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Sectoral Balances: Empirical evidence from Scandinavia

By
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Abstract

This paper explores the sectoral balances for Denmark, Norway and Sweden from a historical perspective. For each country, we examine the interactions amongst the three main sectors: the private sector, the public sector and the foreign sector. A common feature shared by these three economies is that they have persistently experienced surpluses on their current accounts for more than two decades. The three countries, however, diverge from each other when it comes to the composition of the excess domestic savings. In this paper we attempt to highlight these differences based on empirical facts using historical data. Using our empirical facts as a motivation, we set up a simplified theoretical model, which allows us to explain the differences amongst these three countries.

JEL codes: E01, E12, E21, E22, E62, F41.

Keywords: Sector Balances, deficit, net lending, Scandinavia, Nordic.

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1 Introduction

The interaction between broader institutional sectors of the economy has captured the intrigue of economists and policy makers at least since François Quesnay published the two sector circular flow model in *Tableau èconomique* in 1758. Due to better access to national sector account data, the sectoral models have become progressively more complex. The origin of the national accounts can be traced back to James Meade and Richard Stone in the UK, and to Morris A. Copeland in the USA, who contributed greatly to the establishment of the 1953 United Nations System of National Accounts.

Amongst the Nordic countries the forerunners were Denmark, Norway and Finland in the late nineteenth century with Sweden following shortly behind in the first decade of the twentieth century. As Christensen et al. (1995) explained, these were initially based on tax statistics, and followed a commodity flow method. Interest persisted in Denmark, driven partially by income tax evasion controversy and partly by competition between the manufacturing and agricultural sectors as to which was more important for the future development of Denmark. Sweden, however, was the first to begin the annual systemised production of national accounts statistics.

There is a voluminous literature on how different shocks affect the economy, in particular the relationship between fiscal policy and the current account balance, and the impact of a change in the fiscal deficit on the broader economy (Trehan & Walsh 1991, Blanchard & Giavazzi 2002, Bernanke 2005, Blanchard 2007, Vansteenkiste & Nickel 2008, as some examples). Still, much of the analysis is limited to partial or bilateral sector relationships. One downside of the analysis of partial, bilateral or broad economic impacts (for example on GDP) is that some structural interactions are often neglected. As pointed out by (Barbosa-Filho et al. 2006, 2008, Glötzl & Rezai 2017), restricting one's attention to the impact of one sector on general economic conditions or a bilateral relationship carries the risk of inconsistent or biased interpretation. A condition well demonstrated by the contradictory policy conclusions drawn between competing theories of sector deficits.

One way to ensure systemic completeness in an analysis of the broad economic sectors of the economy in to use the system of national accounts (SNA) framework identities. While most economists will be aware of the national accounts, there is relatively little attention given in the empirical literature to budget constraints across the sectors. The government ($Govt$), foreign (RoW) and private sector (Pvt) deficits are entirely and necessarily interdependent. One such fundamental accounting identity, requires that the sum of net lending (NL) of the three broad economic sectors must be zero. This means that regardless of causality, a change that is initiated in one sector will and must be reflected by changes in the remaining, counter-part, sectors.

> "Though in themselves nothing more than accounting identities, these equations carry some important implications...Although the three balances must always sum to exactly zero, no single balance is more a residual than either of the other two. Each balance has a life of its own[1]." (Godley et al. 2007)

[1] As noted by Harrison (2012), the identity is an ex-post truism, but the specific relative balances are not known in advance. He argued that the point is not just to observe the movements of these balances,

The Ricardian Equivalence Hypothesis (REH) (or what Ali Abbas et al. (2011) referred to as *Intertemporal responses*), and the Twin Deficit Hypothesis (TDH) (and in Ali Abbas et al.'s (2011) terms *Intratemporal trade*) try to include all sectors and provide us with analytical tools for understanding a variety of institutional properties. In a sense, these theories try to do what Harrison (2012) has recently recommended (see footnote above). To a large extent, however, such analyses neglect idiosyncratic, country specific circumstances. In this study we examine the link between the sector balances for three apparently similar Scandinavian countries, Denmark, Norway and Sweden, taking the weaknesses of general theories into account. All three have Nordic roots, they are all small social-democratic countries, all three have been classified as welfare states, the institutions (education, legal, health care) are strong in all three, and, more to the point of this paper, all three countries exhibit a long-standing current account surplus, or 'excess national savings'.

Despite these common features, the three countries diverge significantly with regards the composition and distribution of this 'excess national savings' between the institutional sectors of the domestic economy. We present a statistical analysis of the link between the net lending of each of the three major economic sectors. This analysis appears to support the theoretical conclusions of both the REH and TDH. Additional historical and structural information, however, provides much needed insights into the initial findings, which is confirmed through simulations of a simple model.

Our paper makes three important contributions. Firstly, we add to the growing, but limited body of recent literature to focus on financial sector balance (FSB) approach as a tool for analysis. Secondly, using data beginning in the 1970s (1950s for Sweden), we are able to perform our analysis over a long time-frame. Our paper is also the first to focus on the Scandinavian countries as a group. Thirdly, this paper highlights clear differences between the three countries, despite the fact that all three are commonly recognised as a uniform group of Scandinavian welfare states with current account surpluses.

In section 2 we provide a concise description of the Financial Sectoral Balances (FSB) approach and present empirical evidence for the three countries. In section 3 we discuss relevant literature, and in section 4 we discuss the data, methods and results of our empirical analysis. We then construct a simple three sector model in section 5 to illustrate the inter-sector flows, and some of the key characteristics of each economy. This is followed by a brief discussion in section 6 and we conclude in section 7.

2 Net Lending and Structural context

In this section we introduce the concepts of net lending (NL) and present the levels of NL for each of the three countries in our study for periods where data is available. Furthermore, we provide a brief historical context of the structures of each of the economies, highlighting several major economic developments that occurred in each. The focus is on

"The point is to identify sectors of the economy whose individual economic agents will largely be moving in concert with each other in a discernible way so that their aggregate impact creates a discernible net movement in that sector's deficit or surplus from one period to another."

the transition of each economy into one with a current account surplus, which occurred roughly in the mid-1980s for all three.

To understand the properties of NL we start with the composition of GDP:

$$GDP \equiv C + I_p + I_g + G + X - M \tag{ID.1}$$

Where C is Pvt consumption, I_p is Pvt investment, I_g is $Govt$ investment, G is $Govt$ consumption, X is exports and M is imports. By introducing transfer payments across sectors and including public investment in public consumption, G, the three sector balance can be derived as,

$$(S_p - I_p) + (NT - G) + (M - X - NIA) \equiv 0 \tag{ID.2}$$

Where S_p is Pvt savings, NT is tax payments received by $Govt$, net of transfer payments and subsidies paid by $Govt$ and NIA is the net income and current transfers received from abroad. The first bracket expresses the sector balance for Pvt, the second bracket expresses the sector balance for $Govt$, and the third bracket represents the sector balance for RoW[2]. Broadly speaking, changes in the NL position are driven by changes in either the incomes or the expendituers of the sector in question, together with changes in sector investment behaviour.

From equation ID.2, an important property for the sum of the NL across the three sectors can be seen, in that,

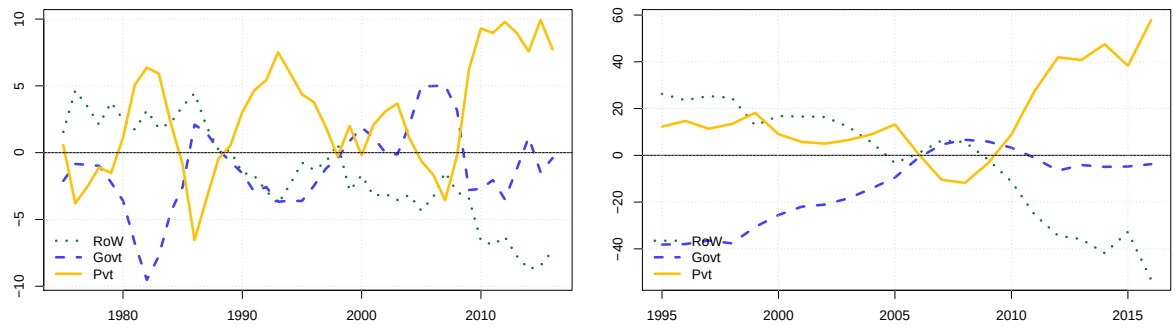
$$\sum NL = 0 \tag{ID.3}$$

This property opens up for a very interesting statistical property, which is used in the analysis in section 4.

2.1 The Three Economies

Figure 1 shows NL as well as NFW for the three main sectors for Denmark.

[2]We use the terms net lending and saving surplus as synonymous, despite the fact, that the two terms diverge from each other due to capital transfers and acquisitions less disposals of non-produced non-financial assets. These two accounts are however very small. The values for net lending and saving surplus are thus very close to one another.



(a) Net Lending (b) Net Financial Wealth

Figure 1: Net lending and net financial wealth DK as percentage of GDP

As shown above, *NL* for *Govt* was negative from 1972 to the late 1990s, with the exception of a few years of positive *NL* in the late 1980s. Brink (1983) explained that the negative *Govt NL* in the 1970s and 1980s was due to low demand for exports and financial consolidation in *Pvt*. In the years leading up to the Great Recession, *Govt* shows positive *NL* of up to 5% of GDP, clearly breaking from all former patterns of *NL* for *Govt*. In the period from 1997-2014 Denmark produced more oil and gas than consumed, which resulted in a positive net export of oil and gas. Since this production is taxable it created a large income for *Govt*. After the crisis, *NL* turned negative again, which resulted in a warning from the European commission in 2010. A part of this negative *NL* can be explained by lack of revenue from the energy trade, and settled at a net balanced level in 2014.(Autrup et al. 2015)

NL of *Pvt* has fluctuated more dramatically from a historical point of view, with negative *NL* until 1980 and again in the second half of the 1980s. Despite the negative *NL* in the second half of the 1980s, savings of *Pvt* actually rose in that period as a result of a tax reform, and credit policy reforms that came to be called the 'potato diet' (DØRS 2008, Gaard & Kieler 2005). Since 1990 however, *NL* of *Pvt* in Denmark has been almost entirely positive. The only exception being the years shortly prior to the Great Recession, where the level of investment exceeded the level of savings. A major contribution to this positive *NL* can be found in the expansion of the labour market pensions scheme as a part of a collective bargaining agreement in 1991 (Autrup et al. 2015). According to empirical results from DØRS (2008), DKK 1 of pension contributions increases the overall savings for *Pvt* by between DKK 0.80 and DKK 0.85. Thus, even though the pension contribution crowds out other savings, the overall effect on sector savings is positive. In the aftermath of the crisis, *NL* of *Pvt* remained positive in every year (at around 10% of GDP). This development is both the result of a drop in investment by households (HH) and non-financial corporations (NFC) and of an increase in savings by HH, financial corporations (FC) and NFC. (Leszczuk & Pojar 2016)

NL of *RoW* can be divided into two sub periods of time; before 1989 and after 1989. Before 1989 the Danish economy faced a current account deficit. Starting from the 1960s Denmark experienced a prolonged period of more than 25 years of current account deficit, which resulted in the accumulation of foreign denominated *Govt* debt, and an associated net foreign liability position to *RoW*. Aside from the high public debt, this

period was characterised by borrowing of *Pvt* and high inflation, which deteriorates the current account (Leszczuk & Pojar 2016). In order to boost Danish exports, the Danish krone was devalued several times between 1978 and 1982. Disinflationary policies were also used to increase international competitiveness and tax policy was used to enforce a balanced budget for *Govt*.

In 1982 the Krone was pegged to the Deutsche Mark and from 1999 to the euro. The stability following the fixed exchange rate regime, combined with low domestic demand boosted the Danish trade balance, which went into surplus in the middle of the 1980s. From the middle of the 1980s the savings of *Pvt*, as mentioned above, increased as a result of credit and tax reforms. Because of the accumulated foreign debt, and the associated interest burden, it was not until 1990 that the current account moved into positive territory. After 1990, the situation changed significantly, and *NL* of *RoW* has since remained negative for all years, except for 1999. This change was, until 2005, mainly due to improvements on the trade balance, while the current account surpluses from 2005-2015 were primarily driven by improvements in the net export of services and net transfers from abroad (income from both direct and financial investment, and wages) (Leszczuk & Pojar 2016).

Figure 1b shows NFW of the individual sectors[3]. The introduction of capital gains is beyond the scope of this paper, and is the reason for the misalignment between the cumulative result in Figure 1a and *NL* in Figure 1b. The effect of accumulated liabilities can be seen fo Denmark in terms of foreign denominated *Govt* debt leading up to the 1990s. The persistent foreign deficit, and the debt related to it, were huge problems for the Danish economy, as discussed by Godley & Zezza (1989, 1992).

According to Iversen & Larsson (2011), in the 1950s and 1960s Denmark and Sweden "to a large extent had based their post-war economic growth on imported oil and a continuously increasing demand for exported goods." They noted that the three decades to follow remained export led, but changed dramatically from relatively protected to two of the most open and internationally integrated countries in Europe, with the political economic model dubbed "coordinated-market economies". The initial post-war stage they described as state-protected and supported domestic market development. From a policy perspective, both countries followed policies with Keynesian roots, but following the OPEC oil crises of the early 1970s, both suffered from expanding *Govt* deficits, inflation and upward wage pressures.

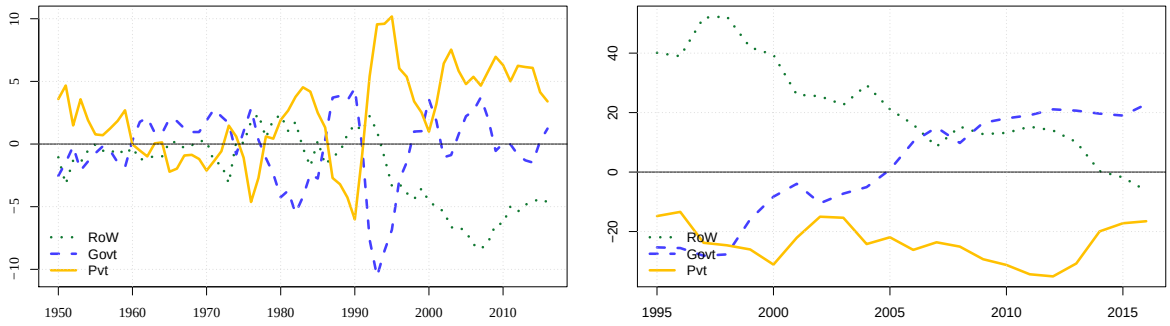
In Denmark the net financial wealth (NFW) of *Govt* was -40% of GDP in 1995. Between 1995 to 2005 the the net financial deficit was reduced to a close to neutral position, and remained fairly stable since. The NFW of *RoW* in Denmark declined continuously throughout the period, from 30% of GDP to −50% of GDP. Finally, the NFW of *Pvt* illustrates what appear to be two entirely different regimes; the first as a stead decline, between 1995 and 2007, where total NFW was negative between 2007 and 2009[4]. The

[3]It should be noted that the financial position of a single sector can be written as $V = V_{t-1} + NL + CG$, where V is the net wealth, NL is net lending, and CG is any capital gains.

[4]Data for *Pvt* lending illustrate accelerated expansion of debt leading up to 2007, in conjunction with a collapse in financial asset prices following the crisis in 2008-9. The ratio of financial assets to liabilities in *Pvt* is somewhat neutralised by the offset of sub-sector holdings against one another, specifically FC

second appears as a rapid accumulation following 2009, where the sector as a whole increased its financial NFW to 60% of GDP — a dramatic consolidation of the sector[5]

Figure 2 shows *NL* as well as NFW for the three main sectors for Sweden. *NL* is normalized by the *GDP*



(a) Net Lending (b) Net Financial Wealth

Figure 2: Net lending and net financial wealth SE as percentage of GDP

Historically, *NL* for the Swedish economy fluctuated around 0% of GDP for all three sectors from 1950 to the middle of the 1970s. For both *Pvt* and *Govt* the fluctuations increased until the first half of the 1990s, where a glut in *Pvt* credit was followed by a banking crisis, and, as noted by Englund (1999), *Govt* was forced into a bailout. Investment in *Pvt* decreased, which manifested in *Pvt* annual *NL* of 10% and *Govt NL* of −10% of GDP between 1992 and 1994.

Since the 1990s both savings and investment of *Pvt* increased strongly and seem to comove. While *NL* of *Pvt* took a small dip in the middle of the 1990s, *NL* remained positive at around 5% of GDP. Prior to the Great Recession the *NL* was still closer to zero as a result of a pro-cyclical investment behaviour of *Pvt*. At the same time however, savings increased as a result of large increases in income relative to the consumption. The crisis is difficult to identify looking at *NL* for *Pvt* where a reduction in income resulted in a small reduction in savings. Since investment had a stronger reaction to the fall in the overall economic activity, *NL* stayed at almost the same level as the year before. Since the crisis, the *NL* of *Pvt* has been positive, largely due to higher levels of savings compared to investment.

After the imbalance connected to the banking crisis in the beginning of the 1990s, *NL* of *Govt* returned closer to zero, but with two periods of surplus budget positions in the early 2000 and 2007-2008. Investment of *Govt* seems to be unaffected by business cycles, thus most changes in *NL* can be identified by changes in savings. Savings of *Govt* is often pro-cyclical, since income increases with the business cycle, while expenditures are by-and-large counter-cyclical. Periods of strong increases in the economic activity at the

holds the counterclaims of both HH and NFC, and NFC equity represents a counterclaim of many HH and FC assets.

[5]The recovery of financial asset prices following the crisis appears to have benefited *Pvt* for all three of the countries in the analysis. Denmark in particular seems to have benefited from this process, with equity prices havingh risen by 228% since 2010 — Followed closely by Norway and Sweden.

end of the 1990s and prior to the Great Recession are therefore associated with positive *NL* in *Govt*, and after the crisis the levels of savings and investment once again converged. Reflecting balanced government budget politics.

NL of *RoW* fluctuated between 5% and -5% in the period of 1975 to the end of the 1990s. Englund (1999) explained that by the mid 1980s Sweden had experienced prolonged inflation that was higher than most other countries. This, together with fixed exchange rate arrangements, resulted in steady real exchange rate appreciation and declining competitiveness of Swedish firms[6]. This jeopardised export based economic growth policies and thus was accompanied by occasional deliberate devaluations of the Swedish Krona — six after 1973. Since 2000 *NL* of *RoW* has maintained a negative annual balance of more than 5% of GDP.

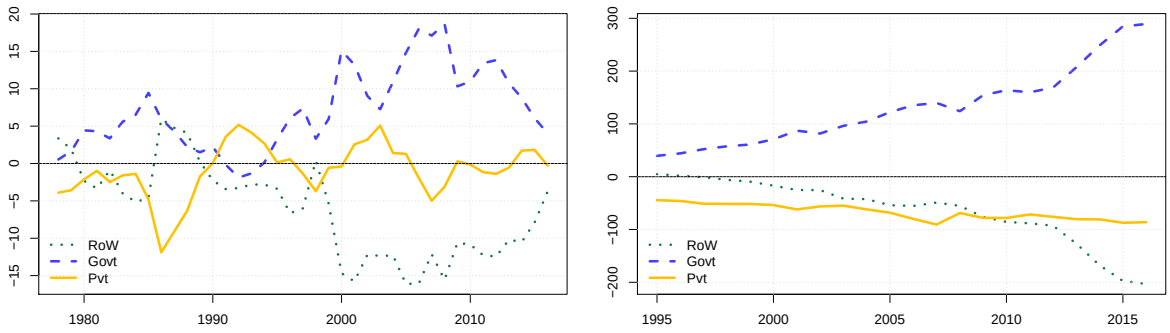
For Sweden the NFW position of *Pvt* is negative, but unlike Denmark, the position remains negative, in contrast to what might be expected from the positive *NL* balance of the sector over the entire period of 1995 to 2016[7]. The trend in the net asset position of *RoW*, however, follows the *NL* position, which is negative throughout the period. *Govt* *NL* in marginally positive, and its NFW position improves throughout, initially negative, and gradually moving to positive 20% of GDP.

Interestingly, Englund (1999) noted that using a flat rate tax deduction (though omitting progressive tax rates) on interest payments, the Swedish household sector had negative costs of borrowing from before 1960 until 1990. Iversen & Larsson (2011) and Englund (1999) both noted extensive deregulation of both the Danish and Swedish financial markets between 1980 and 1990, the last of which for Sweden included deregulation of international capital flows and the establishment of a new money market with options and derivatives. These deregulations permitted Swedish households to take advantage of the low interest rate environment. Englund (1999) explained that "an early step was the abolition of the liquidity ratios for banks in 1983. Interest ceilings were lifted in the spring of 1985, and finally the lending ceilings for banks and the placement requirements for insurance companies went away in November 1985." 1992 saw massive credit losses in the Swedish *Pvt*, associated with the deregulations that preceded. This was combined with an international economic slowdown, a European currency crisis, and a *Govt* financial crisis – followed by a reconstruction of the tax system. All of which led to the abandonment of the official fixed exchange rate system, a massive depreciation of the Swedish Krona and the start of the worst crisis in Sweden since the 1930s. Unemployment rose from 1.5% to 8.2%, together with a substantial decline in per capita GDP (adjusted for international purchasing power).

In Figure 3, *NL* as well as NFW for the three main sectors for Norway can be seen. *NL* is once again normalized by *GDP*, and it is worth noting the huge scale of Norwegain NFW, when compared with Denmark and Sweden.

[6]Both countries experienced increasing concentration of GDP in large firms. According to Iversen & Larsson (2011), the share of GDP contributed by the top ten corporations by revenue rose from 11% in 1982 to 23% in 1994, and finally to 47% in 2006 for Denmark.

[7]This negative position can be explained by closer inspection of the underlying components of the net balance sheet positions of the sub-sectors of *Pvt*. A detailed exposition of the underlying components of the net balances is beyond the scope of this paper.



(a) Net Lending (b) Net Financial Wealth

Figure 3: Net lending and net financial wealth NO as percentage of GDP

NL for the sectors of the Norwegian economy is markedly different from the Danish and Swedish cases. In contrast to Sweden and Denmark, *NL* of *Govt* does not fluctuate around zero, and has been significantly positive since 1993. With a large current account surplus and a (relatively) small positive or negative level of *NL* of *Pvt*, *Govt* thus necessarily has a large positive annual *NL* balance. Since 2010, both *RoW* and *Govt NL* have trended closer to balanced positions, but remain negative and positive on an annual basis respectively.

For Norway, the persistent current account surplus has emerged in the form of a large *Govt* owned, foreign denominated asset, the Government Pension Fund Global[8]. Up through the 1970s and 1980s the current account fluctuated between -5% and 5%, before it in 1989 for the last time was negative. The export of oil and gas can be seen as a important aspect of this transition, which can be demonstrated by looking at the history of the Norwegian oil production. In 1974 the export and oil and gas amounted to 2.4% of the total export of goods; 10 years later, in 1984, the share was increased to more than 50%, which was still the case in 2013 (Norwegian Petroleum Directorate 2013). In the latter half of the 1980s the combination of low domestic demand (lower import) and high demand abroad (not only for petroleum, but also for Norwegian goods and services) gave rise to a surplus on the current account. In 1990, the government oil fund was founded, and as noted by Davis et al. (2003), changed the state of the Norwegian economy. The large volatility in oil prices was during the 1980s appears to have had a strong influence on the Norwegian economy; high oil prices generated huge positive net exports, while low prices had the opposite effect. The low oil price since 2014 has also clearly had a negative effect on revenues and the surplus on the current account has declined notably.

As Davis et al. (2003, p. 83) explained, by investing the surplus from the oil production abroad, the rate of return was independent of the Norwegian economy and the interest and property income of the fund could be used to stabilise the economy in times with low economic activity. The decision to invest the surplus, rather than stimulating the economy immediately, was also to avoid overheating the economy and to preserve the oil revenues for future generations. Oil revenues take several forms for the Norwegian *Govt*, including oil taxes, licenses for exploration, dividends from the co-ownership of Statoil

[8]The market value of the Government Pension Fund as of the second quarter of 2017 was 8 238 billion Norwegian kroner (Norway 2017).

and interest from foreign investments. Another important change in the structure of the Norwegian economy was the choice of exchange rate regime. Accoding to Norwegian Petroleum Directorate (2013), in 1978 Norway decided to leave the *currency snake* and link the Norwegian Krone to a trade-weighted basket of currencies (Alstadheim 2016). In the first half of the 1980s, much the same as for Denmark and Sweden, several devaluations were enacted due to reduced competitiveness of Norwegian firms. In 1986 the Krone was devalued again as a result of sharp reversal from a current account surplus to a deficit. This was caused in part by lower oil prices and partly due to a surge in domestic demand together with diminishied cost competitiveness, which fueled import demand. For a brief period, from 1990 to 1992, the Krone was pegged to the ECU, before switching to a managed floating regime. (Alstadheim 2016)

As stated above, the production of oil and gas created enormous revenues for *Govt*. This revenue, together with the income from investment abroad (both financial and non-financial), boosted the income of *Govt*. In contrast, since 2000 three significant drops in *NL* can be identified: 2000-2003, 2008-2009 and 2012-2016. Investment of *Govt* seems to be quite stable, while savings is more sensitive to changes in business cycles. This means, that the fluctuations in *NL* should be explained by changes in savings (i.e. incomes and non-investment expenditures). While the first and third fall in *NL* can be explained mainly by a small decrease in income and an increase in consumption, the second fall is a reaction to the business cycle, where the Great Recession led to a drop in the income of the *Govt*.

For *Pvt* disposable income increased more than consumption for the period as a whole, which increased the propensity to save. The level of investment also increased, which caused a change in the sign of *excess savings* several times over the period. While the increase in the saving is relatively smooth, due to the strong co-movement between income and consumption, investment fluctuates is more volatile. A drop at the beginning of the 2000s is followed by a rapid increase from 2000-2013 only disconnected by a dip during the Great Recession. This rapid increase moved *NL* from 5% to -5%. After the crisis, *NL* fluctuated around zero.

From the *NL* of the institutional sectors of Norway, the expectation is for an increase in the NFW position *Govt*, an equivalent decline for *RoW*, and marginal changes for *Pvt*. This is confirmed by Figure 3, for *Govt* and *RoW*, although *Pvt* experienced a steady decline in NFW, from roughly -40% to -85% of GDP, despite having periods of positive *NL*.

3 Literature review

The sectoral financial balances analysis (*SFB*), as a tool for analysis, has received some attention in recent years, and is based on the system of national accounts (SNA). The origin of standardised system of national accounts employed today can be traced back to James Meade and Richard Stone in the UK, and to Morris A. Copeland in the USA, who contributed greatly to the establishment of the 1953 United Nations System of National Accounts. Glötzl & Rezai (2017) trace the development of the SNA back to an article

published by Meade and Stone at the Great Britain Treasury – although the inspiration can also attributed further back to Keynes and many others such as François Quesnay. As noted by (Godley & Lavoie 2012, p. 24), the initial interest of Copeland in the 1940s was to investigate the financing requirements of economic activity between and across the national sectors[9]. The SFB approach could be described as a continuation of Copeland's goals with the aid of modern technology. The work of Wynne Godley together with other key authors (Godley & Cripps 1983, Godley & Zezza 1989, 1992, Godley 1999*b*,*a*, 2004, Godley & Lavoie 2001, 2012) is recognised by many economists (Bezemer 2009, Fiebiger 2013) as the instigating factor in the re-emergence of *SFB*. In light of the relatively recent availability of comprehensive and relatively accurate data on the financial side of the economy, Godley, together with several collaborators, conducted truly pioneering work in integrating the real and financial sides of the economy in a unified macroeconomic modelling framework.

Despite the fact that the sector balances are often discussed, in relation especially to Keynesian analyses, surprisingly few empirical analyses can be found in the literature. In a recent paper, Glötzl & Rezai (2017), present an analysis that follows the work presented in Barbosa-Filho et al. (2006, 2008), where three of the main theories of the causalities behind *NL* across sectors are tested empirically: The Ricardian Equivalence Hypothesis (or rational expectations) (REH), the Twin Deficit Hypothesis (TDH) and the Keynesian Structural Gap Hypothesis (KSGH).

The REH theory, introduced by Barro (1974) and more recently reviewed by Ricciuti (2003), explains that as *Govt* borrows, households (*Hh*), and *Pvt* in general, expect that *Govt* will need to repay its debt in the future. The key assumption in this case it is that *Pvt* is able to anticipate and interpret the impact of the net borrowing of *Govt* on their current and future consumption possibilities, and respond in a rational manner by 'smoothing' inter-temporal consumption patterns. The response is therefore to save in times when *Govt* increases spends.

The Twin Deficits Hypothesis has been investigated extensively (Salvatore 2006, Kim & Roubini 2008, Giavazzi & Spaventa 2010, Kalou & Paleologou 2012, Nickel & Tudyka 2014), and in particular with respect to the US economy (Trehan & Walsh 1991, Corsetti & Müller 2008, Corsetti et al. 2012). According to this hypothesis a clear link between current account deficits and negative *NL* in *Govt* should be identified. The key mechanism is connected to a tacit assumption of fully employed domestic resources. Therefore, stimulation of domestic demand by *Govt* spending will translate directly into a decline in the current account balance since the extra income in *Pvt* will boost consumption and thereby result in a decline in domestic savings — thus driving a simultaneous 'twin deficit' in *Govt*, and the current account. The crux of which is that not only will additional *Govt* spending fail to improve the foreign balance, but will in fact deteriorate it further.

[9]Adequate data for such a presentation of the financial side of the economy only became available much later in the 1970s and 1980s, and was formalised in the System of National Accounts in 1993 (1993 SNA). These accounts were revised again in 2008, and for the European Union, a the most recent version is the European regional and sector accounts 2010 (Statistical Office of the European Communities. 2013), published in the official journal of the European Union by the Euponean Union Commission & Others (2013)

Ali Abbas et al. (2011) categorised the two theories as emerging from *Intra-temporal trade*, and *Inter-temporal responses* effects. The former describes the impact of fiscal policy on domestic demand, and thus relative purchasing power (or the real exchange rate) (TDH), and the latter describes Ricardian type inter-temporal adjustment by *Pvt* (REH). Their presentation allows for a more nuanced understanding of the effectiveness of different policies given prevailing conditions in trade and financial openness, and monetary/exchange rate regimes. The point of departure for their (Ali Abbas et al. 2011, p. 607) analysis is that "[p]revious empirical studies have generally found evidence suggesting that fiscal expansions worsen the current account." They noted that such studies can be divided into three groups, the first, causality tests and VARs. Second, "the long-term correlation between indicators of fiscal policy and external imbalances", and the third as a combination of narrative and regression analysis to examine the effects on the foreign balance. They drew a similar conclusion from a mixed method analysis, including a series of panel regressions, an analysis of large changes in fiscal and current account balances, and a quarterly structural VAR.

In Barbosa-Filho et al. (2008) and Glötzl & Rezai (2017) a third Keynesian Structural Gap Hypothesis (KSGH) is proposed. Rather than presenting a universal law for *Govt*, *Pvt* or *RoW* deficit management, KSGH suggests that external deficits, or *RoW* surplus or deficit conditions, are determined by exogenous structural factors (e.g. terms of trade, competitiveness, or the conditions in international financial markets) that can persist for extended periods of time, and are therefore largely outside of the control of the domestic economy. The theory predicts, as does the REH, negative co-movements of the *NL* of *Pvt* and *Govt*, but the logic differs. Due to the autonomy of *RoW*, it is both domestic sectors that must adjust absorb changes in foreign *NL*. In the case of a current account deficit, *Pvt* and *Govt* financial balances therefore need to adjust in order to offset the surplus position of the *RoW*.

In Barbosa-Filho et al. (2006) a graphical presentation of *NL* of the five institutional sectors for both the US (for 1947-2004), and a panel of developing countries (for 1980-2002), is used to criticise the TDH and REH. The contradictory expectations are confirmed in a statistical analysis, where they use a variance-covariance analysis of *NL* and capacity utilisation to reject the two hypotheses. In Glötzl & Rezai (2017) the analysis is carried out for 22 European countries using quarterly data from 1999 to 2013. They show, how *NL* of the single sectors behaves with regards business cycles; their results are inconclusive and generally it depends on the chosen country. In their analysis *NL* of households and financial corporations in Denmark lead the business cycle, while *NL* of non-financial corporations and *RoW* react as a response to the business cycle. *Govt* shows no evidence of either lag or lead.

In Sweden on the other hand, *NL* of *Govt* (and non-financial corporations) reacts to the business cycle, while *NL* of households leads the business cycle. In both Denmark and Sweden, net borrowing of households and non-financial corporations is pro-cyclical, while net borrowing in *Govt* is counter-cyclical. For Denmark *NL* of *RoW* is counter-cyclical and *NL* of financial corporations is pro-cyclical, neither of which show significant patterns for Sweden. In Glötzl & Rezai (2017), the REH and TDH are rejected, fully in line with the conclusion in Barbosa-Filho et al. (2006). In Semieniuk et al. (2012),

an empirical analysis of the three sector balance is used to discuss the possible outcomes of the Stability Pact program from 2011-2014, where the authors seriously question the reliability of predicted results from the European Commission. Given the predictions of the growth rates in each economy and the assumption for the financial balance for *Govt* and *RoW*, Semieniuk et al. (2012) simulate and evaluate the implicitly assumed prediction for *Pvt*.

4 Empirical Data and methods

4.1 Data

The data used in this analysis is from four sources, and has all been sourced in annual frequency. *NL* data is sourced primarily from the Eurostat database, but for Denmark it is supplemented with data from the ADAM (Annual Danish Aggregate Model) databank, which is affiliated with Statistics Denmark. This data is all normalised by dividing each entry by GDP of the country in question for each year. In this way, we were able to get annual data starting in 1950 for Sweden, 1970 for Denmark, and 1978 for Norway.

The output gap[10] data was available from the OECD database from 1985 for all three countries. The output gap is calculated by estimating the potential level of GDP and calculating the proportionate difference between potential GDP and actual GDP.[11] For robustness check, we used both OECD data from 1985, as well as our own calculations on data available from the Eurostat database and Statistics Sweden prior to 1985. In order to get our own rough measure we applied the Hodrick-Prescott (HP) filter to annual data for each country. The results of which, are very similar to those available from OECD.

The empirical analysis is comprised of two main parts. The first is a variance composition analysis, and measures how much of variation in *NL* of a particular sector can be explained by variation in each of the other sectors. The second is a business cycle covariance analysis, and takes the *NL* of each sector and compares the variations in *NL* to variations in the level of capacity utilisation of the domestic country. These two analyses are described formally below.

4.2 Statistical Properties

Following the method presented in Barbosa-Filho et al. (2006), a combination of national accounting and statistical properties can be used to provide information on *NL* behaviour across the economy; in particular, how the *NL* of different sectors co-moves. Since the

[10] The reciprocal of the output gap can also be interpreted as a very rough measure of capacity utilisation.

[11] In practice this can be achieved in numerous ways, and according to the OECD (2017), the methodology for each country can be somewhat different, but it varies between complex estimations of components of output, and simple detrending of long run output.

sum of *NL* across the different sectors is zero, the variance of this sum can be written as:

$$Var(\sum X_i) = 0 \tag{ID.4}$$

Where X_i represents *NL* of the single sector. Using the fact that,

$$\sum_i Cov(X_i, X_j) = 0 \tag{ID.5}$$

the result for a single variable can be written as,

$$Cov(X_i, X_i) = Var(X_i) = -\sum_{i \neq j} Cov(X_i, X_j) \tag{ID.6}$$

The variance in X_i is therefore equal to the negative sum of the covariances between X_i and the other variables. This property can be used to investigate the decomposition of a change in *NL* in one sector on *NL* of other sectors.

This can be extended to test the behaviour of *NL* of a single sector relative to the business cycles. The business cycle is represented by the output gap, as discussed in the section on data above.

$$\sum_i Cov(X_i, Y) = 0 \tag{ID.7}$$

Where Y represents the business cycle, while X_i is *NL* of the single sector. If the covariance between *NL* in a sector and the output gap is positive, *NL* of the sector is counter-cyclical, while a negative covariance can be interpreted as pro-cyclical *NL* behaviour.

In this second part of this analysis, we conduct a test for possible lagged or leading covariation between *NL* of individual sectors and the business cycle. The implication is that changes in *NL* of a sector might provide some information regarding general behaviour within the sector relative to economic expansions and contractions.

4.3 Results

In this section we present a descriptive analysis of our results from the two statistical analyses described above.

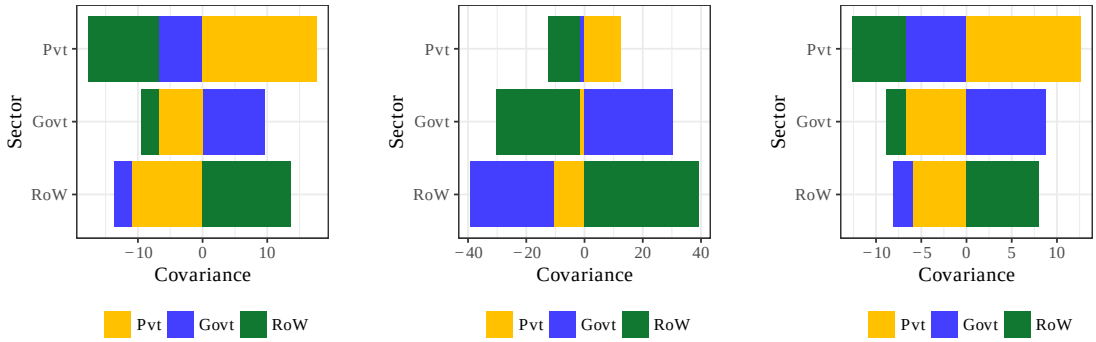
4.3.1 The composition of net lending

For each sector the variance in *NL* can be decomposed into its covariance[12] with *NL* of the other sectors, which can be seen in Figure 4 below.[13] In order to simplify the discussion,

[12]Due to the inability to statistically test covariance, all covariances have been converted to correlation coefficients, and tested for statistical significance. The results can be found in the appendix.

[13]For Robustness check, results based on pre-1985 dataset and post-1985 dataset can be found in the appendix. The conclusions drawn from these results are the same as presented for the dataset of the full sample.

we will simply refer to whether a sector is positively related to or negatively related to another sector, whereby we mean more specifically, that *NL* in that sector is related to *NL* of the second sector.



(a) DK (b) NO (c) SE

Figure 4: Sector covariance

In case of Denmark, the analysis shows that *RoW* co-varies negatively with *Pvt* and *Govt*. This means, that an increase in *NL* of *RoW* is linked to decreases in *NL* in both *Pvt* and *Govt*. The effect seems to be largest in *Pvt*, while the changes in *RoW* are associated with a minor (and insignificant) negative changes in *Govt*[14]. *Pvt* has a strong negative covariance with both *Govt* and *RoW*. An increase in *Pvt* is therefore associated with a fall in both *Govt* and *RoW*. Finally there is a negative covariance between a change in *RoW* and in both *Govt* and *Pvt*. The analysis is muted on causality, and thus the result could be interpreted from the perspectives of both the REH and KSGH — where a negative change in *Pvt* would be expected to be associated with a positive change in *Govt*.

The data for Norway reads a very different story due to negative covariances between *RoW* and both *Govt* and *Pvt*. A positive change in *NL* for *RoW* is therefore associated with a negative change in both *Govt* and *Pvt*. For *Pvt* there is a negative covariance with both *RoW* as stated above and *Govt*[15]. A positive change in *Pvt* is therefore associated with a negative change in *RoW* and *Govt*. The Norwegian case could be interpreted on face-value to support the TDH, where one would expect strong positive negative correlation between the balances *RoW* and *Govt*.

The analysis for Sweden tells a similar story to that for Denmark, but with more compelling evidence for a relationship between *RoW* and *Govt*. Again there is negative covariance between *RoW* and both *Govt* and *Pvt*. Thus, a positive change in *RoW* comes with a negative change in *Govt* and *Pvt*. Looking at *Govt*, the covariance with *RoW* is negative as stated above. The covariance between *Govt* and *Pvt* is also negative, which has the consequence that a negative change in *Govt* is associated with a positive change in *Pvt*. The Swedish case thus provides some support for both the REH and TDH.

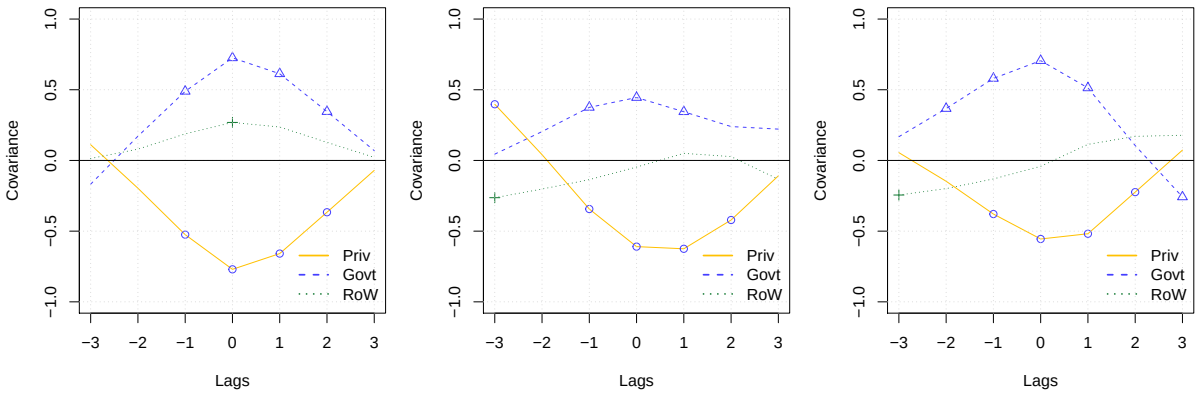
[14]The correlation coefficient between *NL* in *Govt* and *RoW* has a p-value of 0.13, and is therefore not significant at a 10% level of significance.

[15]This value is small, and the correlation coefficient has a p-value of 0.54, which is well outside of any normal limits.

4.3.2 Business cycle covariance of sectors

This analysis illustrates the covariance between the sector in question and the level of the output gap (OG) on an annual basis, for three lagged and three leading years. This analysis allows us to find the sign of the covariance between NL in a single sector and the OG, in order to say something about the behaviour over the business cycles. It also lets us see if a positive or negative net position for the sector in question leads or lags the business cycle, where position 0 indicates a concurrent movement between sector net position and the OG.

The results of this three-sector business cycle covariance test are illustrated in Figure 5 below.[16]



(a) DK (b) NO (c) SE

Figure 5: Sector correlations with the business cycle

These results provide some useful information, despite the fact that the test for lags or leads do not show any clear patterns[17]. All three countries have negative covariance between Pvt and OG. This indicates that an a positive OG is associated with negative NL, which can be interpret as pro-cyclical NL behaviour (the sector thus net-borrows as capacity utilisation rises). NL of $Govt$ is positively related with the OG, so that an increase in the OG is associated with positive NL. This can be interpret as counter-cyclical NL behaviour (or stabilisation borrowing and spending by $Govt$ during downturns, and vice versa for expansionary periods), as it dampens the business cycle. For RoW no clear story can be told, since the correlation values are mostly insignificant and the sign depends strongly on the chosen number of lags.

The relevance of this analysis is to shed light on the likely behaviours of the sectors at different points of the business cycle. For example, if $Govt$ is likely to spend (and borrow) counter-cyclically, and Pvt pro-cyclically, then a negative correlation between

[16] For Robustness check, results based on pre-1985 dataset and post-1985 dataset can be found in the appendix. The conclusions drawn from these results are the same as presented for the dataset of the full sample.

[17] A table of the results from this test, along with the graphical presentation of the covariances can be seen in in the appendix. Glötzl & Rezai (2017) find some evidence for leads and lags using quarterly data, but the results are country specific.

Pvt and *Govt* may exist in the absence of any rational expectations. The obscurity of the relationship between *RoW* and *OG* may also cause us to question the notion that expansions in aggregate demand necessarily lead to an increase in imports, as the TDH would have us believe. Equally, the counter-cyclical spending of *Govt* may have nothing to do with intentions, and could simply be the result of pro-cyclical changes in the level of tax income in conjunction with sticky expenditures. To help grasp some of these potential dependencies we construct a simple model that incorporates the three sectors, while satisfying the *NL* identity in Equation $ID.2$.

5 Model

Up to this point we have presented some contextual information for each of the economies, together with a brief analysis of the interactions between *NL* balances, and between *NL* and *OG*. In this section we set up a very basic Keynesian income-expenditure model with fixed prices based on the three-sector balances presented earlier. After which we will discuss similarities and differences between the countries based on the theoretical foundation offered in the TDH, the REH and KSGH.

5.1 Structure

The model is based on the Keynesian focus on injections and leakages, where all the injections for simplicity are kept exogenous, while all the leakages are endogenous and depended on economic activity. Despite its simplicity, this setup allows us to look at the effects of the relevant shocks to the three economies presented above. On the basis of the business cycle covariance test above, it is proposed that the *NL* behaviour of *Govt* is counter-cyclical, while the *NL* behaviour of *Pvt* is pro-cyclical.

The model is structured in 14 equations, where a number of them are accounting identities[18]. The disposable income of the *Pvt* is determined as the income after tax plus income on wealth. Consumption in *Pvt* is determined following a standard Keynesian consumption function, where disposable income and the net wealth from the previous period determine consumption. Disposable income minus consumption determine savings in *Pvt*. Taxes are calculated as a constant part of GDP. As mentioned in section 2, we look at the net taxes after transfers between the two domestic sectors. Imports are a function of domestic economic activity, while exports depend positively on the real exchange rate.

The last six equations are accounting identities. The *NL* the three sectors depends on excess savings for *Pvt*, and on the differences between income and expenditures for *Govt* and *RoW*, where interest income/expenditures are accounted for separately from other incomes/expenditures. The stock of wealth for each sector is calculated as the stock at the end of the previous period plus *NL* in the current period.

[18]The structure for the entire model can be seen in the appendix

5.1.1 Simulations

This simple model is simulated in order to achieve a baseline model, from which we investigated the effect of changing parameter values. The initial values for the model are chosen according to proportional values to be found in the data for the countries. Since all three countries had a current account surplus, this is also reflected in the baseline-scenario. *NL* for *Pvt* and *Govt* is calibrated in order to reflect the actually situation in Denmark and Sweden after the crisis: large negative *NL* in *RoW*, small negative *NL* in *Govt* and a large positive *NL* in *Pvt*. Furthermore, the baseline-scenario respects the results achieved in the analysis of the composition of co-variance of *NL* amongst the sectors. We thus constructed a simple baseline scenario from which we could explore the effects on net lending of a change in a number of economic structural conditions (for example the scale of exports relative to GDP, the marginal propensity to import or the relative levels of *Govt* spending and taxes).

In the empirical part of the paper some differences between the three countries can be identified. The question we want to ask in this part of the paper is: Given the post crisis general structure of the economies, and a very simple structural economic model, can we explain the interactions between the sectors through simple accounting identities. In order to investigate this, we perform at number of shocks to the model reflecting differences between the economies and observe the impact on the *NL* balances for the three sectors through the process.

A glance at the net-income in *Govt* reveals, that the income is much higher in Norway compared to the other economies, mainly due to the tax-income from the oil production. An increase in the tax rate in this model represents a redistribution towards *Govt*, which in this model has a positive effect on *NL* in *Govt*, while it has a negative effect on *NL* in both *Pvt* and *RoW*. This result is achieved, because the increase in tax rate reduces the disposable income of the domestic economy, which reduces domestic demand from both consumption and imports, via a decrease in GDP.

Another difference between Norway on one side and Sweden and Denmark on the other side is the scale of imports as a share of GDP, again largely as a result of the scale of exports in GDP. In Norway the share is significantly lower than in the two other countries. A reduction in the import share increases GDP (through higher demand for domestic goods), while the demand for foreign goods decreases. As a result, *NL* of both domestic sectors is affected positively, while the effect on *NL* in *RoW* is negative.

The combination of higher tax rate and lower import share results in a situation, where *NL* of *RoW* persistently grows more and more negative, while *NL* in *Govt* becomes more and more positive, while *NL* in *Pvt* is stable close to 0. Which is much the same as can be seen in the charts for Norway in section 2.

In the table we compare the results from the simulation with the baseline scenario and look at the sign of the covariances between *NL* in the three sectors.

Shock	NLG	NLROW	NRP
$Tax_{rate} \Uparrow$	+	-	-
$Import_{rate} \Downarrow$	+	-	+
$G \Uparrow$	-	+	+
$E \Uparrow$	+	-	+

An second use for this simple model is to discuss the reasons for the present foreign surplus positions suggested for the individual countries in section 2. Brink (1983) argued that the combination of *Pvt* consolidation and low demand from *RoW* in the 1980s were the main reasons behind the accumulation of *Govt* Debt in Denmark. This argument can quite easily be tested within this framework, by lowering both the propensity to consume and the level of exports. The result of the shock reflects the outcomes described in Brink's argument. Unsurprisingly in the Keynesian model, a fall in propensity to consume has a negative impact on the aggregated demand mainly through the consumption channel, while the decrease in the demand from abroad decreases exports. The aggregate effect of these shocks is a negative effect on aggregate demand in the economy and thereby an improvement of *NL* for *RoW*, while *NL* for *Pvt* falls mildly, and *NL* for *Govt* deteriorates strongly. The *NL* positions of both *Govt* and *RoW* in this case were subject to simultaneous deterioration in the absence of any public policy or full employment conditions. It could rather be described as driven by imbalances generated in *Pvt*.

A second key feature to be identified is that both Denmark and Norway went from persistent current account deficits to current account surplus positions around 1990. In section 2, some arguments for this transition included exchange rate devaluations, an increase in exports (because of increases in both quantity the price of oil sold) and a fall in interest rates on largely foreign denominated debt. The increase in exports increases aggregate demand directly. The simultaneous decrease in the interest and exchange rates eases the debt burden on the indebted *Govt*. Combining these three changes at the same time in this model has a negative effect on *NL* for *RoW* (improvement in the current account), while the effect on *NL* of both *Pvt* and *Govt* is positive. In this case, an appreciation of the net positions of *Pvt* and *Govt* as a result of an imbalance generated in *RoW*.

Finally, the effects of different changes on the NFW position for the single sectors can also be analysed within the model[19]. The shock to the economy suggested above, not only improves the current account and *NL* on the two domestically sectors, but also improves NFW of these two sectors, while NFW for the *RoW* deteriorates. When NFW for a sector deteriorates, the debt-burden of that sector accumulates, which contributes an automatic a bias to *NL*. During the 1980s for example, a significant surplus on the Danish trade balance was needed in order achieve a current account surplus, due to significant net transfers to *RoW*. A look at NFW for Denmark and Norway suggests that even with a deficit on the trade balance these two countries are likely to run a current account surplus, while the situation in Sweden differs.

[19] As stated earlier due to simplicity, we ignore capital gains in this paper.

6 Discussion

In this section the empirical results from section 4, with reference to the theoretical foundation provided in section 3. At first glance there seems to be empirical evidence for all of the three theories - REH, TDH and the KSGH.

The TDH seems to explain the results presented in section 4 for Sweden and Norway since both *Govt* and the current account are in surplus. While the result is less clear for Sweden, Norway seems to be a prime example of the TDH – the fiscal surplus in *Govt* dampened consumption of *Pvt*, which increased the level of national savings more than the level of national investment and thereby created an improvement of the current account. According to Vansteenkiste & Nickel (2008), this could lead to the conclusion that *Pvt* agents in Norway and Sweden are 'Keynesian', but this can be questioned by the fact that *NL* of *Pvt* in Sweden shows evidence of 'Ricardian' behaviour, when it comes to the relationship between *Govt* and *Pvt*.

As discussed in section 4, the evidence of negative covariance between *NL* in *Govt* and *RoW* does not shed any light on causality. In the TDH it is assumed, that the actions taken by *Govt* lead to a change in *RoW*. According to the KSGH the causality runs in the opposite direction; the behaviour of *RoW* sets the framework for the domestic economy. In the KSGH, an external imbalance could be caused by structural conditions, for example, as a result of specific resources of a country. A closer inspection of Norway reveals precisely such specific natural resources in the form of oil and gas. In the period from 2000 to 2012 the petroleum sector accounted for around 50% of total Norwegian exports, while it generated around 30% of total *Govt* revenues through taxes. Both shares have fallen from 2012 to 2016. The production of petroleum clearly provides Norway with a comparative advantage, or excess competitiveness, to use the terminology from Barbosa-Filho et al. (2006). This excess competitiveness is likely to result in negative *NL* for *RoW*[20]. This current account surplus affects the *NL* of *Govt* and *Pvt*. As indicated above, the export of oil generates, through special petroleum taxes, an extra revenue for *Govt*, and in turn, the large Norwegian oil fund is owned by *Govt* and invested offshore, and therefore creates a significant property income flows from *RoW* to *Govt*. A clear negative correlation between *NL* in *RoW* and *Govt* can therefore be identified, but not for the reasons suggested in the TDH.

In section 4 it was also discussed that the negative correlation in *NL* between *Govt* and *Pvt* could be associated with both the REH and the KSGH. In order to accept the REH it is required that one accepts consumption smoothing and rational expectations; if *Govt* increases its negative *NL* (I.e. deficit spends), *Pvt* expects this to be financed through a reversal of this position a some later date, and should therefore increase savings in the short run. This position assumes deliberate actions as a result of accurate appraisal of government finances by *Pvt* as a collective. The results from the analysis propose pro-cyclical *NL* behaviour of the *Pvt* with respect to the output gap; that is, a positive output gap is expected to decrease the level of *NL* (or increase net borrowing) behaviour of *Pvt*. According to Knudsen (2017), this feature of pro-cyclical borrowing is present in the Danish *Pvt* over the period 1970 to 2015. *Pvt* investments fluctuate with business

[20] Or at least to a decrease in *NL* of *RoW*.

cycles, and increases in output are associated with increases in investment. *Pvt* savings on the other hand tends to move in the opposite direction of investment, and are generally higher in periods of low economic activity. *Govt* savings, on the contrary, normally move in the opposite direction to *Pvt* savings. This can largely be explained by the lower tax income and high transfers to (e.g. unemployment benefits) *Pvt* in periods of low economic activity. *Govt* investment however, seems to be roughly neutral to the business cycle. Overall, domestic investment is therefore pro-cyclical, while domestic savings is driven by two opposing forces. *NL* appears to illustrate the same patterns.

Since none of the suggested theories seems to be able to explain the sector balances in all three countries, we developed a small simple model with the propose of investigating the effects of the differences in structure between the three countries. To explain the situation in the three economies for the last 25 years *NL* of the *RoW* is restricted to be in deficit (current account surplus); both due to deficit on the trade balance and due to net interest flows to the domestic economy. The results from the simulations suggest, that the differences in the distribution of the excess national savings between the countries are due to differences in the structures. In Norway, for example, the net income of *Govt* is proportionately higher in Norway than in Denmark and Sweden. This simple structural difference redistributes from the *Pvt* to the *Govt*, which increases the income of *Govt* and thereby *NL* of *Govt* at the expense of *Pvt*. At the same time, the propensity to import out of GDP is significantly lower in Norway compared to Denmark and Sweden. Shocking the baseline-scenario in the model by changing these two parameters creates a scenario reflecting the actual situation in the Norwegian economy. The model can also be use to reproduce the historical development in *NL* in the three countries. According to Brink (1983) consolidation in *Pvt* and low economic activity in the *RoW* led to a negative *NL* (and debt accumulation) for the *Govt* in the 1970s and 1980s. Both the three sector balance and our simple model help to explain why this must be the case: when *NL* in the *RoW* and *Pvt* improve, the fundamental accounting identity forces *NL* of the *Govt* to deteriorate. This result is also supported by the simulation results in the model.

The fundamental dynamics of the model, where *NL* of *Pvt* reacts pro-cyclically to changes in the economic activity, and *NL* of *Govt* reacts counter-cyclically to changes in the economic activity is supported by the results from the statistical analysis in section 4. Despite its simplicity, the model actually seems to provide usefull information about why differences in the distribution of the excess national saving can be found across the three countries.

7 Conclusion

A common perception is that Denmark, Norway and Sweden, as Scandinavian welfare states, can be treated as a single country type. While there are some obvious geographical, cultural and administrative similarities, the three countries may not be as analogous as expected. In this paper we have looked at the three countries from the perspective of the three sector balances approach used by Wynne Godley among others. For at least the last 25 years all three countries can be characterized as small open economies with a

current account surplus. Despite this common feature, the three countries diverge with regards the distribution of this 'excess national savings' between the institutional sectors of the domestic economy. In the case of Norway *NL* of *Govt* is persistently in surplus, while *NL* of *Pvt* fluctuates around zero. In Sweden and Denmark the situation is another, since *NL* of the *Govt* fluctuates around zero, while *NL* of the *Pvt* is positive. Despite seemingly identical the result for the two countries, they differ from a historical point of view. The current extreme surplus of *Pvt* in the Danish economy seems to be have been stimulated by economic policies following the Great Recession, whereas the drivers of surplus in Sweden and Norway can be traced back to the 1990s.

Three theories are used to explain the causalities between the behaviour of the different sectors: REH, TDH and the KSGH. In the case of the three countries in this paper, none of the three theories seems to be able to explain the differences across countries. For Norway and Sweden on the one hand negatively covariances between *NL* of *Govt* and *RoW* can be found, which support both TDH and the KSGH. For Denmark and Sweden on the other hand negatively covariances between *NL* in *Govt* and *Pvt* can be found, which support both REH and the KSGH. In the second part of the statistical analysis we looked at how *NL* of individual sectors co-move with business cycles. *NL* for *Pvt* acts pro-cyclically for all three countries, while *NL* for *Govt* acts counter-cyclically for all three countries. The results for *NL* for *RoW* were not robust across the countries, suggesting the absence of a relationship.

To investigate the question about the differences between the countries further, we developed a very simple Keynesian Income-Expenditure model, which integrated some of the empirical facts highlighted in both the descriptive part of the paper and the statistical analysis. Despite its simplicity, usefull information about the potential causes of divergence in the distribution of 'excess national savings' were presented for each of the three countries, each of which appear to exlpain both the annual and cummulative financial positions of the three sectors for all three countries. While the countries seem very similar, there are major structural differences between them when it comes to, for example, propensity to import and *Govt* net income after tax. Furthermore when it comes to the shift from current account deficit to current account surplus, shocking the model by using the arguments suggested in section 2 actually change the position of the domestic economy towards *RoW*; creating a shift between current account deficit and current account surplus. Thus re-creating dynamics observed in reality.

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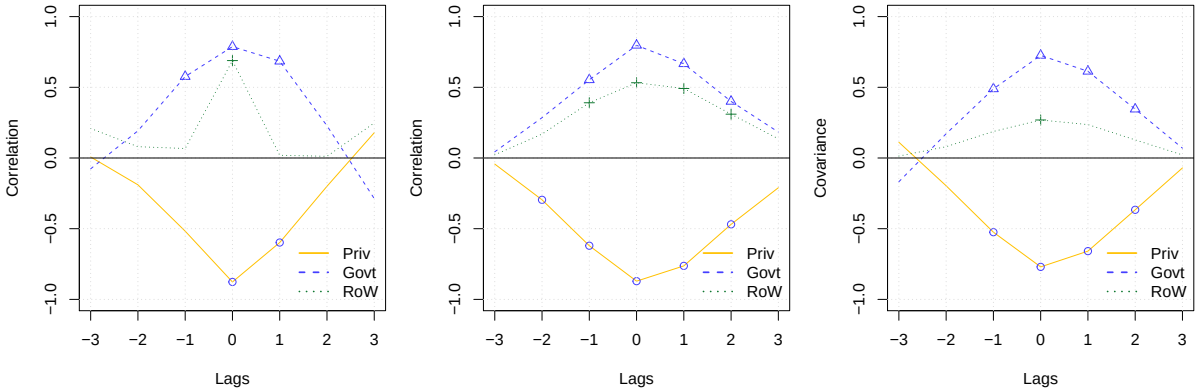
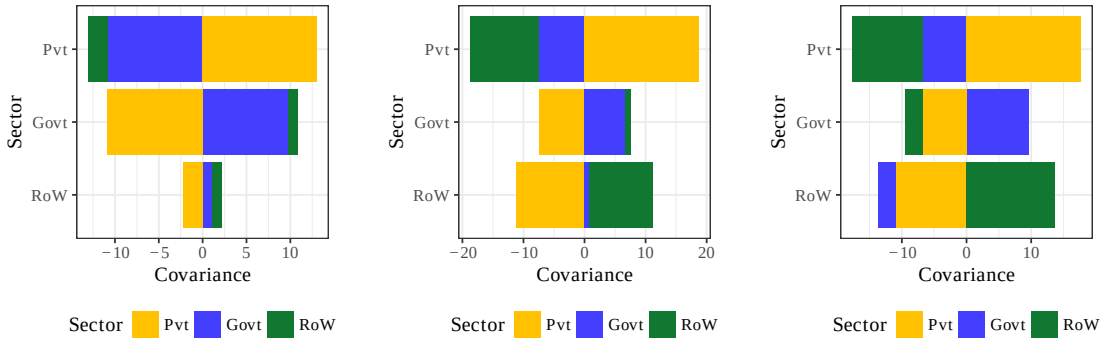
Appendix A Robustness checks

A.1 Denmark



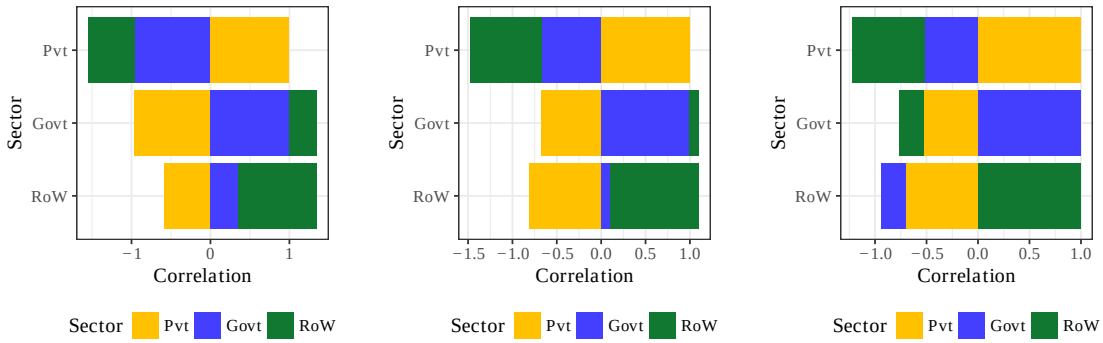
(a) Pre1985 (b) Post1985 (c) Pre1985

Figure 6: Sector correlations for DK



(a) Pre1985 (b) Post1985 (c) Long

Figure 7: Covariance composition: DK



(a) Pre1985 (b) Post1985 (c) Long

Figure 8: Correlation composition: DK

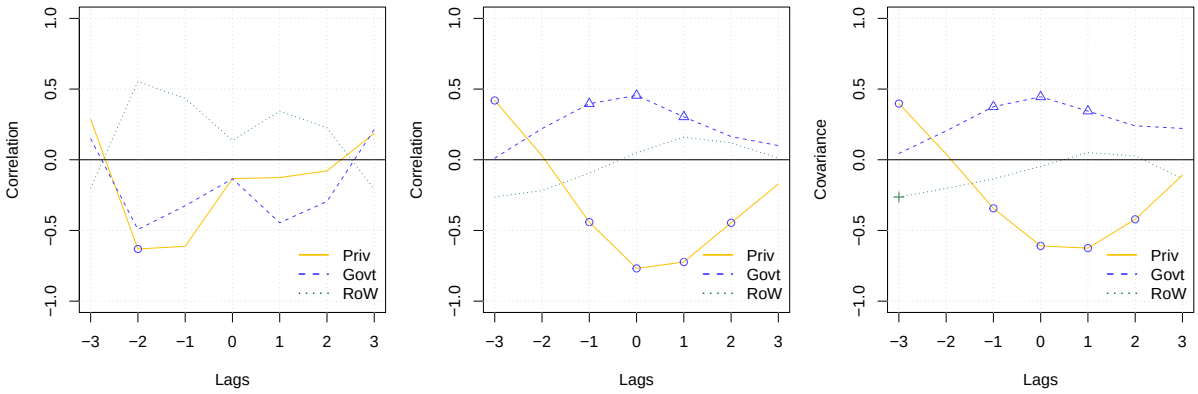
	Pvt	Govt	RoW
-3	0.11	-0.17	0.01
-2	-0.20	0.17	0.08
-1	-0.52 ***	0.49 ***	0.19
0	-0.77 ***	0.73 ***	0.27 *
1	-0.66 ***	0.61 ***	0.24
2	-0.37 **	0.35 **	0.13
3	-0.07	0.07	0.02

Table 1: DK:Long CCF

	RoW	Govt	Pvt	OGap
RoW		-0.24	-0.70 ***	0.27 *
Govt	-0.24		-0.52 ***	0.73 ***
Pvt	-0.70 ***	-0.52 ***		-0.77 ***
OGap	0.27 *	0.73 ***	-0.77 ***	

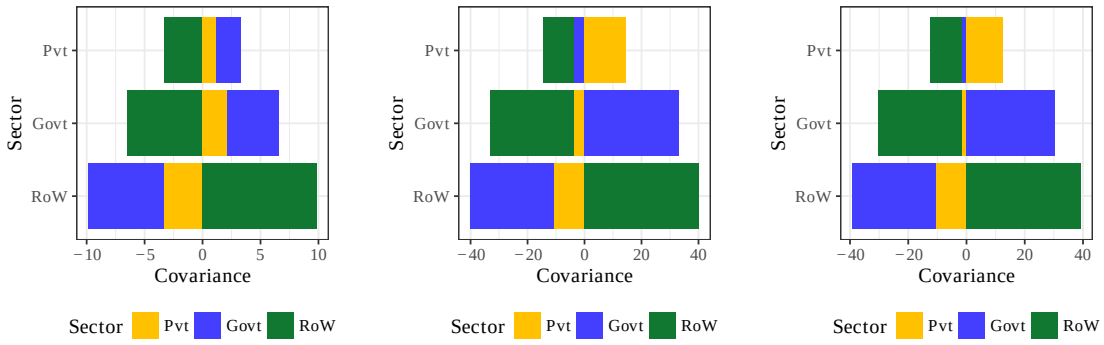
Table 2: DK: Long RCORR

A.2 Norway



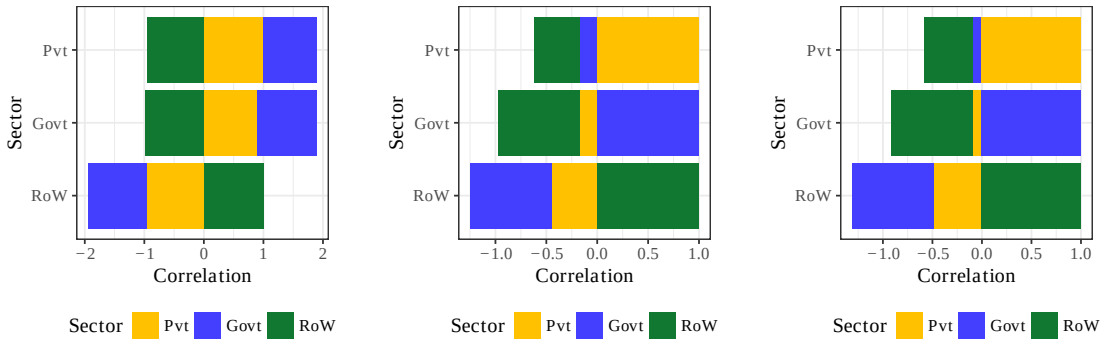
(a) Pre1985 (b) Post1985 (c) Long

Figure 9: Sector correlations for NO



(a) Pre1985 (b) Post1985 (c) Long

Figure 10: Covariance composition: NO



(a) Pre1985 (b) Post1985 (c) Long

Figure 11: Correlation composition: NO

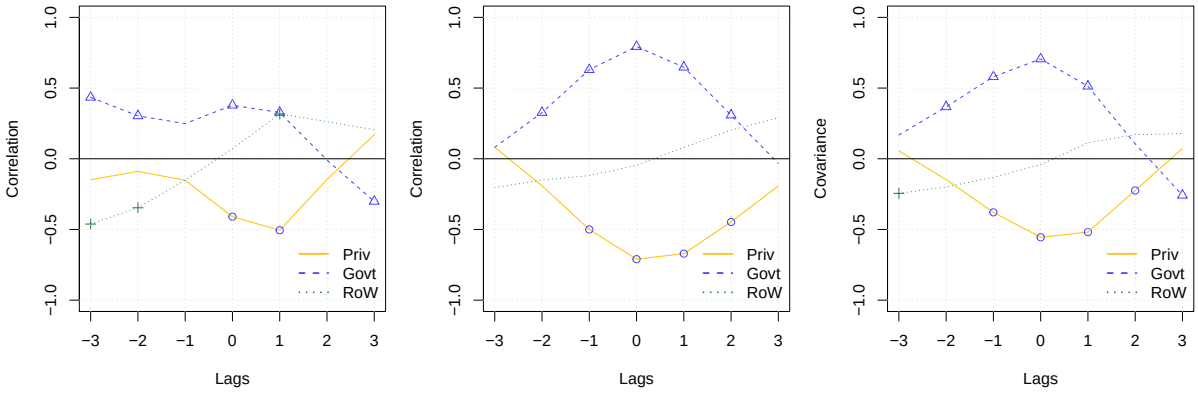
	Pvt	Govt	RoW
-3	0.40 **	0.04	-0.26 *
-2	0.04	0.20	-0.20
-1	-0.34 **	0.38 **	-0.14
0	-0.61 ***	0.45 ***	-0.05
1	-0.62 ***	0.34 **	0.05
2	-0.42 ***	0.24	0.03
3	-0.11	0.22	-0.13

Table 3: NO:Long CCF

	RoW	Govt	Pvt	OGap
RoW		-0.83 ***	-0.48 ***	-0.05
Govt	-0.83 ***		-0.09	0.45 ***
Pvt	-0.48 ***	-0.09		-0.61 ***
OGap	-0.05	0.45 ***	-0.61 ***	

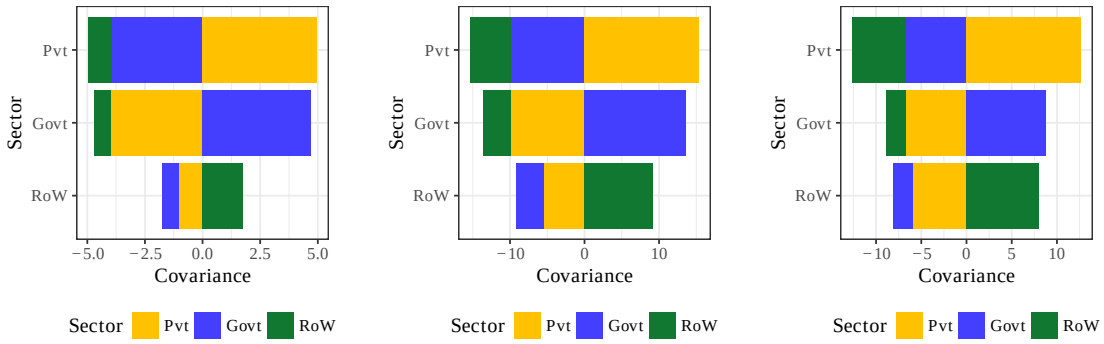
Table 4: NO:Long RCORR

A.3 Sweden



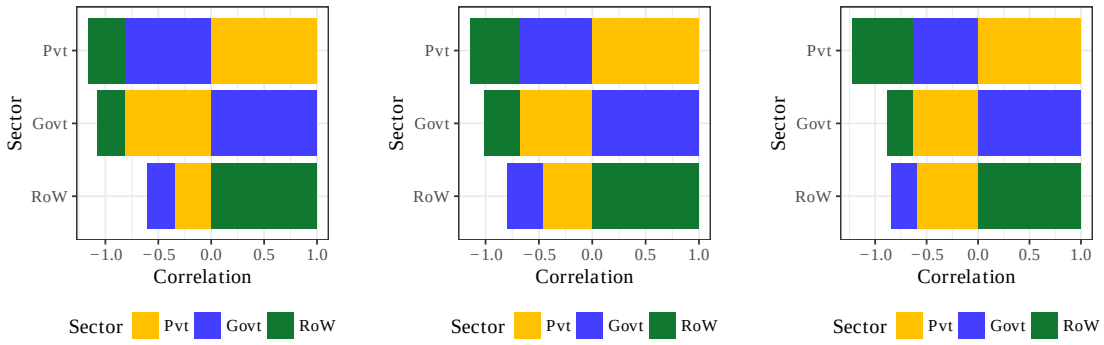
(a) Pre1985 (b) Post1985 (c) Long

Figure 12: Sector correlations for SE



(a) Pre1985 (b) Post1985 (c) Long

Figure 13: Covariance composition: SE



(a) Pre1985 (b) Post1985 (c) Long

Figure 14: Correlation composition: SE

	Pvt	Govt	RoW
-3	0.06	0.17	-0.24 **
-2	-0.15	0.37 ***	-0.20
-1	-0.38 ***	0.58 ***	-0.13
0	-0.56 ***	0.71 ***	-0.04
1	-0.52 ***	0.51 ***	0.11
2	-0.22 *	0.11	0.17
3	0.07	-0.26 **	0.18

Table 5: SE:Long CCF

	RoW	Govt	Pvt	OGap
RoW		-0.25 **	-0.59 ***	-0.04
Govt	-0.25 **		-0.63 ***	0.71 ***
Pvt	-0.59 ***	-0.63 ***		-0.56 ***
OGap	-0.04	0.71 ***	-0.56 ***	

Table 6: SE: Long RCORR

A.4 Model Structure

$$Y = C + I + G + X - M \tag{1}$$

$$YD = (1 - t) * Y + i * W_{pvt} \tag{2}$$

$$C = \alpha_0 * YD + \alpha_1 * W_{pvt,t-1} \tag{3}$$

$$S = YD - C \tag{4}$$

$$T = t * Y \tag{5}$$

$$M = m * Y \tag{6}$$

$$X = X_0 * e \tag{7}$$

$$e = \frac{E * Pf}{P} \tag{8}$$

$$NL_{pvt} = S - I \tag{9}$$

$$NL_{govt} = T - G + i * W_{govt} \tag{10}$$

$$NL_{row} = M - X + i * W_{row} \tag{11}$$

$$W_{prv} = W_{pvt,t-1} + NL_{pvt} \tag{12}$$

$$W_{govt} = W_{govt,t-1} + NL_{govt} \tag{13}$$

$$W_{row} = W_{row,t-1} + NL_{row} \tag{14}$$

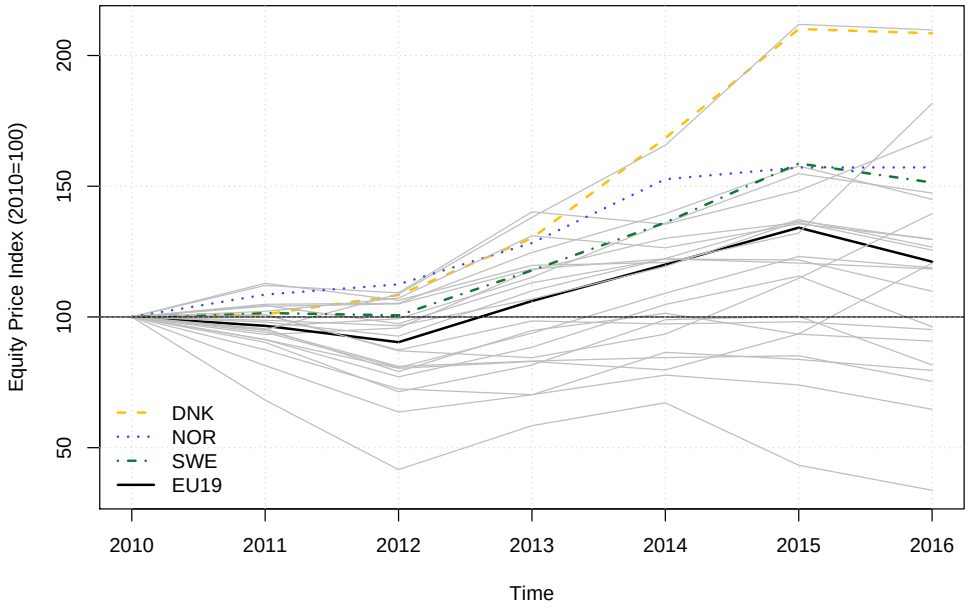


Figure 15: Equity price indices