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BACHELOR THESIS

Global Imbalances Reflected in the Eurozone's Accounting

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Declaration of Authorship

I hereby proclaim that I wrote my bachelor thesis on my own under the leadership of my supervisor and that the references include all resources and literature I have used.

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Prague, May 11, 2015 _____

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Abstract

In this study I investigate the discrepancies between net investment income and development of net international investment position of the Eurozone. To examine these discrepancies, I use the concept of dark matter which enables quantification of such discrepancies. This study has two goals: to present an alternative view on the development of net international investment position in the Eurozone, and to test validity of the dark matter concept by inspecting its interaction with main economic driving forces such as exchange rate or energy prices. Previous research was mainly focused on the United States and did not study dark matter in broader economic context. To date, no systematic analysis has considered the origins of dark matter behavior. The results indeed present the stocks of dark matter behaving in predictable manner, although, contrary to my expectations, they seem not to be connected with exchange rate. The Eurozone's international investment position adjusted for the stocks of dark matter looks also more optimistically, pushing the concerns about global imbalances aside.

JEL Classificiation	F32, F34, F39, F41, H26, H87
Keywords	global imbalances, international investment, dark matter, current account adjustment, rebalancing

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Abstrakt

V této práci zkoumám nesrovnalosti mezi vývojem mezinárodní investiční pozice a čistým investičním příjmem států Eurozóny. K jejich analýze využívám konceptu temné hmoty, který umožňuje tyto nesrovnalosti kvantifikovat. Tato studie má dva cíle: představit alternativní pohled na vývoj mezinárodní investiční pozice Eurozóny a ověřit platnost myšlenky temné hmoty rozborem její interakce s hlavními ekonomickými veličinami jako například se směnným kurzem či s cenou energií. Předchozí studie byly převážně zaměřeny na Spojené státy americké a nesoustředily se na temnou hmotu v širším ekonomickém kontextu. Doposud se pak žádná studie nezabývala původem chování temné hmoty. Výsledky této práce odhalují předvídatelné chování temné hmoty, ačkoliv navzdory mým očekáváním její kolísání zřejmě není ovlivněno vývojem směnného kurzu. Po započítání temné hmoty se i mezinárodní investiční pozice Eurozóny jeví optimističtěji, a rozptyluje tak obavy o neudržitelnosti jejího vývoje.

JEL klasifikace	F32, F34, F39, F41, H26, H87
Klíčová slova	globální nerovnováha, mezinárodní investice, temná hmota, přizpůsobení běžného účtu
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Bachelor Thesis Proposal

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Proposed topic	Global Imbalances Reflected in the Eurozone's Accounting

Topic characteristics The aim of the thesis is to analyze the obvious discrepancies between stable international investment position and for many years prevailing current account deficits. A consensus about this discrepancy has not yet been reached. One way to explain it is to admit existence of assets which are not included in international position of certain countries. That would mean the acknowledged assets are undervalued; in other words, there is extra revenue stemming from these assets. According to Hausmann & Sturzenegger (2007), this can be due to liquidity services (since dollar and euro is widely spread, the ECB and FED can earn seigniorage from foreign holders of euro or dollar), insurance (foreign investors pay a premium for stability provided by western governments) and knowledge (enterprises run by western investors are generally more profitable than those in the West run by foreigners due to know-how and corporate governance which the West tend to export). The second one would be to take the assets hidden in tax havens into account. According to Zucman (2013) there is a general imbalance between world liabilities and assets. This should be so because many assets are hidden in tax havens, and thus are reported only as liabilities. Since it is estimated that the most of the assets in tax havens come from developed countries, these would significantly improve their net international investment position. One can consider it as the fourth kind of dark matter. I would like to summarize existing literature on the topic, put it into perspective of financial crisis, and estimate both dark matter and assets in tax havens of EU member states. Lately, it has been mostly US deficit of current account that was considered; however, I believe that a thorough analysis of current account and international investment position of states such as Germany, France, and the Eurozone in general can shed some light on true wealth and future macroeconomic projections of the EU.

Outline

1. Introduction
2. Literature Review
3. Summarization of methods used in the analysis
4. Description of the collected data
5. Testing the hypotheses
6. Analysis of impact of the financial crisis on the macroeconomic discrepancies considered
7. Conclusion

Core bibliography

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Contents

Acronyms

BoP	Balance of Payments
CA	Current Account
CCA	Cumulative Current Account
CPIS	Coordinated Portfolio Investment Survey
FDI	Foreign Direct Investment
DM	Dark Matter
FEM	Fixed Effect Model
GDP	Gross Domestic Product
IIP	International Investment Postition
IMF	International Monetary Fund
NII	Net Investment Income
NIIP	Net International Investment Position
OECD	Organisation for Economic Co-operation and Development
S&P	Standard and Poor's
R&D	Research and Development
REM	Random Effect Model
US	United States
USD	United States Dollar
WWII	The Second World War

Chapter 1

Introduction

Discrepancy between the world's aggregate assets and liabilities as well as inconsistency between the development of current account deficits and NIIP have been one of the main concerns of internatinonal macroeconomics since 1970s. Even though the topic has been under close scrutiny, most of the authors have been preoccupied with impact of the imbalances on real economy and the means through which the imbalances could be eliminated (see Roubini and Setser 2004, Gourinchas and Rey 2005, Dooley, Folkerts-Landau and Garber 2004, Obstfeld and Rogoff 2005, Lane and Milesi-Ferretti 2007, and Feldstein 2008). Approaches to the analysis of what causes the global imbalances vary and the reasons behind the inconsistency between NIIP and NII remain unexplained. Moreover, most of the studies are focused on the United States; Europe usually gets mentioned only as another part of developed world, in a sense a residual. In this paper, I aim to build on theory provided by Zucman (2013) and Hausmann & Sturzenegger (2006), and examine driving forces behind global imbalances and other puzzles of the system of national accounts focusing on the Eurozone.

Global liabilities exceed global assets (Lane and Milesi-Ferretti 2006). This phenomenon can be observed since 1970s, when it was identified for the first time, and it prevails even though reporting of both assets and liabilites has significatly improved over the last four decades. The difference is by no means negligable. In 2011 it was more than 5 trillion USD accounting for 6% of the global net financial wealth of

households (Zucman 2013). Because BoP and NIIP statistics reveal the discrepancy in stock data consisting of excess portfolio securities and bank deposits, it is hardly surpising that there is a discrepancy in the flow data as well. Indeed, there is more investment income paid than received; at least that is what could be inferred from the balance of payments statistics.

The discrepancies in the data on year-to-year basis in not the only puzzle of global accounting. There are imbalances and inconstistencies between the balance of payments and NIIP of each country in the long term as well. Cummulative current account deficits do not correspond to the change of NIIP and NII does not mirror NIIP. For example Germany has accumulated 1.5 trillion USD through constant current account surpluses in 1990-2011, whereas its reported NIIP increased by mere 567 billion. Neither the valuation effect, nor the cumulative NII can be responsible for the difference. The valuation effect would have to be negative and enormous in magnitude which is improbable. The cumulative NII is positive in the respective period which excludes it as a culprit as well. Despite the positive cumulative NII, Germany has experienced negative NII in several years which contradicts its positive NIIP. That is puzzling, but it is only a glimpse of the situation in which the US enjoys ever greater positive NII with huge current account deficits and constantly deteriorating NIIP.

I aim to incorporate the estimates of wealth hidden in tax havens into the NIIP statistics to improve the reliability of stock data. Even with this adjustment, however, the stock data and flow data do not match, not even in the long run. Using concept of dark matter introduced by Hausmann & Sturzenegger, I try to reveal driving factors behind this inconsistency, such as effective exchange rate, energy prices, and stability of the particular economy via regression analysis. This unique approach has not been applied before. Usually, it is only the underlying factors of current account imbalances that are being analyzed, e.g. Menzie, Eichengreen, Ito (2011). To look deep into the relationship of NII and NIIP using NIIP adjusted for the hidden assets is novel. The notion of dark matter has been used to describe the discrepancies in global accounting but its structure within the global economy

has not yet been investigated. Moreover, my approach is immune to claims that dark matter stems from global imbalances as I correct the data for the hidden assets making the global assets and liabilities match.

In the following Chapter 2, I summarize the most important papers which I build upon. The key ones are Zucman's The Missing Wealth of Nations and Hausmann & Sturzenegger's Global imbalances or bad accounting? The missing dark matter in the wealth of nations. I aim to present different perspectives on the topic which could be helpful in understanding the sources of the imbalances in national accounts and their implications.

In Chapter 3, I describe the methodology which is based on framework provided by Zucman and Hausmann & Sturzenegger. Further analysis is done by statistical regression. Chapter 3 also discusses the data and its reliability as it is crucial for any implications. I rely on trustworthy sources such as OECD, Eurostat, and The External Wealth of Nations Database constructed by Lane and Milesi-Ferretti.

Chapter 4 presents the results of the models. After adjusting NIIP for assets hidden in tax havens, I elaborate on the stocks of dark matter attributable to each county of the Eurozone as well as on the aggregate stock. There are many factors influencing the volatile stocks of dark matter; I identify the most significant ones and thus shed some light on inconsistencies in national statistics.

The last chapter discusses the implication of revised national accounts on the necessity of global adjustment. It has been widely accepted that US dollar and to some extent the Euro have to depreciate in order to escape from the dangerous path of deteriorating global imbalances. I suggest that the adjustments do not have to be so severe and that they in fact partially occurred in the recent years.

Chapter 2

Literature Review

In this chapter I briefly describe literature regarding analysis of global imbalances, estimation of wealth hidden in tax heavens, links between NIIP and NII, and the implication of global imbalances in form of return spreads for the global economy. Whereas the global imbalances and their impact on the world economy have been broadly investigated, the hidden wealth and the connection between NIIP and NII is a rather uncharted land.

2.1 Estimates of the known

A prevailing notion is that even though current account deficits have occurred in the United States for many years without any implication to its NIIP or its exchange rate, it is only so because the cumulative current account deficits have not reached a breaking point yet. Once the breaking point is reached, adjustment in international flow of goods, services, and capital will be necessary.

One of the key factors keeping the breaking point at bay is the financial integration. Even though it currently makes the deficits possible, it could also add to abrupt exchange rate correction which would consequently lead to serious global financial and economic difficulties. This is so, because the United States as well as other countries consistently experience higher yield on their foreign assets than on their foreign liabilities. This spread allows the United States to run steady current

account deficits and maintain positive NII at the same time (Obstfeld and Rogoff 2005). However, in case the spread gets tighter, it would have catastrophic consequences for the investment income of the United States.

So far, we have observed an opposite development. As the US net foreign assets deteriorate with exception of 1992 every year, NII remains surprisingly stable over the same time period. To analyze consequences of the yield spread, note that net total return on both foreign and domestic assets is $r^a F + (r^a – r^l)L$, where F stands for level of net foreign assets, L for gross liabilities and r^a and r^l for yield on assets and liabilities respectively. Even if net foreign assets are negative, yield spread ensures positive NII.

There is no straightforward explanation for the return gap. At least not such that would explain it as a whole. It accounted for 3.1 percentage points over 1983-2003 in the United States (Obstfeld and Rogoff 2005). Part of the spread could be explained by an exceptional role the US dollar plays in world economy. Central banks all over the world hold a big share of their reserves in USD and in short-term instruments denominated in USD. Because the short-term instruments provide very low yield and the currency itself shrinks at the inflation rate, there is a considerable downward pressure on the interest rate on American liabilities abroad.

Curcuru and Thomas (2012) focus on yield spread in return on direct investment and they find the spread lying between 2.3 and 5.6 percent, depending on prior adjustments for taxes, taxes on repatriated earnings, and risk. The US direct investment return difference is supposed to be explained by three factors.

Firstly, there are the tax reasons. Multinational enterprises have incentive not to repatriate profits they make abroad because they would have to tax them. Therefore, they reinvest the profits in low-tax jurisdictions and they fund operations in high-tax jurisdictions through debt. That pushes the yield on foreign assets upwards and the yield on domestic assets downwards. Moreover, R&D facilities yielding long-term profit for the whole multinational enterprise are likely to be located in the home countries, again cutting from the already lower yield. In short, the multinationals are trying to avoid taxation by shifting their profits to subsidiaries in low-tax

jurisdiction. The estimate of Bosworth (2008) explains one third of the difference between US direct investment abroad and US direct investment in the US through this channel. However, one should note that foreign investors have also incentives to avoid taxations and they seldom come from low-tax jurisdictions. Their strategy may be different, but the impact on the data should be the same.

Secondly, Curcuru and Thomas (2012) find that the higher yields are associated with higher risks. They discover that the Sharpe ratio remains similar across investment in different countries which satisfies assumption about market efficiency. However, Hausmann and Sturzenegger (2007a) identified an ex-post yield spread as well. This could be explained by Peso paradox: one unfortunate and very improbable event associated with great losses might compensate decades of interest rate premiums. One can thus make false implications even from a large sample. Such a hypothesis is unfortunately impossible to test as we can hardly estimate how likely the improbable events are to happen.

Thirdly, they identify sunk costs as factor explaining 140 basis points of the yield spread. Sunk costs are costs happened in the past which cannot be undone (e.g. costs of R&D). They represent cost of instability, a comparative advantage of developed countries over the developing ones.

2.2 Dark Matter

The return spread is not the only metric which can be used to measure inconsistencies between NII and NIIP. Hausmann & Sturzenegger (2006) point out that in 1982 the United States had NIIP of 329 billion USD and NII of 35 billion USD. Till 2005 the current account deficits accrued to almost 5 trillion USD, whereas the NIIP dropped to only negative 2 trillion USD, and astonishingly, the NII remained positive, 18 billion USD. Even considering valuation effects, the decrease in NIIP is still significantly lower than the cumulative current account deficits would suggest. To answer this discrepancy, the authors return to the rate of return spread. They go even further and calculate net present value of NII, which then identify as true NIIP.

The difference between the reported NIIP and the one based on NII is then labeled as dark matter. They claim that it is the export of dark matter that finances the current account deficits. Dark matter is assets which cannot be directly observed; one can only measure its effects, such as additional investment income. This is a tight parallel with the physical phenomenon, where dark matter is also only a term for something, whose effects we can observe even though its nature is not yet known to us.

The core assumptions of dark matter approach are following: firstly, flow data are reliable; secondly, stock data are not. An inaccuracy in stock data may arise because FDIs are not properly measured. Statisticians capture only the initial investment, but fail to evaluate its true potential. Many countries indeed gather only book values of FDIs. One way to address this problem is to use market to book ratio which gives us more accurate estimate of the true value of FDIs. Using the market to book ratio of S&P 500, as Hausmann and Sturzenegger did, gives us value of FDIs that makes from the United States a net creditor. Gourinchas and Rey (2005) use different method. They separate the factors of return spread according to the class of the security (FDI, equity, debt) and find that the spread is mostly present in equity and debt instrument. The FDI return spread after their separation is just one basis point.

Gourinchas and Rey do not only break the spread according to the instrument class, they also separate composition and return effect. Composition effect captures the fact, that the structure of assets and liabilities is different. For example, if the United States invests mostly in equity whereas rest of the world buys mostly US debt, the return on US assets will be higher than the return on US liabilities. That spread would account for composition effect. The return effect measures the spread within categories. To give an example of return effect, imagine that stocks held by US based investors yield consistently higher return than the rest of the market portfolio. Due to market efficiency, it is hard to imagine that return effect could even exist. If the US investment funds consistently offered higher returns, foreigners would surely put their money into their management. That is why it is

very surprising that the composition effect explains only one quarter of the interest spread, 0.86 out of 3.32 percentage points (Gourinchas and Rey 2005). In case of equity, the composition effect is even negative. It is therefore mostly return effect that needs to be explained.

Hausmann and Sturzenegger's explanation is that US securities possess a natural premium for its safety and stability. An analogy would be the role of Switzerland during WWII. The Swiss also enjoyed the privilege of being able to borrow at "safety discount". Now it is the United States who seems to be perceived as the most stable and secure economy. There is indeed an ex-post interest rate spread in debt securities (according to Gourinchas and Rey (2005), it was 0.56 percent in period 1952-2004). That could be a consequence of risk-averse investors preferring stable returns. Arrow-Debreu Model supports this phenomenon as it predicts insurance premia when income transfers take place under uncertainty. This analytical framework is not satisfying to some as it rather opposes common sense. If there is constant difference in ex-post rate of return, an arbitrage can take place, where an agent borrows at lower rate of return than he later obtains. This would evidence of a major failure of market efficiency (Buiter 2006). Clearly, the impact of insurance on interest rate spread is not settled yet.

Another partial explanation for the interest spread in debt securities is liquidity. People are simply willing to pay a premium for liquid securities. Currency is a great example of this phenomenon. Many foreign agents hold significant amounts of dollars or euros, even though the currency brings them no yield; it is a zero coupon perpetuity. People are willing to hold the foreign currency nonetheless and the issuers are consequently collecting seignorage. This is without any doubt taking place but its effect might not be large. According to Buiter's estimate, the effect of seignorage on net international position is between 210 and 525 billion USD, which can hardly explain the whole stock of dark matter.

Are the explanations of Curcuru and Thomas, Gourinchas and Ray, and Hausmann and Sturzenegger applicable to European positive stocks of dark matter (or positive yield spread) in the last years? The explanation stemming from the special

position the US dollar enjoys could be easily used in case of the Euro as well. The Euro has gained a position of both reserve and transaction currency in recent years and it has been even more popular in darker shades of economy as the banknote with the highest value, 500 Euro note, has greater purchasing power than the highest value dollar bill. The other explaining factors could be well applied on any developed country and thus works well with Europe, in particular with the Eurozone.

2.3 The missing wealth

Inconsistency of NII and NIIP is not the only puzzle of the global accounting. In spite of increasing accuracy of national accounts in past 40 years, there are still more assets than liabilities to be found in the world balance sheet. This could be hardly explained by a mere error in data collection. Assets with no identifiable owner are commonplace whereas liabilities are quite easily traceable. That, after all, makes sense as there is incentive to hide assets either for tax or legal reasons. The gap between world's assets and liabilities is huge and it has been rising steadily; in period 2001-2011 it more than doubled (Zucman 2013).

Gabriel Zucman claims that this gap could be a good proxy of the assets hidden in tax havens. To illustrate the process of the wealth disappearance, he writes:

"When French households entrust U.S. securities to Swiss banks, these assets cannot be captured by surveying French custodians. They go completely unrecorded in the French IIP. Household offshore portfolios do not appear on the IIPs of tax havens either. The Swiss National Bank asks domestic banks to report on the securities they hold in custody. Swiss bankers observe that they hold U.S. securities belonging to French residents. These securities are neither assets nor liabilities for Switzerland, so in keeping with the residence principle, they are excluded from Switzerland's position."

However, the US securities are recorded as a liability by the United States as

the US central securities depository keeps track of all settlements. Hence the system of global accounting makes it possible to miss certain assets, and thus create discrepancies in NIIP.

Households choose Swiss bank and possibly Luxembourgian trust fund in order to avoid taxes. A tax evader needs to use both a country with high level of bank secrecy and a country with small tax on cross-border payments. Mutual funds in Luxembourg, Cayman Islands, etc. do not have these taxes and Switzerland does not provide information regarding its banks' clients. This chain, therefore, is perfect for tax evasion.

Since it was only the Swiss National Bank who revealed data regarding the ownership of wealth in Swiss banks, it is hard to locate all hidden assets with precision. This task gets even more difficult since the most of the wealth comes from tax havens where the track of the owner vanishes completely. Zucman, however, looked at the development of the ownership of Swiss accounts in 1976-2008 and found that the accounts attributable to Europe and the accounts attributable to tax havens are almost perfectly negatively correlated. Thus it seems the most of the wealth administered by the Swiss banks belongs to Europeans. Moreover, because of the absence of corporate tax in Middle East, there seems to be no reason why oil money should be administered via sham corporations in tax havens. There are also no clues that significant shares of these funds belong to Asian or African investors (Zucman 2013).

Assuming that the assets recorded by direct reporters and globally recorded liabilities are measured accurately, Zucman has estimated the wealth in tax havens. Using the data from Swiss National Bank, he has also estimated a structure of these assets; 4.5 trillion USD of securities and 1.4 trillion USD of deposits. This estimate works with respect to flow data as well. Assume net inflow into tax havens is the net portfolio assets purchase. Since change in hidden assets equals inflows plus valuation, the valuation part could be inferred as a residual of the asset change. The valuation in each year strictly follows rising or plummeting world stock markets which validates the methodology.

It is reasonable to assume that most of the hidden assets are owned by US and European citizens. The hidden wealth alters net international investment position significantly. For instance, assuming Eurozone residents own 40% of offshore portfolios in Switzerland and 25% of offshore portfolio in other havens, Eurozone becomes a net creditor. International investment position of the United States also improves significantly when we account for the hidden assets.

This has strong implication for international financial flows. The current narrative is that the capital flows from developing to developed countries, even though there is no consensus about the reasons behind it. The shift in NIIP of developed countries completely changes such narrative. Suddenly, developing countries are only repaying what they have borrowed in last decades. We do not experience a period of increasing global imbalances; instead, the global economy is regaining its lost balance.

Zucman's approach of estimating the hidden wealth does not only help us to understand stock data but it explains the inconsistency in flow data as well. If the whole gap between assets and liabilities comes from incentive to hide from tax and legal authorities, it makes sense that the same agents will hide the respective financial flows as well. Owners of assets in tax havens thus transfer their profits out of country of their origin, not the other way around. If they did, they would have to tax it which would make the whole endeavor of moving financial assets futile (Zucman 2014).

This approach explains the global imbalances and it also makes the relation of NII and NIIP of developed countries more reasonable. We mostly observe positive NII and negative NIIP and thus mere increase of NIIP helps the observed data to fit into the economic reasoning. The fit is, however, far from perfect.

2.4 What you see is all there is...

...or is there? Studies regarding global imbalances often work with the official data as they are slipping into grim scenarios of exchange rate adjustments, periods of

decreased global growth and need of structural reforms. Adjusted data puts the whole problem of global imbalances into a different perspective. It is nonetheless desirable to mention several implications of the global imbalances using the raw data.

Lane and Milesi-Ferretti (2007) distinguish three different scenarios which can possibly happen once the breaking point is reached. The first scenario predicts that the savings rate in the United States will catch up, which will gradually reduce current account deficits. The second scenario counts with a burst of trust in US assets, which leads to rapid dollar devaluation and consequently to inflation pressures. To overcome the adjustment, the world has to go through a period of reduced economic performance. The last scenario adds several benign policies to the first one. It assumes reduction in budget deficits as well as increase in productivity in the US and the Eurozone, which restores the global balance even more smoothly.

Similarly, Obstfeld and Rogoff (2005) claim that dollar has to depreciate by 33% in order to stabilize current account deficits. They acknowledge that persistent deficits are possible due to ever deeper financial integration, but realize at the same time that an adjustment of current account deficits is possible only through severe depreciation of effective dollar exchange rate. The severity of such depreciation depends on the length of time period during which it takes place.

Exchange rate adjustment would not directly address the yield spread. Instead, depreciation would pose an inflation pressure on dollar causing the domestic interest rate to rise. That would in turn, at least partially, close the interest rate gap (Dooley et al 2004).

There is yet another view, which puts the whole global imbalances story into a more optimistic perspective. Dooley, Folkerts-Landau, and Garber argue in their paper for Deutsche Bank, that global imbalances are natural consequence of emerging economies trying to catch up with the developed ones. They claim that logic of Bretton Woods system has never ceased to exist; instead, it just paused as Europe and Japan achieved certain level of economic development. When the eastern bloc imploded and East Asia along with Eastern Europe opened themselves to interna-

tional trade, a need for a center country with stable currency emerged. Naturally, this role is played by the United States.

Countries of East Asia thus export goods to the United States, which in turn experience increasing current account deficits. Since exports are fuel of growth of Asian countries, they finance their current account deficits through purchase of short-term debt instruments and through increase of reserves. If they did not do it, their currencies would tend to appreciate with respect to dollar. That is unacceptable for these economies, as the undervaluation of their currencies makes their exports more competitive. Hence, as long as those economies have growth potential, they will finance the US current account deficits.

This is a clear parallel with Europe and Japan in post-war period when Bretton Woods was created. As the capital of these two regions was almost destroyed, their central banks held their currencies undervalued and fueled growth with export. Once they recreated their capital stock, the potential for rapid growth was gone and the undervalued currency was no longer feasible as it undermines consumption. The authors argue that the potential of rapid growth in China is definitely not depleted, because a large fraction of its population is not urbanized. Moreover, there is still India waiting to join the club and to put its billion people to capital intensive labor. This supports the view that certain level of global imbalances are not much of a problem and that they may well prevail in decades to come.

Either of these views being true, I argue that the data (and subsequently the projections as well) need prior adjustments. If we account for assets hidden in tax havens and for stock of dark matter, the implication of the global imbalances do not have to be so dramatic. Even though it seems strange at the first glance to cherry pick the data in order to get results satisfying the theory, it seems there is enough evidence to rely only on the subset of the data available at this time.

The existence of rate of return spread has been broadly known for quite a time. Although the spread has been analyzed and quantified by many authors, its nature as well as its causes has remained concealed. It is important to realize that since we observe more global liabilities than assets, the world has to subsequently suffer from

negative rate of return spread. This shortcoming should be eliminated by incorporation of the hidden assets. There is still rate of return spread left for individual economies, which I quantify by the concept of dark matter. An analysis of the stock of dark matter and its potential causes could help to review often catastrophic scenarios of restoring global balance.

Chapter 3

Data and Methodology

3.1 Data Description

To analyze factors influencing the inconsistencies in international statistics in the Eurozone, I need consistent data on balance of payments as well as data on international investment position of each country. As a starting point, I work with Lane and Milesi-Ferretti database *"The external Wealth of Nations"*. This vast database covers the whole Europe and is thus very useful for the analysis of the European role in global imbalances. The dataset covers the international investment position and its breakdown to FDI, Portfolio and Debt assets and liabilities till 2011. It also provides information about reserves and current account balances. Even though the dataset reaches to 1970, I am only concerned with period 1994-2011, because this period provides a reliable panel data set for the whole Eurozone.

The dataset is not particularly broad. It is tempting to include other European countries or to widen the covered time period. I have decided not to do so because more countries would result in many missing values and using data before 1994 would make the panel dataset unbalanced which is not desirable with respect to the regression methods. The most recent years are not included since Lane and Milesi-Ferretti database reaches only till 2011. It would not be wise to simply add official statistics from 2012 and 2013 to the database because it is constructed in a different manner than, for instance, IMF data, and therefore these values do not

perfectly match.

To get the results as precise as possible, I use estimates of hidden assets calculated by Zucman (2013). He uses discrepancies in global assets and liabilities to estimate assets hidden in tax havens. These data are, however, dependent on Coordinated Portfolio Investment Survey conducted by IMF. The CPIS survey reaches only to 2001, and earlier data are thus not available. To estimate the values prior to 2011, I use data on fiduciary deposits. Those are deposits used by foreigners in tax haven banks, as they are not a subject of advance taxes. These deposits are basically an investment made in the name of the off-shore bank, where the original owner bears both the profit and the risk. Money on these accounts is invested in equities and bonds all around the world and is strongly correlated with the amount of hidden assets. There are data available on aggregate fiduciary deposits; therefore, I use this dataset and estimate the values of past global discrepancies and thus the amount of hidden assets. The correlation in observed sample is quite high (0.96). The logic behind the correlation is that as capital flees to the tax haven, the ratio of long-term investment and deposits ready to be used remains roughly the same as the nature of the tax evaders to not change rapidly. That gives me confidence to use fitted values of the aggregate hidden assets based on observed fiduciary deposits instead of the real values.

The aggregate hidden assets need to be attributed to particular country. In 2009, Boston Consulting Group has estimated that at least 42 percent of all assets in tax heavens are attributable to Europeans and 30 percent to the US residents. Other estimates are even higher, and I thus choose 50 percent as my estimate. To assign hidden assets to a particular country within the Eurozone, I use rather crude method based on the size of the particular economy. There are of course other driving forces behind capital flight to the tax havens such as capital taxes, efficiency of tax authorities, corruption, and general respect to the law, but to separate the effects of these factors and get more precise estimates is beyond the scope of this paper. I hope to rely on cultural and legislative proximity of European countries, and attribute the missing wealth according to the country's GDP.

It is important to keep in mind that even though it might be tempting to exclude countries which can be identified as tax havens from my list, it would be wrong to do so. A benign legislation is often benign only towards foreigners and do not benefit the Swiss, the Luxembourgians , etc., and that is why they serve only as conduit for the tax evaders of other nationalities.

To measure the levels of dark matter, precise data about net investment income are needed. Lane and Milesi-Ferretti database does not provide NII; I use the data from OECD statistics. These data include only revenues from investment assets before tax. They thus do not include cross-border transfers such as foreign aid or remittances from migrant workers. Remittances flowing from developed countries to the developing ones are often a multiple of the official foreign aid (Migration And Remittances Factbook 2011). For developing countries those citizens are a valuable asset and thus seem reasonable to add them to the measurement of dark matter. Even though it might prove reasonable to account for these factors in future studies, both sources of income are negligible in the Eurozone, and therefore could be omitted.

3.2 Methodology

My contribution to the topic is the synthesis of two different approaches to the problem of the imbalances in the Eurozone. Firstly, I address the global excess liabilities by adding the missing wealth traceable to tax havens into the world NIIP. Secondly, I attribute the missing wealth to the NIIP of each country of interest. Thirdly, I use these adjusted numbers to calculate the stocks of dark matter. The data created in such manner help to trace down the factors influencing discrepancies in the global accounting. To reveal correlation and potential causality of inspected underlying factors and stocks of dark matter, I employ statistical regression for panel data.

Dark matter materializes from the difference between officially reported NIIP and NIIP calculated based on NII. The development of official NIIP does not correspond

to the often very steady NII. That is why Hausmann & Sturzenegger followed a different method (proposed by Ulan and Dewald in 1989), in which NIIP is derived from the NII in a following way:

$$NIIP_t^{DM} = \frac{NII_t}{r},$$

where the subscript DM stands for dark matter. In other words, $NIIP^{DM}$ is mere capitalized value of NII. The obvious issue arises and that is the choice of the discount factor r. Although it might seem that the choice of constant discount factor across all countries and the whole period is both bold and crude, it is neither. Even though there is no doubt that countries in certain periods have different price-earnings ratio, in the long run and across the whole Eurozone, these deviations should cancel each other out. To support that, I look at the relationship between cumulative current account and change in NIIP after dark matter adjustments with discount rate of 5 percent. A simple linear regression yields significant coefficient of 1.037 suggesting the price-earnings ratio is reasonable. The official data yield coefficient of 0.94. Moreover, this study is focused on driving factors behind the dark matter, not on the volume of the dark matter itself.

Willem Buiter criticizes the assumption of constant price-earnings ratio. He points out that certain stocks are growth stocks, which makes their price-earnings ratio lower, because the return is mostly in form of valuation effects. If one compares heterogeneous regions, this objection is valid. The emerging markets have surely more growing stocks (as fraction of their market capitalization) than the developed ones. However, I limit my study solely on the Eurozone, a quite homogeneous set of countries, where such a generalization is not an issue.

Hence using a constant discount rate, the volume of dark matter as defined by Hausmann & Sturzenegger (2007b) is:

$$DM^{H\&S} = NIIP_t^{DM} - NIIP_t = \frac{NII_t}{r} - NIIP_t = \frac{\tilde{r}(NIIP_t+\mu_t)}{r} - NIIP_t = \frac{\tilde{r}}{r}\mu_t + \frac{\tilde{r}-r}{r}NIIP_t.$$

It is a difference between capitalized value of NII and official NIIP. A straightforward decomposition accounts for the assets to be mismeasured. The variable μ

stands for such errors in measurement. It also addresses the return differential. The expression $\tilde{r} - r$ stands for such differential, where $\tilde{r}$ is the real discount rate, not our constant estimate r. Hence dark matter is either a result of errors in measurement of NIIP or a consequence of rate of return differentials.

Since the stock of dark matter is dependent on the return rate, it can be very volatile. Thus the volatility itself is not a rationale for dismissing the concept as a whole. The volatility could be actually benign for my analysis. It is easier to track factors influencing dynamic variable than a variable with an easily predictable trend.

Because I have taken into account the hidden assets, the stock of dark matter of country i is:

$$DM_t^i = NIIP_t^{DM} - NIIP_t^{adjusted} = \frac{NII_t}{r} - (NIIP_t + \frac{GDP_t^i}{GDP_t^{EU}} HIDASS_t^{EU}),$$

where HIDASS stands for hidden assets attributable to Europe and is weighted by GDP of the country i. Although the adjustment does not necessarily decrease the stock of dark matter because it does so only when the particular country imports dark matter, the data should be nonetheless more reliable. Globally, the stocks of dark matter should cancel each other out. To test this, however, data on NII and NIIP of every single country are required. It is impossible to test this hypothesis because the global data set of both NIIP and NII is not available.

Having readjusted NIIP for assets in tax havens and dark matter, the core regression can take place. The point of interest is how the stock of dark matter is influenced by stability, price of energy, economic development, exchange rate, volume of trade, and economic crisis. Data for price of energy, exchange rate, and volume of trade could be easily gathered, but stability, economic development, and economic crisis need feasible proxies.

The proxy for stability is a standard deviation of annual growth rate in past ten years. The period of ten years is chosen such that it would exceed the business cycle, even though it by no means accommodates fluctuations with longer periods, such as Kondratiev waves. The economic development's proxy is the GDP per capita as it quite precisely corresponds with the general notion of economic development.

Lastly, economic crisis is represented by a dummy variable for years 2008 and 2009 as those were the years that the financial crisis hit the markets the hardest.

3.2.1 Hypotheses

The purpose of the statistical regression is to verify, whether there is a link between the inconsistency of NII and NIIP represented by the stock of dark matter and variables representing different influences of the economy. The hypotheses regarding each explanatory variable are following:

- Hausmann & Sturzenegger have already hypothesized that much of the dark matter is caused through "insurance channel", i.e. stability. That means a stable country is able to sell its stability to others. In other words, an instable country diversifies and buys stability elsewhere in form of securities with lower yield. That means stability should be linked with higher stocks of dark matter.

- Another hypothesis postulates that since the value of numerous assets strongly depends on the price of oil, fluctuations of energy prices might cause rapid revaluations of investment positions not captured by the statisticians and thus only traceable in the stocks of dark matter. Impact of change in energy prices on the stock of dark matter depends on the structure of European investment position. Because the Eurozone hosts energy behemoths such as RWE, E.ON, Total, Royal Dutch Shell, and Eni which mostly control domestic market and have large foreign exposure, it is reasonable to assume that an increase in energy prices has a positive impact on NII and consequently on the stock of dark matter.

- Wealth should supposedly capture effect of developed institutions as well as advanced financial infrastructure. Rich European countries are associated with comparably more developed institutions. These might prove to be assets again not captured by the official statistics and their effect might be revealed through their connection with the levels of dark matter. Consequently, the effect of wealth should be positive.

- Another channel which indirectly influences the valuation of assets is exchange rate. According to many economists, correction of exchange rates is the key to solving the global imbalances. Shifts in exchange rates cause relative revaluation of assets and thus might affect the stock of dark matter as well. To measure the development of exchange rate, I use the effective exchange rate of each particular country. The effective exchange rate weights bilateral exchange rates based on the trade volume in particular currency and it is thus optimal for the regression. I expect that change of exchange rate neither increases nor decreases the stocks of dark matter. Instead, devaluation of the currency results in more extreme NIIP. If the country is net debtor, devaluation of its currency deteriorates its NIIP and if it is net creditor, devaluation actually increases its NIIP. That is so, of course, only under assumption that most of the securities are denominated in euros. Since the Euro is a rather dominant currency, I expect this assumption to hold. Because the Eurozone as a whole is a net creditor after adjusting for the hidden wealth, I expect the effective exchange to have a general positive effect on the stock of dark matter as increase of effective exchange rate indicates devaluation.

- The data are of course by no means accurate. However, it is possible that there is a systemic bias caused either by flawed data collection or by illicit financial flows of firms trying to avoid or evade taxes. The first case could hardly be tracked back in this analysis, but the second case could. Illicit financial flows are associated with greater economic integration with the surrounding world and thus greater volume of trade. The volume of trade as a share of GDP is added to the regression in order to reveal whether there are problems with data collection of cross-border payments. Its effect should be an increase in absolute value of dark matter.

- Lastly, the regression inspects the effect of crisis on the stocks of dark matter. The crisis began as the housing bubble burst, but it was not just the value of real property that drastically diminished. Since the Eurozone was hit more severely than the rest of the world, its assets lost their value. The question is

whether the valuation was proportional with respect to the investment income the assets generate. Such a discrepancy would be mirrored in the stocks of dark matter and the link revealed by the regression. The object of interest is a mere significance of the crisis variable.

3.2.2 Regression

As stated before, the aim of the regression is to inspect whether the discrepancies represented by dark matter reflect underlying pattern of the economy or is a mere abstract construct with no value added. I expect the stock of dark matter to be influenced by the chosen variables in the aforementioned manner. It is highly improbable to get statistically significant results in accordance with my hypotheses, if the whole concept is nonsensical. Therefore, I regard several significant variables as confirmation of validity of Hausman & Sturzenegger's approach.

The core regression itself has a form of:

$$DM_{it} = \beta_0 + \beta_1 Stability_{it} + \beta_2 EnergyPrice_{it} + \beta_3 Wealth_{it} + \beta_4 XRate_{it} + \beta_5 VolTrade_{it} + \beta_6 Crisis_{it}.$$

But before I look into this regression, I inspect the impact an explanatory variables can have on the absolute stock of dark matter. This approach enables isolating the effect of a variable on widening or shrinking the global imbalances as a whole with the volume of trade variable as a main culprit.

The general approach to the data is panel regression. With one ideal model as a target, I was unfortunately only able to decisively eliminate the pooled model as both the Lagrange Multiplier and F Test suggest that the pooled model is inferior to both random effect and fixed effect model. That is no surprise as it is reasonable to expect there are significant individual country effects. For instance, due to their structural differences (e.g. different size of financial sector and energy intensive industries), one has to expect different individual effects for Luxembourg and Italy. But it is not possible to confidently choose between the FEM and REM as Hausman test recommends the FEM only with significance threshold of 10%; at 5% it is inconclusive.

I would expect that the individual effect is dependent on the explanatory variable. Large NIIP to GDP ratio of Luxembourg indicates its individual effect to be dependent on the explanatory variables such as effective exchange rate. Although this reasoning would lead us to the FEM, from obvious reason, I cannot claim that with certainty. Thus, I estimate both REM and FEM, because neither the tests nor independent reasoning is convincingly in favor of either. Only conclusion of the Lagrange Multiplier Test and the F test is that the pooled model can be eliminated.

Breusch-Pagan's Lagrange Multiplier Test as well as Pesaran's cross-sectional dependence test suggests there is a cross-sectional dependence in the data. Moreover, Breusch-Godfrey Test reveals serial correlation and Breusch-Pagan test heteroscedasticity. Thus it is not feasible to use standard covariance matrix as the estimates would not be robust and the standard errors would not be reliable. In my regression, I use Arellano covariance matrix which allows a fully general structure with respect to heteroscedasticity and serial and cross-sectional correlation. I estimate the model two times; allowing for cross-sectional dependence and then for serial correlation.

Chapter 4

Results

4.1 Data transformation

In 2011 the Eurozone had a current account surplus, negative NIIP accounting for 15% of its GDP, and positive NII. Disregarding positive NII stemming from negative NIIP, there is nothing fundamentally flawed with the data. However, a glance at the period 1995-2011 gives us rather different view. The Eurozone has accumulated 635 billion USD in current account surpluses, lost 439 billion USD through negative investment income, but its NIIP deteriorated by nearly 1.5 trillion USD. This development is illustrated by Figure 1.

Clearly, valuation effect could not be responsible for the slump in the Eurozone's NIIP. Adjusting for the hidden assets makes the slump milder; it is then only negative 790 billion USD. Inclusion of dark matter turns the development of NIIP upside down. According to this metric, the Eurozone's NIIP had improved by almost 900 billion USD.

The adjusted data works well with respect to larger economic areas. As Hausmann & Sturzenegger pointed out, it gives us plausible account of what is happening in the national accounting of the United States. The Eurozone adjusted data also fit well the narrative of the dark matter concept. Relative safety of the region as well as liquidity of euro-denominated securities tend to add to the benign rate of return spread and thus to positive stock of dark matter. But nationally, the behavior of

the adjusted data is rather whimsical. There is no economy whose data would fit significantly better after the adjustment as it could be plainly seen in Table 1.

Table 1 presents change in official NIIP, change in adjusted NIIP including dark matter, cumulative current account, cumulative NII, and cumulative export of dark matter over the period 1994-2011. Common sense suggests that the change of NIIP would roughly reflect the cumulative current account and cumulative NII development. That is not the case and the adjusted data do not provide any improvement in this particular area either. It seems that the method is viable only with respect to large economic blocs.

4.2 Results of the Regression

The core aim of my paper is to study the stocks of dark matter in the context of global economy. I have already described the hypotheses of how the stock of dark matter is expected to behave in dynamics of the global economy. Firstly, I inspect the effect of the studied variables on the absolute value of dark matter.

Table 2 shows the results of the regression. *Wealth* variable is significant in both REM and FEM, controlling for either serial correlation or cross-sectional dependence. The results suggest the economic development has positive effect on the absolute stock of dark matter. That is in accordance with the stated hypothesis as it was assumed that developed financial infrastructure gives the economy flexibility which can result in higher discrepancies. Since I used the stocks of dark matter scaled to the GDP in the regression, the interpretation of the coefficient is straight forward. A thousand USD increase in GDP per capita results in 0.014 increase in stock of dark matter over the respective GDP. Note that it is not an increase by 1.4% but by 0.014 percentage points as the stock of dark matter is already measured relatively to GDP.

Crisis variable is not considered significant, because there are many reasons to believe that the data possess cross-sectional dependence. It is beyond any doubt that the certain regions within the Eurozone are structurally very similar, for example

Germany, Austria, and The Netherlands. Since those economies tend to respond similarly to outside shocks, it is reasonable to expect cross-sectional dependence (which is in accordance to the statistical testing) and do not consider this variable in the regression. Surprisingly, the volume of trade does not seem to influence the absolute stock of dark matter. That means the data do not possess a structural bias resulting from the volume of trade.

Secondly, I look into what influences the stocks of dark matter in general. Table 3 summarizes the results of the respective regression. There is no reason to believe REM is superior to FEM. On the contrary, the employed testing vaguely prefers FEM. That is why I consider *Stability* variable as statistically significant. However, its positive value contradicts the hypothesis. Since stability is measured as standard error of growth rates in last 10 years, lower value of the variable means more stable economy. Thus the model states that the more stable economy is, the less likely it is to export dark matter. That is at odds with my hypothesis as well as the one of Hausmann & Sturzenegger. Stability should enhance the positive rate of returns spread, because investors are supposed to be risk-averse.

The reason for this strange outcome might lie in the choice of the covered region. In global context the hypothesis might hold. The Eurozone is, however, specific in this manner. Until Greece had sunk into the crisis, every single country of the Eurozone was perceived as comparably risky. Investors thus looked for greater yields which were offered by more volatile economies. Indeed, higher growth rates are related to higher volatility in the dataset. Investors did not demand significantly higher risk premiums which provided positive increase in rate of return spread for volatile economies. The perception of the same risk for various economies is history even in the Eurozone. That is the reason to believe that broader and more recent dataset would yield different results.

Energy prices affect negatively the stocks of Eurozone's dark matter. That confirms the previously stated hypothesis. Even though slump in energy prices enhances growth and might be even benign to the current account balances because of the Eurozone's import of energy intensive goods, the Eurozone's NII is nonetheless af-

fected negatively. The profits of energy companies (including those not listed) are trimmed, so the stock of dark matter consequently slumps as well.

The impact of the crisis is by definition problematic. It did hit the financial sector the most, but many of the financial companies are listed and thus are not among the main dark matter generating suspects. Smaller financial institutions are often located in Luxembourg, Ireland or the Netherlands, but it is obvious from the data that the positive *Crisis* coefficient is not driven by events in those countries. It remains to mention that the crisis broadened the discrepancies in the Eurozone's accounting and that it did not serve as a correcting mechanism. Creative destruction it may have been, but correcting one definitely not.

Although I hypothesized that the wealth should have positive effect, the regression yields a negative result. This puzzling outcome might be of the same character as the *Stability* coefficient. Because the studied dataset covers only the Eurozone, the effect of wealth is reversed. Relative high degree of financial integration ensures similar plumbing across the Eurozone. Then it is solely the yield that the investors target and the capital flows to the poorer countries which indeed experienced higher returns in the inspected time period. Inflow of the capital results in smaller risk premium which positively adds to the rate of return spread and thus the stock of dark matter.

The statistically significant variables are as interesting as the insignificant ones. Since the volume of trade has no impact on the discrepancies measured by dark matter, it seems that there is no bias resulting from the flawed bookkeeping of international flows of goods and services. Moreover, the effective exchange rate does not affect the stock of dark matter either. That is especially surprising because the adjustment of exchange rate is frequently mentioned as the main channel through which the correction of global imbalances should occur. Insignificance of the exchange rate variable is really puzzling, but to derive a satisfying conclusion, an analysis of broader dataset would be needed.

Chapter 5

Discussion

My goal was to apply the approach of Hausmann & Sturzenegger and to enrich it with the hidden assets revealing method developed by Zucman. Although I think this method contributes a lot to thinking about global imbalances, it has several shortcomings. The most obvious one is the arbitrary chosen discount factor. Constant factor ensures comparability in time and across countries but we pay for it with questionable absolute values of dark matter stock. Indeed the results are not very robust with respect to the discount factor.

Another problem stems from the limited dataset that I use. Focusing on balanced dataset with data gathered in the same way in each country in the whole covered time period, I had to restrict the dataset significantly. Even though the dataset is quite reliable that way, certain hypotheses are impossible to test. The hypotheses about stability and wealth had to be (thanks to geographical limitation of the data) reconsidered. Moreover, having data reaching to the more distant past would possibly reveal connection between the discrepancies in NII and NIIP and development of exchange rate, as the economic reasoning supports such link.

This approach does not have the ambition to replace current methods of NIIP computation. Its main contribution is to quantify the discrepancies in Eurozone's accounting so that analysis of their origin and character could be carried through. Essentially, it describes the same thing as the rate of returns spread; its main merit lies in the way it presents the phenomenon because it overlaps to the NIIP. It thus

casts a shadow of a doubt on the catastrophic scenarios describing unsustainability of current account deficits of many developed nations. I have confirmed neither the hypothesis that adjustment of exchange rate is the correcting mechanism of global imbalances, nor that the crisis tightened the gap in global accounting.

Should we nonetheless expect the global imbalances to adjust through an economic turmoil? Probably not in the way described by Lane and Milesi-Ferretti or Obstfeld and Rogoff. Although the effective exchange rate of the Euro experienced significant shifts in last two decades, it does not seem to have impacted the Eurozone's stock of dark matter. It is questionable, whether such a channel would be functional in the future. Following the conclusions of Hausmann & Sturzenegger or Gabriel Zucman, the global imbalances might not be as severe as it seems based on the national accounts, so their abrupt correction might not be even needed.

Chapter 6

Conclusions

In my study, I have conducted the method of measuring global imbalances by Hausmann & Sturzenegger on the Eurozone. In addition to that, I have attributed assets hidden in tax havens to each country's NIIP; a method proposed by Gabriel Zucman. I have inspected the data of the whole Eurozone in years 1994-2011 because this subset of data provides the most reliable dataset. To get a better idea about the nature of dark matter, I have run a statistical regression trying to reveal the character of its interaction with other economic forces.

The results for the Eurozone confirmed what Hausmann & Sturzenegger found in case of the United States. Even though the official NIIP quickly deteriorates, the NII remains surprisingly stable. This trend, however, is not recognizable in each particular country. It seems that the whole concept of dark matter is suitable to rather larger economic blocs. The same applies to inclusion of the hidden assets. Logically, the hidden assets close the discrepancies only if the official yield on assets is higher than the official yield on liabilities. Since the Eurozone is not as homogeneous as one would think, the inclusion of the hidden assets affects the discrepancies of individual countries in an ambivalent manner. Still, the effect of both methods on the Eurozone as a whole is utmost plausible.

The results of the statistical regression give us mixed information. The two confirmed hypotheses indicate certain predictability of dark matter as it behaves as it was predicted. The other two outcomes contradict the hypotheses. However, this

comes as no surprise as it seems to be a direct consequence of the geographically limited data set. What is very puzzling is the insignificance of exchange rate. It is difficult to comprehend that the variable used in many global imbalances simulating models as correcting force plays no role in fluctuations of dark matter. It is either consequence of the shortness of covered time period or it indeed does not play a significant part in the discrepancies between NIIP and NII in the Eurozone. A further research is needed to resolve this issue.

Looking aside from the methodology, it seems that the Eurozone and the developed countries in general are in a better condition than the official data suggest. That works as a counterargument against forecasts of Western economic decline as well as against pleas for economic policies which ought to fight the deteriorating NIIP of the developed countries. The current state of affairs might not be as grim as it seems at the first glance.

Chapter 7

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Chapter 8

Appendix

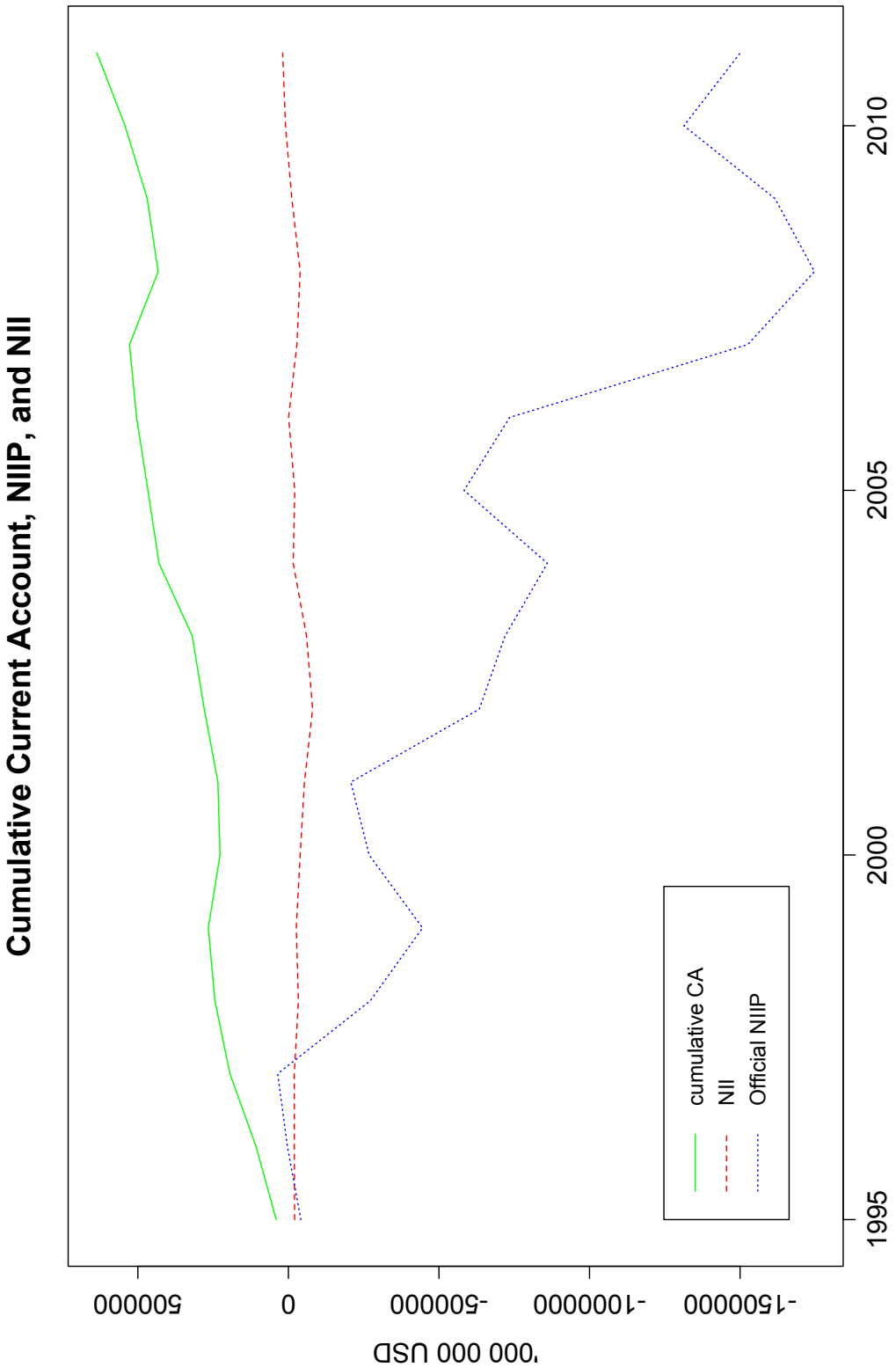
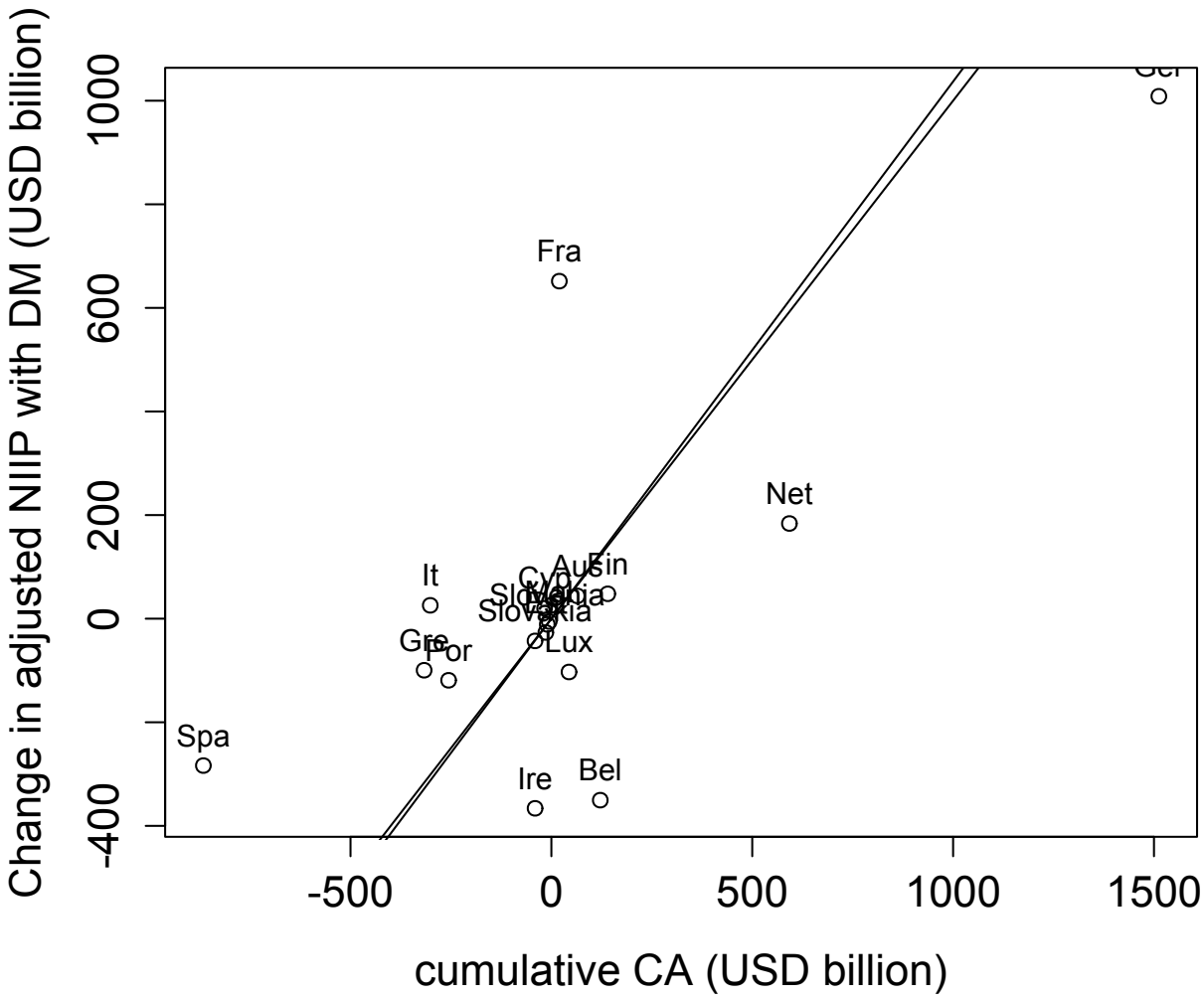
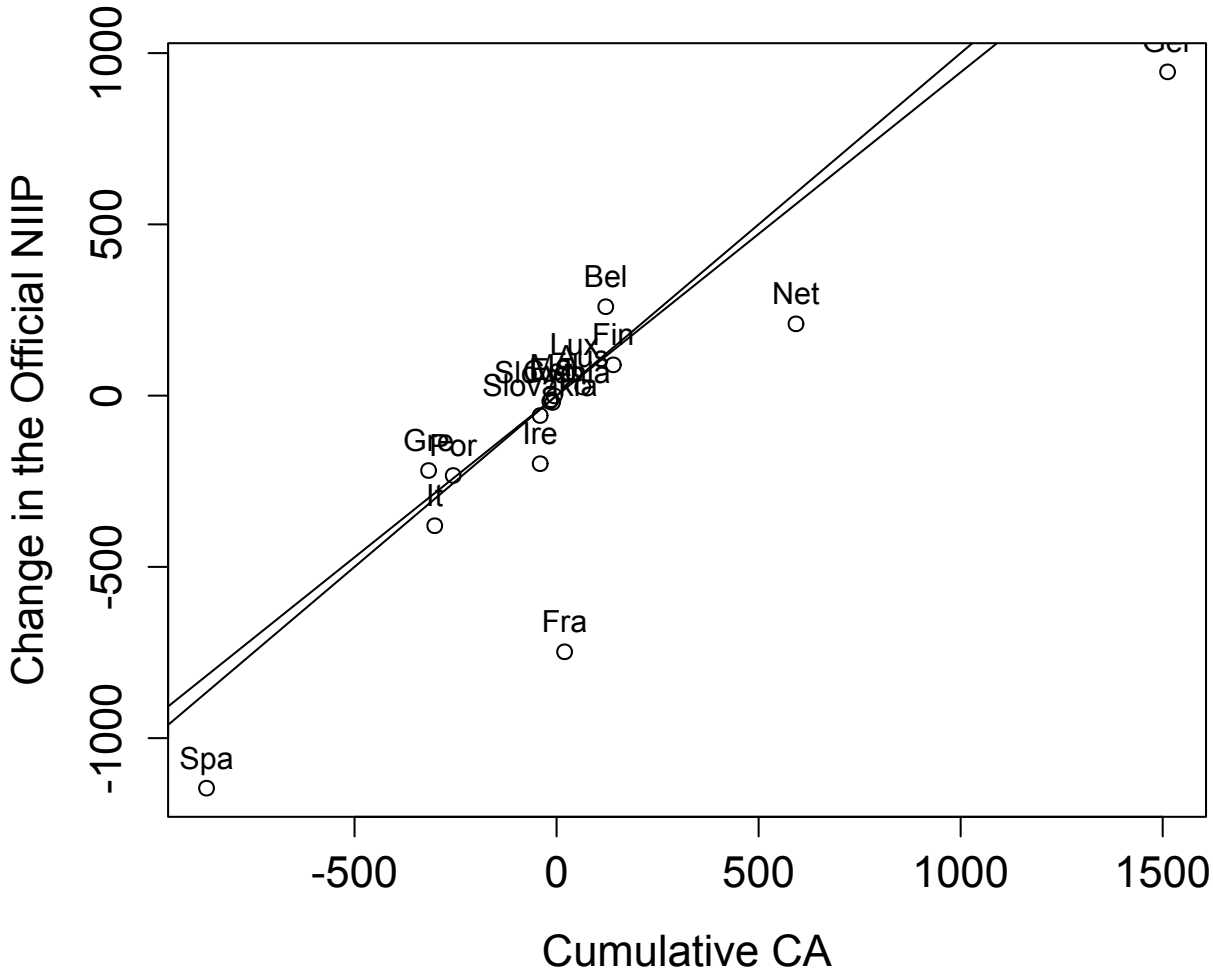


Figure 1: Development of CCA, NIIP, NII in the Eurozone



Note that the fitted line and the line with slope of 1 almost coincide.

Figure 2: Change in Adjusted NIIP with DM vs. Cumulative CA



Note that the fitted line and the line with slope of 1 almost coincide.

Figure 3: Change in the Official NIIP vs. Cumulative CA

Table 1: Summary of the Data

	Change in the Official NIIP	**Change in the Adjusted NIIP**	**Cumulative CA**	**Cumulative NII**	**Cummulative Export of DM**
Eurozone	-13%	6%	7%	-6%	25%
Austria	11%	17%	14%	-12%	6%
Belgium	43%	-75%	45%	10%	-118%
Cyprus	-36%	168%	-90%	-58%	238%
Estonia	-48%	-12%	-123%	-66%	-71%
Finland	55%	39%	87%	-15%	-20%
France	-26%	27%	8%	8%	53%
Germany	24%	28%	46%	5%	6%
Greece	-81%	-26%	-131%	-27%	43%
Ireland	-45%	-70%	-12%	-183%	-27%
Italy	-15%	10%	-11%	-15%	27%
Luxembourg	102%	-260%	120%	-1%	-382%
Malta	-28%	-71%	-102%	-21%	-46%
Netherlands	17%	11%	96%	10%	-6%
Portugal	-82%	-50%	-142%	-31%	32%
Slovakia	-59%	-40%	-105%	-55%	37%
Slovenia	-43%	-23%	-32%	-17%	20%
Spain	-67%	-13%	-74%	-21%	54%

Note: The data are fraction of respective GDP covering period 1994-2011

Table 2: Absolute Stock of Dark Matter

	Dependent variable:			
	(REM, time)	(REM, cross-sec.)	(FEM, time)	(FEM, cross-sec.)
Voltrade	0.135	0.135	0.037	0.037
	(0.103)	(0.340)	(0.134)	(0.380)
Crisis	-0.153***	-0.153	-0.150***	-0.150
	(0.035)	(0.106)	(0.032)	(0.102)
Wealth	0.014***	0.014***	0.012***	0.012***
	(0.002)	(0.005)	(0.003)	(0.004)
Constant	0.035	0.035		
	(0.123)	(0.161)		
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 3: Core Regression

	Dependent variable:			
	(REM, time)	(REM, cross-sec.)	(FEM, time)	(FEM, cross-sec.)
Xrate	-0.001	-0.001	-0.004	-0.004
	(0.002)	(0.003)	(0.003)	(0.004)
Voltrade			-0.140	-0.140
			(0.184)	(0.370)
Stab	0.044***	0.044	0.088***	0.088**
	(0.017)	(0.032)	(0.014)	(0.041)
Enprice	0.005***	0.005**	0.006***	0.006**
	(0.002)	(0.002)	(0.002)	(0.003)
Crisis	0.180***	0.180***	0.154***	0.154*
	(0.059)	(0.065)	(0.050)	(0.093)
Wealth	-0.024***	-0.024**	-0.027***	-0.027**
	(0.003)	(0.011)	(0.008)	(0.011)
Constant	-0.015	-0.015		
	(0.222)	(0.360)		

Note: *p<0.1; **p<0.05; ***p<0.01