-GDP ratio δ, and on the y-axis is the marginal GDP growth per capita resulting from increased debt-funded government spending. At low levels of debt, additional debt faces only a slowly declining marginal return in growth, reflecting normal responses in private saving, investment and interest rates to the rising debt level. Upon reaching a certain debt-to-GDP level, the negative reaction to increasing debt becomes much more

pronounced and debt quickly becomes unproductive and even harmful; a reflection of the debt intolerance effect, represented by the steeper decline in the M_D curve beyond point **A** at a debt ratio δ_A. The point **B** where the line intersects the x-axis represents the debt threshold: beyond this point, increasing the debt actually starts to have a negative effect on growth. The curve itself is highly simplified, and the slope may in reality change much more gradually or more drastically, but its purpose is merely to illustrate the concept of a non-linear debt threshold.

The M_D curve can then be represented by a segmented regression function:

$$M_D = c_0 - \alpha_\alpha \cdot \delta \qquad \text{for all } \delta \leq \delta_A$$

$$M_D = c_1 - \alpha_\beta \cdot \delta \qquad \text{for all } \delta \geq \delta_A \qquad [3.1.1]$$

Where α_α and α_β are the slopes of both segments of the curve with $\alpha_\beta > \alpha_\alpha$, and c_0 and c_1 are the intersect values at the y-axis, where $c_1 = c_0 + c$. Following the debt threshold theory as put forth by Reinhart and Rogoff (2010), the country-specific debt threshold can be obtained through varying both the slopes α_α and α_β of the curve, and through shifting the point δ_A on the x-axis at which the curve becomes steeper. For weak, emerging economies, point A will move to the left and the steeper part of follows that the intersection-point B also moves to the left, representing a lower debt threshold. The slopes α_α and α_β depend on a host of economic factors which have been determined by various research papers, some of which are mentioned earlier in this section: first are the interest rate (i) and the inflation rate (π), which represent the direct monetary cost of debt. Second are the indirect costs of debt to the economy: the effect of the debt ratio on private saving (s) and total factor productivity (TFP). Third are the instability effects of debt: increased exposure to risk (ρ) and an increasingly limited ability of governments to use fiscal policy as a stabilizing tool (ϕ), and some aggregate error-term (ε).

$$\alpha_{\alpha,\beta} = f(i\ (+),\ \pi\ (-),\ s\ (+),\ TFP\ (-),\ \rho\ (+),\ \varphi\ (+),\ \varepsilon) \qquad [3.1.2]$$

The various (+) and (-) symbols indicate whether there is a positive or negative relation between the variable in question and α. Interest rates affect α positively, because as interest rates rise, the cost of debt increases. Private saving also affects α positively: as a rising debt ratio tends to increase private saving which puts pressure on the economy, this can also be viewed as a rising cost of debt. The instability effects ρ and ϕ affect α positively because these are effects inherent to debt and continuously rise as the debt ratio rises. Total factor productivity affects α negatively: because a higher debt ratio has a depressing effect on total factor productivity, a lower total factor productivity can be viewed as a higher cost of debt. Inflation also affects α negatively, because a rising inflation actually decreases the cost of debt; theoretically it would therefore be possible for α to become negative if inflation is high enough.

The M_D curve offers some interesting insights: the distinction between α_α and α_β that divides up the curve leads us to the point δ_A of government debt ratio, which represents the 'panic point' beyond which markets suddenly become infected with fear about the credibility of repayment and where extra debt quickly becomes unproductive. The location of the panic point δ_A is determined by various country-specific factors, such as the historical debt ratio limit, the history of fiscal policy deficits and fiscal prudence, and the economic outlook.

In terms of α, what happens at this panic point is that the interest rate shoots up as risk premia rise sharply, private saving increases as households anticipate a rise in taxes, negative effects of the spreading fear attract speculation and discourage private investment (which, incidentally, likely has a negative effect on total factor productivity as well), and the governments' hands are bound through increased scrutiny of its expenses. All this causes a sudden sharp rise in α, which explains the distinction between α_α (before the panic point is reached) and α_β (once panic has spread). Although this panic point is highly subjective and variable across countries and economic conditions, it is no less real than bank runs or other instances of herd behaviour in the markets which has been extensively documented in the literature on behavioural economics.

Furthermore, since the M_D curve is aimed at understanding the impact of fiscal policy, it is based on the notion that it is not the debt ratio as such that slows down economic growth, but rather the combination of the level of the public debt and the change in public debt. Coincidentally, this would help to explain some of the contradictory data regarding the negative effects of high debt rates on growth, where some countries with high but declining debt ratios would attain levels of growth comparable to countries with low debt ratios.

More importantly, from the M_D curve we can also state that the marginal cost of public debt (which I shall dub **κ**) increases as the debt ratio increases. At a debt ratio of zero, the marginal cost of debt is roughly equal to its monetary value plus a basic interest ($\kappa = 1$). However, as the debt ratio increases, additional debt brings ever increasing exposure to risk and puts upward pressure on the interest rate and the private saving rate, and thus gains an economic cost beyond its initial value. In terms of the M_D curve developed here, this can be represented by the following function:

$$\kappa = (1 + \alpha \cdot \delta) \qquad [3.1.3]$$

where $\alpha = (\alpha_\alpha , \alpha_\beta)$ represents the country-specific negative economic impact of rising debt-to-GDP (δ). In essence, by measuring the progressively depressing effect of debt on GDP as the debt-to-GDP ratio rises, κ represents a multiplier effect for the cost of debt. The concept of κ is therefore crucial to the determination of a cost-benefit model of fiscal policy, as κ can be used to calculate the real cost of running a government deficit (C_G):

$$C_G = \kappa \cdot \Delta D \qquad [3.1.4]$$

The real cost of running a government deficit is thus calculated in a manner similar to the way the benefit of fiscal policy is calculated: a monetary impulse times a multiplier value, in order to determine the real economic impact of the impulse. It is important to remember that the debt multiplier κ gets bigger as the debt ratio rises, and that running a government deficit thus becomes costlier at higher debt ratios.

3.2 The Fiscal Multiplier

Defined as the ratio of how much aggregate GDP will change for a unit change in fiscal spending, the fiscal multiplier is essentially the translation of the impact of fiscal policy on the economy into a single factor. As such, the importance of the fiscal multiplier in the assessment of fiscal

policy should be obvious. Less obvious, unfortunately, is the determination of the fiscal multiplier. This is clear from the vast amount of papers that all propose different models for determining the fiscal multiplier, and the enormous variety in multiplier estimates they provide: estimates range from a multiplier value of zero or worse, to values of 3 or higher.[1]

Nonetheless, in the IMF paper by Blanchard and Leigh (2013) on growth forecast errors and fiscal multipliers, they make mention of fairly clear consensus multipliers for 'normal times' in advanced economies: *"a reasonable case can be made that the multipliers used at the start of the crisis averaged about 0.5. A number of studies based on pre-crisis data for advanced economies indicate actual multipliers of roughly 0.5, and it is plausible that forecasters, on average, made assumptions consistent with this evidence."* (Blanchard and Leigh, 2013, *p19*)

However, the 2008 financial crisis and the subsequent sovereign debt crisis all but constitute 'normal times', and there is compelling evidence that multipliers during crisis times are very different and likely much higher than in normal times. Firstly, the financial crisis has rendered private agents both liquidity and credit constrained; this increases the likelihood that changes in government spending will directly affect private spending behavior, rather than be absorbed through changes in private saving behavior. In its most basic form, the multiplier is represented by the following formula:

$$\mu = 1 / (1 - c_m) \qquad [3.2.1]$$

The multiplier (**μ**) is a direct function of the marginal propensity to consume (**c_m**), or how much of an additional euro of income is spent. When private agents are liquidity or credit constrained, they tend to spend a higher portion of any additional income: c_m goes up, and as a result μ goes up.

Secondly, the prolonged recession has created a significant output gap, which largely nullifies any 'crowding out' effect fiscal policy might have. It is often suggested that government spending would compete with private spending, and that increased government spending would merely replace, or crowd out, private spending, thus neutralizing the effect of government spending on the real economy. However, during a recession spending gradually drops further and further below potential output, thus creating a so-called output gap. Since the economy is suffering from lack of spending, changes in government spending need not compete with private spending; instead, government spending can increase demand and thus boost the economy towards its potential level by absorbing the excess output.

Thirdly, the Zero Lower Bound constraint that the ECB faces is likely to increase multipliers. To see why, it is important to first understand the objective of monetary policy. As stated by the ECB itself: *"The primary objective of the ECB's monetary policy is to maintain price stability. The ECB aims at inflation rates of below, but close to, 2% over the medium term."* An exogenous shock to the economy in the form of changes in government spending has a destabilizing effect on inflation rates, and therefore would require action by the ECB; it adjusts the interest rate to keep

[1] For an extensive literature overview of the different models for determining the fiscal multiplier and their estimations, see Boussard, De Castro and Salto (2012).

the inflation rate stable, but by doing so it affects private spending and effectively cancels out the change in government spending. However, because of the ZLB and the strain already on the ECB, they are not at liberty to adjust interest rates in response to changes in government spending. Therefore, changes in government spending will be much more impactful under current ZLB conditions. This is also convincingly proven by Christiano, Eichenbaum and Rebelo (2009) and by Farhi and Werning (2012) who use a rather more sophisticated analysis to show that multipliers can indeed be much higher than one in a situation where the ZLB binds.

All in all, the recent literature provides compelling evidence for the hypothesis that multipliers are strongly dependent on the state of the economy. Blanchard and Leigh suggest that *"it seems safe for the time being (…) to assume higher multipliers than before the crisis." (*Blanchard and Leigh, 2013, *p20).* DeLong and Summers (2012) even state that multipliers estimated in normal times are irrelevant under 'current' circumstances. If we accept the hypothesis that multipliers are indeed significantly dependent on the business cycle, can we combine this with the hypothesis that debts are affected by a debt-ratio dependent debt multiplier?

If we consider figure 6 from the previous section, the marginal growth effect of deficit represented on the y-axis is essentially no different to the fiscal multiplier for debt-financed spending: the multiplier is defined as the change in aggregate GDP for a unit change in fiscal spending, which can be translated as the marginal effect on growth of fiscal (deficit-)spending. At a debt ratio of zero, the fiscal multiplier should be equal to the intersect value of the M_D curve with the y-axis, and thus to c_o.

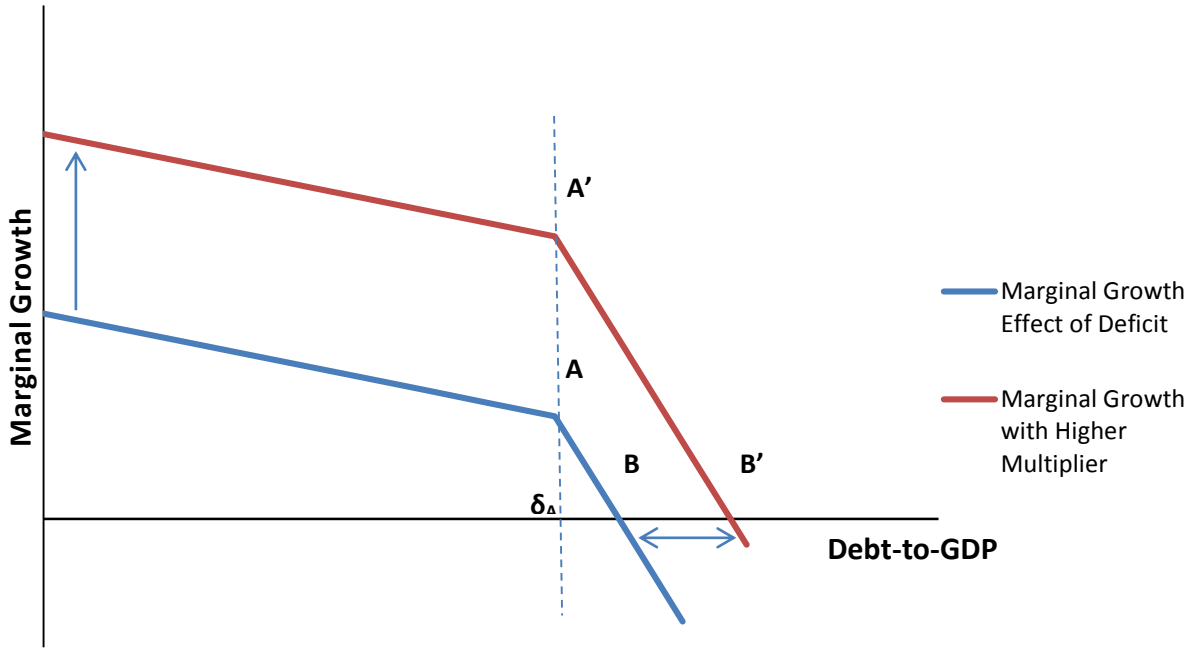
Therefore, we can easily introduce the concept of state-dependent multipliers by substituting the c_o from equation 3.1 with the multiplier μ:

$$M_D = \mu - \alpha_\alpha \cdot \delta \qquad \text{for all } \delta \leq \delta_A$$

$$M_D = (\mu + c) - \alpha_\beta \cdot \delta \qquad \text{for all } \delta \geq \delta_A \qquad [3.2.2]$$

Any change in the multiplier now shifts the line upwards or downwards along the y-axis. Working with our assumption that multipliers are currently elevated, in **figure 7** the M_D curve is shifted upwards to reflect this. None of the other characteristics of the curve have been affected: the negative and non-linear effect of debt that several authors have found is preserved and the point $\boldsymbol{\delta_A}$ at which debt intolerance kicks in remains unchanged on the x-axis. However, we can also observe that shifting the curve upward to reflect a higher multiplier has shifted the debt threshold from point **B** to point **B'**: the debt threshold is thus not a static point, but varies with the multiplier. Additionally, we now see that M_D is basically the debt-adjusted multiplier: at zero debt, M_D equals μ, but as the debt level rises, the impact of fiscal policy steadily becomes weaker. This also implies that the effective debt-adjusted multiplier is not a single figure either, but varies with the level of indebtedness.

Figure 7. The Non-Linear Growth Effect of Debt with Variable Multipliers.



Although figure 7 is based on a highly stylized representation of recent academical findings, the details are inconsequential to the theoretical implications. The interdependent dynamic effect that is revealed here provides an important insight into the dynamics of fiscal policy: one cannot make fiscal policy decisions based on the debt ratio while ignoring the multiplier, and vice versa. This interdependentness may also help to explain why finding a singular threshold value for debt has been so controversial, and why it is so difficult to determine the value of the multiplier.

3.3 The Spillover Effect

The spillover effect constitutes the impact of fiscal policy in the Home country on the GDP of Foreign countries. In a world that is becoming increasingly economically integrated and increasingly interconnected, logic dictates that cross-border effects of fiscal policy should also become more prominent. Several recent papers have provided evidence that spillover effects are indeed both statistically and economically significant: according to Auerbach and Gorodnichenko (2013) *"fiscal spillovers have a greater impact than would be implied simply by the ratio of imports to government spending"*. They also show that spillover multipliers vary strongly over the business cycle, being especially impactful when both the recipient and source country are in recession.

Hebous and Zimmermann (2013) focus on fiscal consolidations, and find that foreign fiscal consolidations negatively affect domestic output. They also provide an analysis of the various channels through which spillover effects might manifest themselves: the international trade channel, the interest rate channel and the exchange rate channel. They conclude that spillovers are transferred mainly through trade linkages. Additionally, as can be expected from their level of economic integration, they show that cross-border effects of fiscal policy are especially prominent among European countries.

Because of the strong presence of fiscal spillover effects in the Euro area, several authors have stressed the need for coordinated fiscal policy that takes into account the effects of fiscal policy on the entire Euro area rather than taking into account just the Home country effects. One particularly harsh observation was recorded by Barry Eichengreen: *"Serious recessions have generally been avoided in consolidation episodes only when a country has succeeded in substituting foreign demand for domestic demand. But such substitution is especially difficult when other countries are simultaneously taking steps to limit their residents' spending. If the resulting fall in output is large enough, spending cuts and tax increases may not even succeed in reducing debt-to-GDP ratios. (…) This makes one wonder what European countries were thinking when they agreed to all embark simultaneously on major fiscal consolidations starting in 2010."* (Eichengreen, 2013)

The importance of taking into account fiscal spillover multipliers when choosing the best course of action for fiscal policy can be illustrated by a simple example. Consider a two-country model consisting of two equally-sized countries, Home and Foreign, which are faced with identical economic circumstances. Let us assume that we can represent the net effect of fiscal policy in the following way:

$$\Delta\delta_H = f(\mu_H , \mu_F , \kappa_H , \Delta G_H , \Delta G_F) \qquad [3.3.1]$$

Evaluating the success of fiscal policy based on its effect on the debt-to-GDP ratio (δ) is a common practise: in the absence of ulterior motives, the debt-to-GDP ratio provides a clean cost-benefit picture of the effect of fiscal policy. It is even enshrined in the core document governing the usage of fiscal policy in the European Union, the Stability and Growth Pact, in the form of a debt limit of 60 percent of GDP that should generally not be exceeded. Here, the net effect of fiscal policy on the debt-to-GDP ratio of the Home country ($\mathbf{\Delta\delta_H}$) is determined by a function of five variables: the Home fiscal multiplier ($\mathbf{\mu_H}$), the Foreign fiscal spillover multiplier ($\mathbf{\mu_F}$), the cost of debt ($\mathbf{\kappa_H}$) based on the formula 3.2 in section 3.1, and the change in government spending of both Home ($\mathbf{\Delta G_H}$) and Foreign ($\mathbf{\Delta G_F}$).

The function itself has very simple characteristics: a Home expansion *(consolidation)* raises *(lowers)* the Home debt-to-GDP ratio by the real cost of the debt ($\kappa_H * \Delta G_H$) and lowers *(raises)* the Home debt-to-GDP ratio by the economic benefit of the fiscal spending ($\mu_H * \Delta G_H$), while a Foreign expansion *(consolidation)* lowers *(raises)* the Home debt-to-GDP ratio by the economic benefit of the fiscal spillover ($\mu_F * \Delta G_F$). Optimal fiscal policy is then the policy that yields the biggest reduction in the debt-to-GDP ratio according to the following formula:

$$\Delta\delta_H = \kappa * \Delta G_H - \mu_H * \Delta G_H - \mu_F * \Delta G_F \qquad [3.3.2]$$

It can then be shown using a simple game matrix that ignoring the fiscal spillover multipliers can lead countries to make serious policy mistakes. For our purpose here we do not require the exact size of the government impulses ΔG_H and ΔG_F (which we assume to be equal); it suffices to know whether there is a fiscal expansion, a fiscal consolidation, or neither. Therefore, for simplicity's sake, we will assume that all ΔG are equal to either -1 in the case of a consolidation, or +1 in the case of an expansion. Consider then the following game matrix in **table 1**:

Table 1. Fiscal Policy with Spillover Effects in a Model with Two Identical Countries.

	Home consolidates	Home stays neutral	Home expands
Foreign consolidates	$-\kappa+\mu_H+\mu_F$	μ_F	$\kappa-\mu_H+\mu_F$
Foreign stays neutral	$-\kappa+\mu_H$	0	$\kappa-\mu_H$
Foreign expands	$-\kappa+\mu_H-\mu_F$	$-\mu_F$	$\kappa-\mu_H-\mu_F$

This matrix shows a series of outcomes based on fiscal policy decisions in both the Home and Foreign country. In order to clarify the point, we can input some plausible values:

$\mu_H = 0.5, \mu_F = 0.2, \kappa = 1$		
-0.3	0.2	0.7
-0.5	0	0.5
-0.7	-0.2	0.3

$\mu_H = 0.7, \mu_F = 0.3, \kappa = 1$		
0	0.3	0.6
-0.3	0	0.3
-0.6	-0.3	0

$\mu_H = 1, \mu_F = 1, \kappa = 1.5$		
0.5	1	1.5
-0.5	0	0.5
-1.5	-1	-0.5

$\mu_H = 1.8, \mu_F = 1.2, \kappa = 2$		
1	1.2	1.4
-0.2	0	0.2
-1.4	-1.2	-1

$\mu_H = 1.5, \mu_F = 0, \kappa = 1$		
0.5	0	-0.5
0.5	0	-0.5
0.5	0	-0.5

$\mu_H = 2, \mu_F = 1.5, \kappa = 2$		
1.5	1.5	1.5
0	0	0
-1.5	-1.5	-1.5

Positive figures indicate an increase in the debt-to-GDP ratio, while negative figures indicate a decrease in the debt-to-GDP ratio. Fiscal policy preference is then to choose the outcome that begets the biggest reduction in the debt-to-GDP ratio. The green colour indicates the policy preference of each Home country in the absence of Foreign policy considerations (= Home always assumes Foreign stays neutral). Assuming that both Home and Foreign face identical policy multipliers they will end up choosing to enact the same policies. Blue indicates the combined policy result of the uncoordinated policies. In red is indicated the optimal combined policy result whenever this does not coincide with the actual combined policy result: these are policy mistakes resulting from not taking into account and coordinating with Foreign policy. We observe that policy mistakes occur whenever $\mu_H \leq \kappa$ but $\mu_H + \mu_F > \kappa$, and that the mistakes can be quite severe, especially when μ_F is large: in the bottom left matrix the uncoordinated combined policy effect of Home and Foreign causes a net increase in each country's debt-to-GDP ratio despite budget cuts, whereas a coordinated policy could lower the debt-to-GDP ratio in both countries by 1 percentage point while expanding the budget and stimulating the economy. Furthermore, we observe that policy mistakes with respect to ignoring spillover effects only occur during either consolidations or neutral policies, never during expansions. Policy mistakes with respect to fiscal expansions are limited to situations where $\mu_H < \kappa$, and are thus not Foreign-policy dependent.

Although the above example, for simplicity's sake, made use of two equally-sized countries with identical economic circumstances, the implications hold true for any other

combination of countries with varying economic circumstances and facing different multipliers. The only thing that changes is the complexity of the math involved.

Since fiscal spillovers are transmitted mostly through trade linkages, they are especially prominent in trade blocs. The Euro Area, which is both a free trade area and a currency union, not only faces particularly strong spillovers but also partially coordinates fiscal policy on a supranational level already. An important lesson for the Euro Area therefore stems from the fact that it is in a unique position to harness the effect of fiscal spillovers: within the Euro Area, fiscal spillovers are largely a useful and desirable side-effect, since the spillover effects are transmitted mostly to other members of the monetary union. If we would attempt to optimize fiscal policy on the level of the monetary union rather than on the level of the individual countries, the relevant fiscal multiplier to consider (for determining the preferred fiscal policy stance of individual member countries) is the sum of the multiplier-effect on the own economy and the spillover multiplier-effect on all other countries within the union. Moreover, it enables a host of unique strategic fiscal policy options where fiscal policy can be conducted in country H in order to achieve the desired outcome in country F. Fiscal expansions and contractions can be allocated where they yield the highest relative returns, reminiscent almost of a system of Ricardian comparative advantages.

We can conclude that countries in the Euro Area would do well to take into account the effects of their fiscal policies on the rest of the monetary union as well as on their own economies, especially given the likely large size of their spillover multipliers. Economic performance within the Euro Area would benefit greatly if countries would coordinate their policies in order to maximize policy effectiveness on a union level. Adam Smith's invisible hand steering self-centred policies automatically towards collective benefit certainly does not extend itself to fiscal policy on an international level, let alone on a monetary union level.

3.4 The Hysteresis Effect

Hysteresis is a concept first developed in a 1986 paper by Blanchard and Summers, who were looking for an explanation for the high and rising unemployment rates in Western Europe since the 1970's. Hysteresis generally refers to a system whereby the equilibrium value of a parameter is determined by the actual value of the parameter; in economics, it has come to refer to the effect of recessions (temporary drops in output) on the long-term potential level of output: the potential level of output is influenced by the output gap. Blanchard and Summers postulated that shocks that cause unemployment in a single period have long-term effects on the unemployment-rate through *"adverse effects of long-term unemployment on workers' incentives to work, and from wage setting mechanisms which give employed workers disproportionate power in determining wages"* (Blanchard and Summers, 1986, p16). They argue that only employed workers partake in wage negotiations, and they have an incentive to set wages at a level that keeps the unemployed out in order to protect their own jobs.

In a recent paper, DeLong and Summers (2012) identify three main channels through which hysteresis manifests itself:

- Firstly, as long-term unemployed workers see their skills deteriorate and their old network ties evaporate, it not only becomes harder for them to find a new job but they may also become demotivated and stop looking for a job. Thus, labor force participation and potential labor output decline during recessions.
- Secondly, as firms go bankrupt as a result of prolonged economic depression, capital stock is destroyed, firm-specific knowledge is lost and potential output thus declines.
- Thirdly, continued low levels of private investment in a depression hamper future growth, as potential output is hardly improved during the depression.

Modeling-wise, they propose that *"in future periods potential and actual output Y_f will be lower by some fraction η of the depth by which the economy is depressed in the present"*. From the first two channels mentioned above it becomes apparent that the hysteresis effect becomes more pronounced the longer a recession lasts. The size of the fraction η is therefore determined by both the size and the duration of the present output gap.

$$\Delta Y_f = \eta \Delta Y_n \qquad [3.4.1]$$

Ball (2014) estimates that the long-term effects of the recent global recession have resulted in average output losses of 8.4 percent since the onset of the crisis compared to its pre-crisis trend, with outliers such as Greece and Ireland suffering output losses of more than 30 percent. Moreover, according to his estimates the potential output has dropped by nearly as much as actual output; this suggests that the temporary drop in output from the recession has been translated almost one-for-one into a permanently lower output level, and thus a very strong hysteresis effect. Not all countries have suffered this fate, explains Ball: Australia for instance has emerged nearly unscathed from the global recession due to fiscal stimulus and strong exports to Asia, which both served to offset the negative effect of the global recession on the output gap. This illustrates the important role of both fiscal stimulus and a growth-inducing economic environment to minimize long-term damage from a recession.

The hysteresis effect captured by DeLong and Summers (2012) in η represents the long-term economic damage caused by the current output gap in the form of lost potential future output. Put differently, η represents the costs of not addressing the current output gap or, vice versa, the benefits of reducing the output gap. DeLong and Summers use the concept of η to calculate a net present value of changes in future output as a result of changes in government spending:

$$\Delta V = [\mu + \frac{\eta\mu}{r-g}]\Delta G \qquad [3.4.2]$$

where r is taken to be the long-run real interest rate on government debt and g is the long-term output growth rate, with r > g. This assumption however limits the applicability of the model: think of the near-zero interest rates that many countries face today, or even the possibility of deflation. Moreover, for the cost-benefit model that I will develop here I am interested solely in how taking into account future benefits impacts our estimate of the benefit of fiscal policy. Therefore I propose to stick to the basic form mentioned under [3.4.1] and merely substitute the ΔY_n for the extent to which the fiscal policy impulse (ΔG) is responsible for it:

$$\Delta Y_f = \eta\mu\Delta G \qquad [3.4.3]$$

An interesting side-question to the concept of η is whether it turns negative if the economy booms and the output gap turns positive, or if it simply approaches zero as the economy booms. DeLong and Summers do not provide an answer to this question, and there are arguments to be made for both cases. One could say the hysteresis effect never turns negative, as the first two channels mentioned earlier through which it manifests itself are still positive. On the other hand, one could say that government spending during a boom crowds out private investment and promotes unstable circumstances that will lead to the collapse of firms and firing of workers in the long run when the economy cools down again. Conventional wisdom points to the assumption that expanding an already overheated economy is generally a bad idea, as it threatens long-term stability and may eventually lead to a bigger downswing. Therefore, it seems useful to assume that η indeed turns negative when the output gap turns positive, even if the mechanisms behind it may differ from the mechanisms at work during recessions. Additional research would however be needed to confirm this assumption.

4. Fiscal Policy Model

The aim of the model developed in this section is to bring together the various parts of the theoretical framework developed in the previous section, which encompasses important recent insights regarding fiscal policy workings, and translate them into a single theoretical policy model that can help to better understand and clarify which course of fiscal policy would be best given a country's economic circumstances.

In order to determine which the best course for fiscal policy is, we first have to determine by which yardstick we should measure its success. There are several objectives of fiscal policy, of which the following are generally considered the most important ones:

1. Promote economic growth
2. Promote full employment
3. Stabilize price level
4. Redistribute income and wealth
5. Promote socially optimal resource allocation
6. Encourage investment

Considering the key insights mentioned earlier, and in light of the current spirit of the debate on fiscal policy, I would argue that the promotion of economic growth stands out as the most logical choice for "measuring yardstick" of successful fiscal policy: it is linked directly to the fiscal multiplier and it is the basis on which recessions are declared. Moreover, economic growth is closely linked to unemployment and investment levels, and it has arguably the largest overall impact on a society. Therefore, economic growth seems the most useful measuring stick of successful fiscal policy, and the most practical.

The model I develop here is to a great extent inspired by the model developed by DeLong and Summers (2012) mentioned in the previous section. Similarly to their model, it is based on a

cost-benefit approach to fiscal policy that seeks to determine the circumstances under which expansionary fiscal policy provides a net benefit to the economy. However, it differs in some important respects: it introduces the concept of a debt multiplier that takes into account the current debt-to-GDP ratio, and it also introduces fiscal spillovers. By doing so, it captures both the notion that debt-to-GDP ratios affect the impact of fiscal policy, and it provides a basis for evaluating national fiscal policy on a supra-national level.

As a side-note, even if we would prefer to achieve a different objective of fiscal policy, the model developed here offers a basis on which to quantify the costs of such an approach. For instance, if we chose to pursue a fiscal policy that maximizes employment, we could input those policy figures into this model and compare the outcome with the outcome we would get from maximizing the economic benefit, thus obtaining the opportunity cost of sacrificing economic growth in favour of higher employment. First I will build the model in the case of a single country, disregarding international implications of fiscal policy; later I will introduce international spillovers and monetary union considerations into the model, and show how this would affect fiscal policy decisions for the European Union.

4.1 Single Country Model

In order to introduce the cost-benefit approach, I will start off with a very basic model that ignores not only international implications, but also future dividends of current policy. We will therefore be left with a model that consists solely of the immediate benefit of fiscal policy and the cost of fiscal policy.

The independent variable in the model is, of course, government spending **(G)**. Any change in G is considered as a temporary exogenous shock, and the impact of ΔG on output (**Y**) is determined by the fiscal multiplier **(μ)**:

$$\Delta Y = \mu \Delta G \qquad [4.1.1]$$

The multiplier represents a set of economic conditions that affect how strongly fiscal policy affects the real economy, and should therefore be at the core of any fiscal policy model. Its importance has only grown now that recent studies have convincingly shown that multipliers are not consistent over time, but are strongly dependent on the state of the economy. This also implies that multipliers can vary strongly across countries, and that individual country characteristics should always be taken into consideration when determining fiscal policy.

Additionally, for this model I propose to assume that any changes in government spending (G) are fully reflected in changes in government debt (**ΔD**) rather than in changes in tax rates (**τ**), since we are interested in the relation between government debt and the effectiveness of fiscal policy. A fiscal policy change of ΔG is therefore mirrored in a change in government debt of ΔD. Since any government spending will partially be returned to the government in the form of taxes, and since spending is affected by the presence of the multiplier (μ), the total effect of the increase in government spending on government debt is:

$$\Delta D = (1 - \mu\tau)\Delta G \qquad [4.1.2]$$

Furthermore, as discussed in section 3.1, the real cost of debt can be determined by multiplying the change in debt by the marginal cost of debt (**κ**), such that the total cost of fiscal policy ($\mathbf{C}_G$) becomes:

$$C_G = \kappa \cdot \Delta D = \kappa(1 - \mu\tau)\Delta G \qquad [4.1.3]$$

The marginal cost-benefit comparison that determines the conditions under which the benefits of fiscal policy outweighs the costs of fiscal policy then becomes the following comparison: [4.1.1] > [4.1.3], which we can rearrange into the following:

$$\mu > (1 - \mu\tau)\kappa \qquad [4.1.4]$$

The left-hand side of this intuitive equation represents the marginal benefit of fiscal policy, while the right-hand side represents the marginal cost of fiscal policy. Observe that we can cut ΔG completely out of the equation: the marginal profitability (or marginal effect) of a fiscal policy then does not depend upon the size of the expansion or contraction. We can also see that the right-hand term increases with the cost of debt κ, and decreases with both the multiplier and the tax base. Although the tax base is fairly consistent across time within countries, there can be large differences in the tax base across different countries: as a general rule, deficit spending is less costly in countries with a higher tax base (since a larger portion of the spending is recuperated through taxes). However, since the tax base within countries is fairly consistent across time, we can see that the choice of fiscal policy for a given country at any point in time hinges almost exclusively on the multipliers for both fiscal policy and cost of debt. Moreover, since κ increases as the debt-to-GDP ratio increases, we can see that we require ever bigger multipliers to justify deficit-spending as the debt ratio rises.

Up until here we have for simplicity's sake ignored any future impact of fiscal policy. However, following the conclusions of the previous section on hysteresis, a change in fiscal policy not only impacts current GDP but also impacts future GDP. The benefits hereof are obtained through the formula as mentioned under [3.4.3], and noted as $\mathbf{Y}_f$:

$$\Delta Y_f = \eta\mu\Delta G \qquad [4.1.5]$$

The total fiscal policy benefit ($\mathbf{B}_G$) therefore becomes the sum of [4.1.1] and [4.1.5]:

$$B_G = (\mu + \eta\mu)\Delta G = (1 + \eta)\mu\Delta G \qquad [4.1.6]$$

The net policy effect (**NPE**) resulting from adding future benefits is then determined by the equation $B_G - C_G$:

$$NPE = (1 + \eta)\mu\Delta G - (1 - \mu\tau)\kappa\Delta G \qquad [4.1.7]$$

Since we are interested in determining whether the economic circumstances call for a fiscal expansion or a fiscal contraction in the first place, the figure of interest is the marginal policy effect (**MPE**):

$$MPE = (1 + \eta)\mu - (1 - \mu\tau)\kappa \qquad [4.1.7]$$

As long as the MPE is positive, fiscal expansion provides a net benefit to the economy, and fiscal contraction represents a net cost to the economy. When the MPE turns negative, it is instead fiscal contraction that provides a net benefit to the economy, and fiscal expansion that represents a net cost to the economy. The bigger the MPE, the greater the benefit of fiscal expansion (or the greater the cost of fiscal contraction). Conversely, the further the MPE drops below zero, the greater the benefit of fiscal contraction (or the greater the cost of fiscal expansion). We can again rewrite this into the intuitive marginal cost-benefit comparison $B'_G > C'_G$ that determines under which economic conditions the marginal benefits of fiscal policy outweigh the marginal costs:

$$(1 + \eta)\mu \; > \; (1 - \mu\tau)\kappa \qquad [4.1.8]$$

The basic insights from the previous cost-benefit equation [4.1.4] still hold, but there is an extra factor to take into consideration: the hysteresis effect η, which is based on the size and duration of the output gap. The implication is that recessions provide an extra incentive for deficit spending, and that the benefits of spending increase the deeper the recession is and the longer it lasts. Conversely, if we hold to the assumption that η turns negative when the output gap turns negative, deficit spending becomes a less attractive proposition during economic booms.

Although values for μ, η and τ are to some extent known, the big unknown in the model is the value for κ. In order to get a feeling for the relative impact of the various variables and the critical order of magnitude for κ, we can rewrite the equation from [4.1.8] in its break-even state as:

$$\kappa \; = \; \frac{(1 + \eta)\mu}{(1 - \mu\tau)} \qquad [4.1.9]$$

Table 2 showcases the critical values for κ where the costs of fiscal policy equal the benefits of fiscal policy, assuming a hysteresis parameter of η = 0,10[2]; if the actual value of κ is smaller the benefits outweigh the costs. Recall that κ is determined by the equation:

$$\kappa = (1 + \alpha \cdot \delta) \qquad [4.1.10]$$

Therefore, unless α becomes negative due to rapid inflation, κ will normally not attain a value lower than 1. If we look at table 2, we can see that values larger than 1 only start to appear from a multiplier of 0.75 and up (for higher tax rates a multiplier of > 0.65 can be assumed). This means that for multiplier values lower than these threshold values, fiscal deficit spending always represents a net cost to the economy. On the other hand, once multipliers start to rise above 1, the critical values for the debt multiplier quickly rise to such levels that deficit spending generally represents a net benefit to the economy. Additionally, from table 2 we can observe that the multiplier has an increasingly significant impact on the cost-benefit analysis of fiscal policy as the tax rate rises. This observation naturally leads us to the conclusion that countries with higher tax rates should sooner engage in deficit spending to stimulate the economy than countries with lower tax rates.

[2] This is the average parameter value for η assumed by DeLong and Summers in their 2012 paper on the subject

Table 2. Critical κ Values as Function of μ and τ, η = -0,10.

μ	0.00	0.50	0.75	1.00	1.50	2.00
τ						
0.15	0.00	0.59	0.94	1.29	2.13	3.14
0.25	0.00	0.63	1.01	1.47	2.64	4.40
0.35	0.00	0.67	1.12	1.69	3.47	7.33
0.45	0.00	0.71	1.24	2.00	5.07	22.00
0.55	0.00	0.76	1.40	2.44	9.43	∞

Table 3 showcases the critical values of κ for varying levels of the hysteresis parameter, assuming an average tax rate of τ = 0.35. We can see that critical κ values also vary significantly with changes in the hysteresis parameter, but that the variance caused by hysteresis is of a constant order of magnitude for all multiplier values and thus linear, unlike the tax rate where the effect becomes much more dramatic at higher multiplier levels. Still, the significant variations serve as additional evidence that all fiscal policy decisions should be strongly dependant on the state of the economy, as it affects both the multiplier and the hysteresis parameter.

Table 3. Critical κ Values as Function of μ and η, τ = 0,35.

μ	0.00	0.50	0.75	1.00	1.50	2.00
η						
-0.10	0.00	0.54	0.91	1.38	2.84	6.00
0.00	0.00	0.61	1.02	1.54	3.16	6.67
0.05	0.00	0.63	1.07	1.62	3.32	7
0.10	0.00	0.67	1.12	1.69	3.47	7.33
0.20	0.00	0.73	1.22	1.85	3.79	8.00

4.2 Monetary Union Model

As I have shown in section 3.3, disregarding spillover effects from fiscal policy can lead countries to make very suboptimal policy choices. And as Auerbach and Gorodnichenko (2012b) conclude in their paper on fiscal policy spillovers: *"One may reasonably argue that future theoretical and empirical models should allow for non-linear and potentially strong positive responses of economies to domestic and foreign fiscal shocks".* Ignoring international implications of fiscal policy in a world that is ever more interconnected seems overly simplistic in general, but is certainly dangerously incomplete in the case of a monetary union. Not only are members of a monetary union more dependent on one another, fiscal policy is also more impactful within a monetary union since its effects cannot be diminished through currency valuations or individual monetary policy. Modelling-wise, a monetary union also presents an attractive target precisely because we can disregard monetary policy and currency valuations, and focus purely on the fiscal policy spillover aspect. Therefore I propose to build a monetary union model of fiscal policy, so that we can cleanly capture and assess these *"strong positive responses of economies to (…) foreign fiscal shocks"*, and simultaneously gear the model towards where it would be most useful.

In terms of the fiscal policy model, this means that we shall determine the benefits of fiscal policy not on a per-country level, but on a monetary union level ($\mathbf{B_{Gu}}$): every fiscal policy decision will not only be evaluated based on its effect on GDP at home, but also on its effect on the GDP of every other member country of the monetary union:

$$B_{Gu} = (1 + \eta)\mu\Delta G + \sum_i[(1 + \eta_i)\mu_{Si}\Delta G] \qquad [4.2.1]$$

The first part of the above equation represents the Home benefit of fiscal policy, similar to the equation [4.1.6]. The second part of the equation represents the sum of all the spillover benefits to each other country ***i*** of the monetary union, where $\boldsymbol{\mu_{Si}}$ is the fiscal spillover multiplier from the Home country to country *i* and $\boldsymbol{\eta_i}$ is the hysteresis effect based on the state of the economy of country *i*.

Although it might seem redundant to mention specifically, from this setup it instantly becomes clear that fiscal policy becomes much more impactful once you take into account fiscal spillovers. Especially considering that recent research indicates that spillover multipliers have a highly significant impact, and that they are largest between countries with strong trade linkages such as those in a monetary union, the aggregate fiscal policy benefits on a monetary union level may therefore well be much larger than the fiscal policy benefits of just the Home country.

Conversely, the impact of debt is also higher on a Union level: during the Great Recession, as the financial position of Greece deteriorated, fear of contagion gripped the market and drove up risk premia for other member countries of the monetary union as well. On the other hand, the fiscal stability of countries such as Germany has a positive effect on the cost of debt for other Union members. The real cost of debt on the level of the European Union should therefore be evaluated not only by the cost of the debt impulse at home but also on the sum of its spillover effects on the cost of debt in all other Union member countries $\sum_i(\Delta\kappa_i \cdot \Delta D)$, so that the cost formula at the Union level ($\mathbf{C_{Gu}}$) becomes:

$$C_{Gu} = (1 - \mu\tau)[\kappa + \sum_i(\Delta\kappa_i)]\Delta G \qquad [4.2.2]$$

The equation remains largely equal to the cost of debt calculation in [4.1.3], but the cost is now increased by the extent to which the debt impulse impacts the cost of debt in all other countries *i* of the monetary union, captured by the sum of all changes in the debt multipliers ($\boldsymbol{\Delta\kappa_i}$) multiplied by the debt impulse $(1 - \mu\tau)\Delta G$.

The net policy effect (NPE) is then determined by the equation $B_{Gu} - C_{Gu}$:

$$NPE = \{(1 + \eta)\mu\Delta G + \sum_i[(1+ \eta_i)\mu_{Si}\Delta G]\} - \{(1 - \mu\tau)[\kappa + \sum_i(\Delta\kappa_i)]\Delta G\} \qquad [4.2.3]$$

As the parts pertaining to the Home country are exactly the same as the single country equation of the previous section, the difference of evaluating fiscal policy from the viewpoint of an individual country versus evaluating fiscal policy from the viewpoint of a monetary union can therefore be captured by the difference in the summed effect of policy benefits on all other union members *i* minus the summed effect of policy costs on all other union members *i*:

$$\sum_i[(1 + \eta_i)\mu_{Si}\Delta G] - \sum_i[\Delta\kappa_i(1 - \mu\tau)\Delta G] \qquad [4.2.4]$$

As long as the outcome of the above equation is significantly nonzero, the above equation provides proof of the importance of evaluating fiscal policy on a union level rather than on the level of individual countries. Since there is absolutely no reason to assume that the above equation would equal anything close to zero unless per pure coincidence, the claim that fiscal policy in a monetary union should take into account fiscal spillovers is further strengthened.

From the net policy effect we can again obtain the marginal policy effect by taking the first-order derivative with respect to ΔG:

$$MPE = (1 + \eta)\mu + \sum_i[(1+ \eta_i)\mu_{Si}] - (1 - \mu\tau)[\kappa + \sum_i(\Delta\kappa_i)] \qquad [4.2.5]$$

The implications of the MPE here are exactly the same as those in [4.1.7]: a positive MPE implies a preference for fiscal expansion, while a negative MPE implies a preference for fiscal contraction. We can again rewrite this into the marginal cost-benefit comparison $B'_{Gu} > C'_{Gu}$ that determines under which economic conditions the marginal benefits of fiscal policy outweigh the marginal costs on a monetary union level:

$$\{(1 + \eta)\mu + \sum_i[(1 + \eta_i)\mu_{Si}]\} > (1 - \mu\tau)[\kappa + \sum_i(\Delta\kappa_i)] \qquad [4.2.6]$$

This is essentially the same equation as [4.1.8], only the left hand side is now increased by the sum of the fiscal spillovers to other member countries while the right hand side is now increased by the sum of the debt spillovers to other member countries. As before, fiscal expansion is beneficial to the economy as long as this equation holds; once the marginal cost becomes larger than the marginal benefit, the sign flips ($B'_{Gu} < C'_{Gu}$) and fiscal contraction becomes the economically beneficial course of action. The basic insights from the previous section with respect to the sensitivity of the components still hold as well, as does the observation that the size of the fiscal impulse ΔG does not influence the cost-benefit equation: this implies that the size of the country issuing the fiscal impulse is irrelevant in determining the profitability of the impulse. A larger country may have larger spillover benefits from its fiscal policy stance in absolute terms, but profitability is measured in relative terms.

5. Empirical Evaluation

While the theoretical model of the previous section provides us with an interesting perspective on the dynamics that determine the impact of fiscal policy, it unfortunately does not immediately translate into easy real world applicability due to the near-impossibility of timely or even accurately determining the value of most of the variables. The exact value of the fiscal multiplier has been a heavily debated subject for years, and has so far only yielded some rough consensus figures: from 0.5 in normal times to greater than 1 in times of recession. The value of the hysteresis coefficient is solely based on rough estimates provided by DeLong and Summers (2012). Fiscal spillover multipliers are even harder to determine than national multipliers, with our best estimate being the indication of several recent studies that spillover multipliers are highly significant and roughly equal in magnitude to the international trade-effect of domestic multipliers. And then there is the cost of debt multiplier, which did not even conceptually exist

before this paper and has so far never been estimated. In fact, the only variable in the model that can be reported with any certainty is the tax rate.

In order to see what this model would mean in terms of real world fiscal policy advice, we will have to leave the world of theory behind, adopt a few reasonable assumptions and make use of some commonly available proxy variables. The dataset[3] used contains recent data on the 19 countries of the European Monetary Union. In order to obtain reasonable estimates of the various variables of the model, I will devise some simple rules to provide estimates based on measurable real economic conditions.

In physics, Maxwell's theory and quantum mechanics allow you to predict the way an electron spins about its own axis inside a hydrogen atom to an accuracy of twelve decimal places. Something that accurate isn't just a model—it's a law. In economics, by contrast, there are no laws at all, only models, and you're immensely lucky if you can predict up from down.
- Emanuel Derman

First let us try to determine a reasonable estimate of the current average fiscal multiplier in the Euro Area. Since multipliers are highly dependent on the economy being either in recession or expansion, I will use growth rate and output gap figures as proxy values to evaluate the state of the economy in the Euro Area and provide reasonable estimates of the fiscal multipliers. During the past eight years since the global financial crisis the Euro Area has spent nearly half of that time stuck in recession. The last two years have seen uninterrupted growth again, albeit at a fairly low pace; nonetheless, growth in 2015 stood at 1.6 percent. The current output gap for the Euro Area is estimated to be still -2.6 percent of GDP. Furthermore, the interest rate in the Euro Area is still stuck at the ZLB and not likely to rise anytime soon. Translating this to multiplier estimates, the Euro Area economy still looks to be weaker than normal (multiplier 0.5), but not in outright recession (multiplier 1+). It therefore seems reasonable to assume a current average multiplier of 0.75 for the Euro Area ($\boldsymbol{\mu_{EA}}$).

The multipliers of the individual countries of the Euro Area should vary around this mean value, taking into account their individual economic circumstances. In order to determine reasonable individual multiplier estimates, I will assume multiplier values based on this average value of 0.75 with a positive or negative variation based on the difference in the individual country's growth rate ($\boldsymbol{g_i}$) from the average growth rate ($\boldsymbol{g_a}$ = 1.6) and the difference in the individual country's output gap ($\boldsymbol{\omega_i}$) from the average output gap ($\boldsymbol{\omega_a}$ = -2.6), according to the following formula:

$$\mu = 0.75 - [(g_i - g_a) + (\omega_i - \omega_a)]/10 \qquad \textbf{[5.1]}$$

That is, the mean Euro Area multiplier value minus the sum of the difference in growth rate and output gap from the Euro Area average in tenths of a percentage point (to obtain a roughly

[3] See appendix A

comparable order of magnitude). The calibration of this formula is based on conservative estimates of fiscal multiplier variations based on economic circumstances. Although this is by no means a precise multiplier calculation, it nonetheless yields credible multiplier values and credible multiplier differences based on real economic differences. And, since exact multiplier calculations are difficult and controversial, simple and credible rules of thumb based on realistic assumptions are highly useful and necessary tools for providing timely policy advice.

In order to estimate the aggregate fiscal spillover multiplier, I use a variant of a technique used by Auerbach and Gorodnichenko (2013, p5): I assume that the fiscal spillover multiplier is based on the size of the home fiscal multiplier which is transmitted through trade imports, and that the relevant size of the fiscal spillover multipliers is determined through the percentage of intra-Euro Area trade imports ($\mathbf{IM_{EA}}$) relative to the size of the Home country's GDP ($\mathbf{GDP_H}$) Thus, countries that import a lot from other Euro Area countries have relatively stronger fiscal spillover multipliers than countries that import relatively little from other Euro Area countries. The aggregate fiscal spillover multiplier to other Euro Area countries ($\boldsymbol{\mu_S}$) is then estimated as the sum of the spillover multipliers to all countries *i* of the Euro Area via the formula:

$$\mu_S = \sum_i(\mu_{Si}) = \mu_H \cdot (IM_{EA} / GDP_H) \qquad \textbf{[5.2]}$$

This yields spillover multiplier estimates that are both consistent with a country's openness to trade and sensitive to the country's state of the economy.

For estimates of the hysteresis coefficient, we have to rely on the work by DeLong and Summers mentioned earlier: in their assumption, they take the plausible range of the hysteresis coefficient *"in a severely depressed economy at the zero lower bound to be … between zero and 0.2" (p240).* Moreover, in a later comment they state that *"the bottom-up evidence of persistent effects of downturns on potential output indicates a value for η that is at or above the top of that range" (p255).* Since the hysteresis coefficient is a function of the state of the economy we can use the same indicators we used earlier in the evaluation of the state of the economy in the Euro Area. Additionally, since the hysteresis coefficient is a measure of lost output potential, I propose to also take into account changes in unemployment levels from their long-term levels: increased unemployment levels thus signify lost output potential.

Combining the previous observations about the Euro Area economy (weak but growing economy, significant negative output gap, interest rate at ZLB) with the observation that the unemployment levels in the Euro Area are currently still elevated with respect to their mean level of the past 10 years, it seems reasonable to assume that η is both nonzero and well below its maximum severely-depressed-level, and I will therefore settle on assuming a current average value of 0.1 for η in the Euro Area ($\boldsymbol{\eta_{EA}}$), which is taken to be equal to the sum of the hysteresis coefficients $\sum_i(\eta_i)$ of all Euro Area countries.

In order to determine reasonable hysteresis coefficients for individual countries, I will adjust this average value based on the differences in growth rate and output gap from the average, as before in the calculation of individual multipliers. Since the growth rate and output gap differences are already captured in the individual multipliers, I will use the percentage difference in the individual multiplier from the aggregate multiplier to determine the effect of the growth rate and output differences on η_i. Calculating the effect of the various unemployment levels requires

a somewhat different approach, since different countries have different 'normal' levels of unemployment and the levels are thus not directly comparable. In order to overcome this issue, I calculate the impact of different unemployment levels by categorizing current unemployment levels with respect to their 10 year averages as reported below in **table 4**:

Table 4. Unemployment Level Categories.

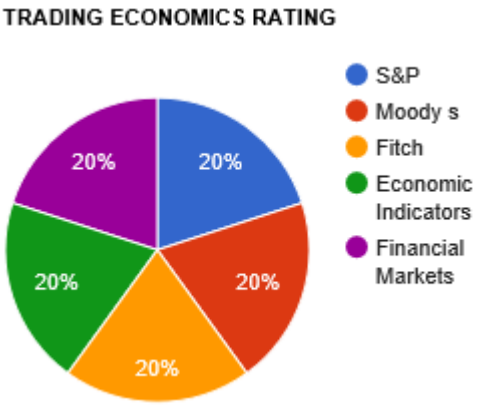
Percentage of average 10 year unemployment level	Less than 75 percent	Between 75 and 100 percent	Between 100 and 125 percent	Between 125 and 150 percent	More than 150 percent
Status	Very Low	Low	Elevated	High	Very High
Difference from η_{EA}	-0.05	-0.025	0	+0.025	+0.05

By categorizing unemployment levels in this way the unique unemployment characteristics of each country are respected, whilst translating the data to universally comparable components. The calculation of the individual hysteresis rates (η) is then done through the following formula:

$$\eta = 0.1 \cdot (\mu_H / \mu_{EA}) + (\text{difference from } \eta_{EA}) \qquad [5.3]$$

In order to estimate the real cost of debt multiplier, I have chosen to make use of the Trading Economics credit rating system (TE rating). The TE rating is a numerical rating system that scores the creditworthiness of a country between 100 (riskless) and 0 (likely to default) based on a weighted average of the ratings of the three big rating agencies, selected economic indicators and the financial markets as shown below in **figure 8**.

Figure 8. Composition of the Trading Economics Credit Rating.



Source: www.tradingeconomics.com

The TE ratings numerical scale provides a big advantage over the rating agencies' alphabetical scales because of the easy comparability between countries and the usefulness of the numerical scale in calculations. This credit rating provides a comprehensive and commonly accepted risk-assessment of the public debt ratio into a single figure that is easy to understand and work with. The biggest disadvantage of these ratings is the inability to reflect the increasing cost of debt κ at lower debt ratios as predicted by the theory in section 3.1, since for many countries

creditworthiness is only affected beyond a certain point. Regardless, since all these figures are merely estimates with the purpose of providing ballpark figures to help understand the implications of the model, I believe that these ratings represent a solid and truthful enough image to compensate for this weakness. The real cost of debt multiplier is then calculated by the following formula:

$$\kappa = 100 \,/\, \text{TE rating} \qquad \textbf{[5.4]}$$

In order to capture the negative spillover effect of high debt ratios on the cost of debt across the Euro Area, I have settled on three important indicators: the debt ratio of the country ($\boldsymbol{\delta_H}$) compared to the Euro Area average ($\boldsymbol{\delta_{EA}}$) to capture the relative weight of the debt ratio, the size of the country's economy ($\mathbf{Y_H}$) relative to the entire Euro Area economy ($\mathbf{Y_{EA}}$) to put the debt in perspective, and the debt multiplier to capture the perceived sustainability of the debt ratio. Of the first two, the debt ratio seems to be of much greater importance: this is evidenced by the fact that the extremely high debt ratio of the relatively small Greek economy has had much more impact on the cost of debt across the Euro Area than the second highest debt ratio of the nearly ten times larger Italian economy. To reflect the bigger impact of extreme debt ratio values I have chosen to square the debt ratio difference, so that my cost of debt spillover ($\boldsymbol{\kappa_S}$) estimation formula becomes:

$$\kappa_S = \sum_i(\Delta\kappa_i) = (\delta_H \,/\, \delta_{EA})^2 \cdot Y_H \,/\, Y_{EA} \cdot \kappa_H \qquad \textbf{[5.5]}$$

The result is that the debt spillover effect for any individual country is determined firstly by the relative size of its debt ratio and secondly by the relative size of its economy, both multiplied by its credit rating.

5.1 Empirical Results & Policy Implications

Using the various estimation methods described in the previous section, I have compiled a list of the resulting empirical estimation values for the Euro Area countries in **table 5**. Although these values are based on a calculated combination of economic research and real world data, it is important to remember that these are nothing but rough estimates, and that none of these figures are set in stone. The object of the figures in the following tables is merely to provide an insight into the fiscal policy implications of the cost-benefit model in an approximately realistic real world setting.

Nonetheless, table 5 already provides us with some interesting insights. We can see that all values vary greatly across all the different countries of the Euro Area; fiscal multipliers vary from -0,1 to 2,19, while spillover multipliers vary between -0,03 to 0,33, hysteresis coefficients vary from -0,06 to 0,34 and debt multipliers vary from 1 to 10, with Greece being the predictable outlier on the high-end of each. Tax rates are the most homogenous, but even they vary from 20,9 percent to 45,4 percent. Considering the apparent heterogeneity of all the Euro Area countries, it seems very unlikely that a one-size-fits-all approach to fiscal policy directives (such as the 3-percent-deficit rule) provides fiscal policy results that are anywhere near optimal.

Table 5. Empirical Estimation Values.

Country	Fiscal Multiplier μ	Spillover Multiplier μ_S	Hysteresis coefficient η	Tax Rate τ	Debt Multiplier κ	Debt Spillover κ_S
Euro Area	0.75		0.10		1.01	
Belgium	0.58	0.25	0.08	0.454	1.14	0.06
Germany	0.54	0.10	0.02	0.406	1.00	0.19
Ireland	-0.10	-0.03	-0.04	0.308	1.43	0.02
Greece	2.19	0.33	0.34	0.300	10.00	0.63
Spain	0.84	0.13	0.16	0.373	1.61	0.19
France	0.75	0.13	0.10	0.446	1.11	0.25
Italy	1.04	0.13	0.16	0.435	1.67	0.55
Cyprus	0.99*	0.33	0.18	0.392	2.78	0.01
Luxembourg	0.19*	0.23	0.05	0.365	1.00	< 0.01
Malta	-0.04*	-0.01	-0.06	0.352	1.35	< 0.01
Netherlands	0.63	0.16	0.08	0.398	1.00	0.04
Austria	0.82	0.25	0.11	0.434	1.04	0.03
Portugal	1.08	0.31	0.17	0.370	2.27	0.08
Slovenia	0.65	0.23	0.09	0.393	1.64	< 0.01
Slovakia	0.48	0.19	0.04	0.295	1.25	< 0.01
Finland	1.13	0.20	0.15	0.436	1.04	0.01
Estonia	0.65	0.30	0.06	0.323	1.23	< 0.01
Latvia	0.33*	0.12	0.02	0.304	1.45	< 0.01
Lithuania	0.55*	0.21	0.07	0.209	1.45	< 0.01

*: No data available on the output gap in the OECD database; the multipliers are calculated based on the difference of the average GDP growth in the past 5 years instead of on the difference of the output gap compared to the Euro Area average.

We can then use the estimated values of table 5 to determine the marginal benefits and costs – and thus the resulting marginal effect – to the entire Euro Area of a change in fiscal policy spending per country for all Euro Area countries. The results can be found in **table 6** and are based on the formula for the marginal policy effect developed in the previous section:

$$MPE = (1 + \eta)\mu + (1 + 0.1)\mu_S - [(1 - \mu\tau)(\kappa + \kappa_S)] \qquad [5.1.1]$$

(MPE = Marginal Policy Benefit – Marginal Policy Cost)

The values in the last column, Marginal Policy Effect, indicate the expected net effect on the Euro Area of a fiscal policy impulse in that country. As mentioned before, positive values (in green) indicate a policy preference for fiscal expansion, while negative values (in red) indicate a policy preference for fiscal contraction. Higher absolute values indicate a stronger preference.

Although the marginal policy effects that are calculated here are not to be taken as accurate[4], the general pattern that emerges nonetheless provides an accurate depiction of the relative effectiveness of fiscal policy across the different Euro Area countries.

Table 6. Total Marginal Benefits and Costs of Fiscal Policy in the Euro Area.

Country	Marginal Policy Benefit	Marginal Policy Cost	Marginal Policy Effect
Belgium	0.90	0.88	**0.02**
Germany	0.66	0.93	**-0.27**
Ireland	-0.13	1.49	**-1.62**
Greece	3.30	3.65	**-0.35**
Spain	1.12	1.24	**-0.12**
France	0.97	0.91	**0.06**
Italy	1.35	1.22	**0.13**
Cyprus	1.53	1.71	**-0.18**
Luxembourg	0.45	0.94	**-0.49**
Malta	-0.04	1.38	**-1.42**
Netherlands	0.86	0.78	**0.08**
Austria	1.19	0.69	**0.50**
Portugal	1.60	1.41	**0.19**
Slovenia	0.96	1.23	**-0.27**
Slovakia	0.71	1.08	**-0.37**
Finland	1.52	0.49	**1.03**
Estonia	1.02	0.98	**0.04**
Latvia	0.47	1.31	**-0.84**
Lithuania	0.82	1.29	**-0.47**

The results are in many cases somewhat surprising and contrary to conventional wisdom. For instance, earlier in this paper it was mentioned that many policy commentators (including Christine Lagarde of the IMF and myself) have been calling on Germany to boost domestic

[4] It is my personal belief that the marginal policy benefits calculated here are generally underestimated, due to the fact that the multiplier estimates used here are based on previous models that did not make a distinction between policy benefits and policy costs, and thus calculated cost-of-debt effects as being part of the multiplier effect. Because the cost-benefit model in this paper does make the distinction between the spending effect and the cost effect, the fiscal multiplier used in this model should on average be higher than standard multiplier estimates would suggest.

demand so that other European countries might benefit from the spillover effects. The cost-benefit model of fiscal policy however shows that fiscal expansion is currently not profitable in Germany, even when taking into account spillover effects to the Euro Area. To understand why conventional wisdom is wrong, let's examine the German case closer. In **table 7** below are summarized a few of the most important economic indicators for Germany in this respect:

Table 7. Key Economic Indicators for Germany.

Debt-to-GDP Ratio	TE Rating	Relative Economy Size	Growth Rate	Average 5 Year Growth Rate	Output Gap	Unemploy-ment Level	EU Imports to GDP
74.9 %	100	29 %	1.7 %	1.5 %	-0.6 %	Low	18 %

First are some of the facts that are generally used to argue that Germany should boost its fiscal spending: the debt ratio in Germany, at 'merely' 74.9 percent of GDP, is much lower than the Euro Area average, and it boasts a perfect credit rating of 100. German debt is thus cheap and relatively risk-free. Moreover, the German economy accounts for 29 percent of the total Euro Area economy and is the largest economy of the Euro Area by a fair margin. A one-percent change in fiscal spending in Germany will therefore have a significant impact on the Euro Area as a whole.

However, as has been shown in the previous section, the actual size of the fiscal impulse is mostly irrelevant in determining the profitability of the impulse. Arguments that fiscal expansions in Germany are good because they carry a lot of weight therefore don't hold water from a purely economic perspective. Furthermore, the German economy is already growing at a decent rate of 1.7 percent per year and has been steadily doing so for the past 5 years: as a result its output gap has shrunk to a mere -0.6 percent of GDP and German unemployment is historically low. Because of this we can expect the fiscal multiplier for Germany to be on the low end of the spectrum. Moreover, since German imports from the rest of the Euro Area amount to only 18 percent of its total GDP, fiscal spillover effects are not particularly strong for Germany either. Therefore, even though the cost of fiscal policy in Germany is among the lowest in the Euro Area, the return on investment for fiscal policy in Germany is very unlikely to be high enough to offset even these modest costs. Contrary to the belief of many, the cost-benefit model of fiscal policy predicts that the Euro Area as a whole will be better off with a Germany that cuts fiscal spending at home than with a Germany that increases fiscal spending at home.

Conversely, the reverse arguments can be made in the cases of Italy and Portugal. These countries have in recent years been dubbed members of the notorious PIIGS (Portugal, Italy, Ireland, Greece and Spain) group of peripheral Euro Area countries which all shared high and rapidly rising debt-to-GDP ratios. As high debt ratio's came to be seen as dangerous, conventional wisdom stated that all these countries should strive for greater fiscal responsibility and reduce their profligate fiscal spending habits. The cost-benefit model of fiscal policy however challenges the view that fiscal contraction is the universally preferable course of action for these countries. **Table 8** reports the key economic values for Portugal and Italy in this respect:

Table 8. Key Economic Indicators for Portugal and Italy.

Country	Debt-to-GDP Ratio	TE Rating	Growth Rate	Average 5 Year Growth Rate	Output Gap	Unemploy-ment Level	EU Imports to GDP
Portugal	130.2 %	44	1.5 %	-0.9 %	-5.8 %	High	28 %
Italy	132.3 %	60	0.8 %	-0.7 %	-4.7 %	High	13 %

First, we see that the debt-to-GDP ratio in both countries is indeed high, and that they both have a poor TE credit rating score. The cost of debt in both countries is therefore among the highest in the Euro Area – behind only Greece and Cyprus – as can be seen in table 6. However, even though their growth rates have recently picked up, the output gaps in both countries are still very large due to their poor growth performance in recent years. Unemployment levels are also strongly elevated from their 10 year averages. As a result, fiscal multipliers and hysteresis parameters for both countries are strongly elevated, and fiscal policy is likely to yield high returns. Portugal is also one of the bigger importers of EU goods relative to its GDP, which increases its spillover multiplier. As a result, even though the costs of debt in Portugal and Italy are among the highest in the Euro Area, the benefits of fiscal expansion are still likely to outweigh these costs for both countries. Once again contrary to popular belief, the cost-benefit model of fiscal policy predicts that the Euro Area as a whole would at this stage be better off with Portugal and Italy increasing rather than decreasing their fiscal spending.

Table 9. Key Economic Indicators for Greece and Ireland.

Country	Debt-to-GDP Ratio	TE Rating	Growth Rate	Average 5 Year Growth Rate	Output Gap	Unemploy-ment Level	EU Imports to GDP
Greece	178.6 %	10	-0.2 %	-3.8 %	-15.2 %	Very High	15 %
Ireland	107.5 %	70	7.8 %	3.4 %	-0.3 %	Low	32 %

There are a few other noteworthy results, which are examined in **tables 9 and 10**. Firstly, although the model strongly suggests that two of the other PIIGS, Greece and Ireland, should stay focused on reducing their fiscal spending, the reasons why are entirely different for each country. In the case of Greece, the model predicts that it should have enormous benefits of expansionary fiscal policy, but that these are still overshadowed by the costliness of its debt due to its extremely high debt ratio and extremely low credit rating. In the case of Ireland, the economy is growing so extremely fast, the output gap is so small and the unemployment level is low enough that expansionary fiscal policy is expected to have very little benefit and will certainly not be worth the costs.

Table 10. Key Economic Indicators for Finland and Austria.

Country	Debt-to-GDP Ratio	TE Rating	Growth Rate	Average 5 Year Growth Rate	Output Gap	Unemploy-ment Level	EU Imports to GDP
Finland	59.3 %	96	0.5 %	0 %	-5.3 %	Elevated	18 %
Austria	84.2 %	96	0.9 %	1 %	-2.6 %	Elevated	31 %

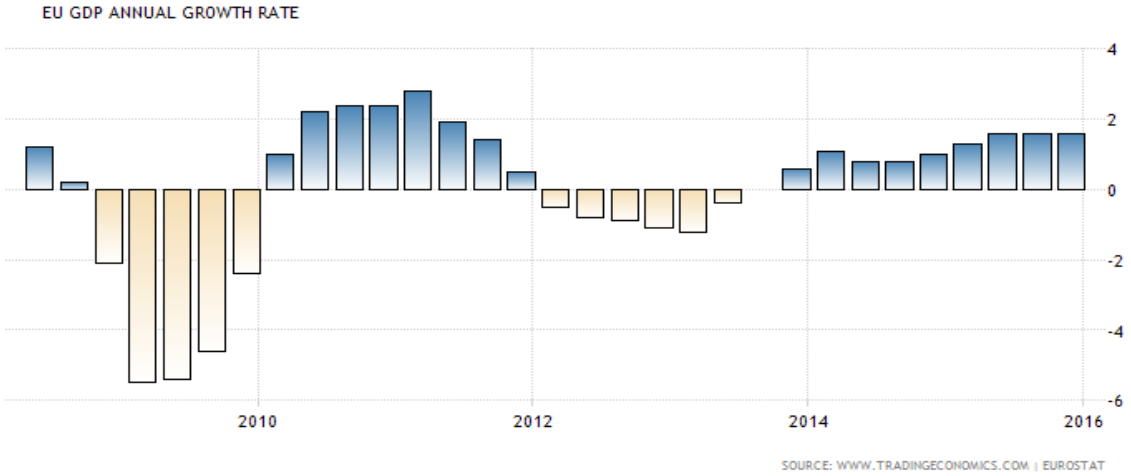
Secondly, the model predicts that expansionary policy should yield the most positive results in Finland and Austria, two countries that are traditionally ideologically committed to policies of fiscal discipline and fiscal responsibility. Finland especially has been very vocal about the importance of respecting budget constraints and sticking to the targets set out in the Stability and Growth Pact. Looking at the figures in table 10, however, we can see that both Finland and Austria have weak growth rates and significant output gaps, and that unemployment is still elevated in both countries: as a result, we can expect fiscal multipliers to be on the higher end of the spectrum in both countries. Additionally, both countries have under-average debt-to-GDP ratios and strong credit ratings, leading to a low cost of debt for both countries. Given these figures, the predictions of the model that expansionary fiscal policy would be very beneficial in Finland and Austria appear very reasonable. There seems to be little doubt that Finland and the Euro Area would currently gain much from expansionary fiscal policy in Finland, and that a Finland that respects the budget rules at all costs would be very costly indeed.

5.2 Modelling Euro Area Post-Crisis Growth

An important test for any model is its explanatory power with respect to historical data. Unfortunately, data on historical sovereign credit ratings is not publicly available in any detail, so historical net policy effect calculations like those in the previous chapter cannot be made. Moreover, the actual impact of fiscal policy on growth rates is unclear, so there is no basis for comparison in the first place. Indeed, the purpose of the model developed in this paper is exactly to fill this existing void and provide a basis for calculating the impact of fiscal policy.

Since fact-checking using exact figures and calculations is thus out of the question, I will instead provide a rough sketch of policy benefits and costs per year since the onset of the crisis, and combine the resulting expected net fiscal policy effect with actual fiscal policy choices in the post-crisis years. In this manner I yield the expected outcome of the actual fiscal policy choices according to the model, which I can then compare with actual growth results. The below **figure 9** shows growth rates in the Euro Area since 2008. Assuming that fiscal policy has played a significant part in determining these growth rates, we should be able to partially explain the growth rates using the cost-benefit model of fiscal policy. In order to create the rough sketch that applies the model to the results, we once again have to rely on ballpark estimates for the model's variables.

Figure 9. Euro Area Growth Rates.



In order to determine plausible multiplier values for each year, I base my estimates on the assessments by Blanchard and Leigh (2013) that multipliers (**μ**) are generally considered to be 0,5 in normal times but were substantially above 1 early in the crisis. Keeping in line with their findings, I will assume a lower boundary of 0.5 for the multiplier for this period, and an upper boundary of 1.5. I then assign a multiplier value to each year based on the growth rates and the output gap in that year, shown below in **table 11**:

Table 11. Euro Area Output Gap.

Variable			Output gap of the total economy						
Frequency			Annual						
Time			2009	2010	2011	2012	2013	2014	2015
Country	**Unit**								
Euro area (15 countries)	Percentage	i	-3,214	-2,015	-1,165	-2,595	-3,439	-3,275	-2,657

Source: OECD | Economic Outlook No 98

Average tax rates across the Euro Area are assumed to be at 40 percent (**τ** = 0.4), and fiscal spillover effects (μ_S) across the Euro Area are assumed to be 0.20 times the size of the fiscal multiplier. Both these estimates are roughly in accordance with the empirical values for tax rates and intra-Euro Area trade determined previously. I will also assign hysteresis coefficients (**η**) assuming a band with lower limit 0 and upper limit 0.2 based on both growth rates and unemployment rates (figure 3, section 2).

Using the estimates of the previous section, the average total cost of debt ($C_G = \kappa + \kappa_s$) for the Euro Area is currently around 1.6, and it seems safe to assume this as a lower bound for the past 8 years. If we then use the individual country variance of the previous section as a benchmark, the total cost of debt during the post-crisis years should vary somewhere between 1.6 and 2.5. Figures are assigned based on the size and recent growth of the debt (figure 1, section 2), and growth rates.

Table 12. General Government Structural Balance.

Country Group Name	Units	Scale	2008	2009	2010	2011	2012	2013	2014	2015
Euro area	Percent of potential GDP		-3.307	-4.589	-4.485	-3.667	-2.003	-1.188	-1.022	-0.862

Source: IMF | World Economic Outlook Database

Fiscal policy stances (ϕ) for Europe are based on changes reported above in **table 12**, which shows the general government structural balance for the Euro Area. We can observe that deficit spending was increased strongly in 2009 and 2010, signifying the massive expenditure increases that governments undertook to rescue the financial sector and stabilize the economy. The subsequent decrease from 2011 onward signifies the austerity efforts to reduce government spending that took place mainly between 2011 and 2013. Total deficit spending for the Euro Area has been relatively stable since 2013, only slowly being trimmed down further.

In keeping with the notion that we are merely attempting a rough sketch to see if we can predict the general direction of the fiscal policy effect using the cost-benefit model, I have chosen to represent the fiscal stances using plusses and minuses, ranging from three plusses for the most expansionary fiscal policy stance (+++) to three minuses for the most contractionary fiscal policy stance (---). Fiscal policy stances are assumed to be a combination of the change in level with respect to the previous year and the level of the structural balance in comparison to the average level in recent history. The average level has been around -2.7 percent of potential GDP since the introduction of the euro in 2002 up to 2008; I will use this as benchmark to measure the stances against.

Using the various estimation methods above I have determined the resulting parameter choices for each year from 2009 to 2015, according to the following reasoning:

2009: Deepest point of the recession, large output gap and rapidly increasing unemployment leading to an exceptionally high μ and η. Deficit spending strongly increased to its maximum value in 7 years, and the rapidly increasing debt ratios cause the cost of debt to rise.

Parameter choices: $\mu = 1.5$, $\eta = 0.20$, $C_G = 2.0$, ϕ = +++

2010: Climbing out of recession, output gap moderately high and unemployment figures remaining stagnant, leading to a lower but still elevated μ and η. High deficit spending is maintained at a slightly lower level than previous year, but the skyrocketing debt ratios plus growing uncertainties about the sustainability lead to a skyrocketing cost of debt

Parameter choices: $\mu = 1.2$, $\eta = 0.15$, $C_G = 2.5$, ϕ = ++

2011: Continued positive but declining growth figures, lowest output gap in 7 years, unemployment rising slightly further: μ falls further towards normal levels, η remains present. Deficit spending is decreased from its peak of the previous two years, but still well above its average long-term value. The commitment to debt reduction and growth of the past 2 years calm fears about the sustainability of debt, causing the cost of debt to fall back down.

Parameter choices: $\mu = 0.8$, $\eta = 0.10$, $C_G = 2.0$, ϕ = +

2012: The Euro Area dips back into a second recession, causing the output gap to rise again and triggering a further rapid rise in unemployment: μ and η both increase. Deficit spending experiences the largest cut in 7 years as austerity measures are enacted, and drops well below its

long-term average, but the second recession makes capital markets nervous nonetheless causing the cost of debt to rise again.

Parameter choices: **μ = 1.1**, **η = 0.15**, **C_G = 2.3**, ϕ = ---

2013: The recession continues throughout the first three quarters of 2013 but finally turns weakly positive in the fourth quarter, leading to the largest output gap in 7 years and unemployment stagnating at record levels: μ stays elevated and η is at maximum. Deficit spending experiences another large cut, but the weak economy and continuously rising debt ratios cause the cost of debt to remain high.

Parameter choices: **μ = 1.1**, **η = 0.20**, **C_G = 2.3**, ϕ = --

2014: The Euro Area can finally report another full year of growth, albeit at a low pace. The output gap is slightly reduced and unemployment levels are slowly coming down: μ and η both decrease. Deficit spending is only slightly lower than the year before, and the cost of debt falls in light of the continued growth and slowdown of the debt accumulation.

Parameter choices: **μ = 0.9**, **η = 0.15**, **C_G = 2.0**, ϕ = -

2015: Growth rates are picking up further and remain stable, reducing both the output gap and the unemployment levels: μ and η decreases. Deficit spending is once again reduced slightly (-), and the ongoing growth rates coupled with the improvement of the government structural balance brings about the first reduction in debt ratios causing the cost of debt to fall further.

Parameter choices: **μ = 0.8**, **η = 0.10**, **C_G = 1.7**, ϕ = -

Obviously all these parameter choices are highly subjective and highly debatable, and future research can hopefully present more accurate and well-funded estimates of the various parameters. Nonetheless, I believe these parameter choices represent a reasonably fair rough estimate of the true values; fair enough to at least show general prediction trends of the cost-benefit model. The model used is a simplified version of the model as presented under [4.2.5], whereby the marginal policy effect (MPE) is determined by subtracting the marginal policy cost (MPC) from the marginal policy benefit (MPB):

$$MPE = MPB - MPC = (1 + \eta)(\mu + \mu_s) - (1 - \mu\tau)C_G \qquad [5.2.1]$$

All the above figures have been compiled in the below **table 13**, and the resulting expected change in the growth rate (**Δg**) is based on multiplying the marginal policy effect as predicted by the model by the actual fiscal policy stance (ϕ). This expected change in the growth rate is then placed next to the observed change in the growth rate (as shown in figure 9) for comparison. I use the same notational method I employed for the fiscal policy stance to denote both the expected growth effect and the change in growth rate, once again keeping with the notion that this is merely a rough sketch in order to compare the general accuracy of the direction of the predictions.

Table 13. Historical Cost-Benefit Model Estimates.

Year	μ	μ_s (0.2 μ)	η	MPB	MPC	MPE	ϕ	Expected Δg_ϕ	Actual Δg_a
2009	1.5	0.3	0.20	2.16	0.8	1.36	+++	+++	+++
2010	1.2	0.24	0.15	1.66	1.3	0.36	++	+	++
2011	0.8	0.16	0.10	1.06	1.36	-0.30	+	_	_ _
2012	1.1	0.22	0.15	1.52	1.34	0.18	_ _ _	_	_
2013	1.1	0.22	0.20	1.58	1.34	0.24	_ _	_	+
2014	0.9	0.18	0.15	1.24	1.28	-0.04	_	+	+
2015	0.8	0.16	0.10	1.06	1.16	-0.10	_	+	+

First, notice that the marginal policy effect changes significantly from year to year. This highlights the importance of regularly re-evaluating fiscal policy choices, preferably at least on a yearly basis. Fiscal contraction may yield significantly positive effects in one year but significantly negative results the year after, or vice versa. A fiscal policy that blindly runs the same deficit or the same surplus for many years on end should expect, on average, to provide a highly suboptimal economic benefit as gains in one year are regularly cancelled out by losses in the next year. Therefore, optimal fiscal policy requires that the policy is flexible and regularly adapted to reflect changes in economic circumstances. Ideally, this flexibility would entail the discretionary ability to change fiscal spending with several percentage points from year to year.

Comparing the expected growth effect based on the cost-benefit model and the observed change in growth rate, we can see that the predictions are generally in line with the observed growth rates. With the exception of 2013, all directions are predicted correctly, and most of the time even with the approximately correct order of magnitude. Considering that actual growth rates depend on a lot more factors than just fiscal policy stances, this is an amazingly high accuracy rate. Even if we allow for the fact that the parameters themselves are highly inaccurate, there is a lot of room for error in the parameters without compromising the general explanatory power and predictive value of the model.

6. Conclusion

The continuous tug-of-war between active fiscal stimulus and balanced government budgets has been at the heart of many economic policy debates for decades, and is often fought on ideological grounds. The financial crisis of the previous decade triggered a renewed wave of academic interest in fiscal policy, which has provided a deeper understanding of the underlying forces at work on both ends. Viewing the conflicting interests of fiscal stimulus and balanced budgets as different sides of the same coin rather than as opposite ends of an ideological spectrum, this

paper has sought to bring them together in a unifying model of fiscal policy by combining several recent academic advances in the area of fiscal policy. In doing so, it has shown that the answer to the question whether the government should spend less or spend more need not be ideological but can be answered in a pragmatic way that is objectively measurable. It has also shown that, in order to be optimal, fiscal policy should be flexible enough to be able to accommodate changing economic circumstances.

The paper uses a cost-benefit approach to answering the question whether fiscal policy budgets should expand or contract, which is based on the hypothesis that predicting the effects of a fiscal policy stance requires balancing four main aspects of fiscal policy, which have all recently received attention in various academic studies and have been closely examined in this paper:

1. **The government debt-to-GDP ratio:** high debt ratios weigh down economies, increase risk exposure and create uncertainty. This increases the marginal cost of debt as the debt ratio rises, so that the costs of fiscal spending depend directly on the debt ratio.

2. **State-dependent fiscal multipliers:** fiscal multipliers are still key to understanding the effects of fiscal spending, and recent research has convincingly shown that multipliers are strongly dependent on the state of the economy.

3. **Fiscal spillover effects:** fiscal policy is shown to have significant spillover effects to other countries, mainly through trade linkages. Taking into account these spillovers is especially important in trade blocs and monetary unions, which can reap significant benefits from fiscal policy coordination.

4. **Hysteresis effects:** recessions cause the permanent destruction of capital and labor, which impacts the long-term growth rate. Since fiscal policy can significantly impact this process, and thus long-term growth rates, hysteresis effects are important to take into account when calculating the benefits of fiscal policy.

A fifth aspect that is also worth mentioning is the tax rate: since fiscal spending is partially returned to the government in the form of taxes, the cost of fiscal spending is lower where the tax rate is higher.

An important contribution of this paper is the development of the concept of the marginal cost-of-debt multiplier, **κ**. Much like fiscal multipliers calculate the impact of fiscal spending under different economic circumstances, the marginal cost-of-debt multiplier calculates the impact of fiscal deficit under different levels of the debt ratio. The basic assumption of κ states that the cost of new debt increases as countries become more indebted. It provides a new approach to understanding the way debt ratios impact fiscal policy, and allows us to quantify and model these effects. Further research is however still required to provide a deeper understanding of the various mechanics behind κ, and to provide more accurate estimates of its true size. Additionally, the introduction of a debt multiplier requires re-evaluation of the size of the fiscal multiplier, as some of the effects that used to be grouped together under the term fiscal multiplier are now measured separately as part of the debt multiplier.

The second major contribution is the subsequent development of a cost-benefit model of fiscal policy, which combines the five aspects mentioned above to create a comprehensive new model for providing objective fiscal policy guidance on a monetary union level. Using this model it can be shown that fiscal policy has radically different outcomes for different countries at different times, and that conventional wisdom about fiscal policy often leads to seriously flawed policy advice. The model underlines the importance of evaluating fiscal policy objectively and regularly, and with respect for each country's individual economic characteristics. The apparent success of the model in explaining recent growth rates speaks to the solidity of the model, and thereby supports the hypothesis that fiscal policy stances should be determined on the basis of the five aspects mentioned above. Future research can hopefully expand the model beyond monetary union level towards a complete international model of fiscal policy, taking into account monetary policy stances and currency valuations.

A subject I have not explicitly touched upon, but one that flows naturally from the conclusions of this paper, is the potential ability of a pan-European investment fund to invest in countries where the marginal policy benefit is highest, whilst benefitting from the relatively low average cost of debt of the Euro Area. This would provide the highest total policy effect to the Euro Area as a whole, but requires a willingness of other countries to act not as net lenders, but as net investors. If we as Europeans could manage to act in the best interest of the Euro Area at large rather than in the immediate best interest of our own countries, we might find that our self-interest in the long run is best served by helping our fellow Europeans succeed. It would certainly be an interesting subject for future research to explore.

A final observation: the theory and the model in this paper rely on concepts that are still not fully understood, and that are often hard to measure precisely. Future research efforts can hopefully provide more clarity, better estimates of the variables and a better calibration of the model. However, I believe it is important to recognize the limitations of our ability to transform economics into an exact science: since economies are so complex no economic model can ever hope to provide a completely accurate depiction of reality. Additionally, if we recognize the fact that we will never be able to measure concepts like the fiscal multiplier, the debt multiplier, the output gap and the hysteresis effect both instantly and with perfect accuracy, I believe we as economists shouldn't shy away from well-funded guesstimates and encourage the usage of credible rules of thumb in order to increase the real-world applicability of our research, while at the same time remembering that the results of our models are indicative only and shouldn't be taken as hard facts. And finally, if we then recognize that economics is only a partially-exact science, I believe we should encourage more abstract logical reasoning and theorizing, and spend less of our time developing elaborate mathematical proofs. Mathematics in economics should be a tool to facilitate our understanding of the messy reality of economics, not a substitute for it. Since economies are so complex and interconnected on so many different levels, we can hardly ever study a subject in isolation and understand its real-world impact at the same time. By allowing ourselves a certain level of imprecision, we gain the freedom to look at the big picture, connect the dots and improve our understanding of the economy at large.

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Appendix A

	TE Rating[1]	Deficit[2]	AVG 4y[3]	Debt[4]	AVG 4y[5]	Growth[6]	AVG 5y[7]	Output Gap[8]	Total GDP[9]	Imports/GDP[10]	EU-19 Imports[11]	Tax Rate[12]
Euro Area	99	-2,6	-3,4	92,1	89,6	1,6	0,6	-2,6	13410,2			
Belgium	88	-3,1	-3,6	106,7	104,5	1,4	0,9	-0,7	531,54	0,831	51,60%	45,4
Germany	100	0,3	-0,2	74,9	77,6	1,7	1,5	-0,6	3868,29	0,39	45,60%	40,6
Ireland	70	-3,9	-7,5	107,5	114,3	7,8	3,4	-0,3	250,81	0,954	33,20%	30,8
Greece	10	-3,6	-8,8	178,6	171,8	-0,2	-3,8	-15,2	235,57	0,352	42,30%	30
Spain	62	-5,9	-8,2	99,3	86,9	3,2	-0,2	-5,1	1381,34	0,301	50,30%	37,3
France	90	-3,9	-4,5	95,6	90,7	1,2	0,9	-2,2	2829,19	0,305	59,00%	44,6
Italy	60	-3,0	-3,1	132,3	125,18	0,8	-0,7	-4,7	2141,16	0,265	47,80%	43,5
Cyprus*	36	-8,9	-6,3	108,2	88,9	1,6	-1,8		23,23	0,527	63,00%	39,2
Luxembourg*	100	1,4	0,7	23	21,9	4,8	3		64,87	1,709	69,80%	36,5
Malta*	74	-2,1	-2,7	68,3	68,8	6,3	3,8		9,64	0,889	25,40%	35,2
The Netherlands	100	-2,4	-3,3	68,2	66,1	2	0,6	-1,8	869,51	0,715	35,70%	39,8
Austria	96	-2,7	-2,2	84,2	82,2	0,9	1	-2,6	436,34	0,495	62,00%	43,4
Portugal	44	-7,2	-6,3	130,2	124,2	1,5	-0,9	-5,8	230,12	0,397	71,50%	37
Slovenia	61	-5,0	-7,7	80,8	62,9	2,9	0,5	-2,9	49,49	0,687	52,00%	39,3
Slovakia	80	-2,8	-3,4	53,5	50,8	3,6	2,4	-1,9	99,79	0,882	45,20%	29,5
Finland	96	-3,3	-2,2	59,3	54,1	0,5	0	-5,3	272,22	0,387	45,80%	43,6
Estonia	81	0,7	0,4	10,4	8,9	1,1	3,7	-1,1	26,48	0,805	56,60%	32,3
Latvia*	69	-1,5	-1,7	40,6	41	2,7	3,7		31,29	0,618	57,80%	30,4
Lithuania*	69	-0,7	-3,8	40,7	39,1	1,6	3,6		48,35	0,793	47,20%	20,9

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